

G06T

IMAGE DATA PROCESSING OR GENERATION, IN GENERAL

Definition statement

This place covers:

- Processor architectures or memory management for general purpose image data processing
- Geometric image transformations
- Image enhancement or restoration
- Image analysis
- Image coding
- Two-dimensional image generation
- Animation
- Three-dimensional image rendering
- Three-dimensional modelling for computer graphics
- Manipulating three-dimensional models or images for computer graphics

Relationships with other classification places

[G06T](#) is the functional place for image data processing or generation. Image data processing or generation specially adapted for a particular application is classified in the relevant subclass. Documents which merely mention the general use of image processing or generation without detailing of the underlying details of such, are classified in the application place. Where the essential technical characteristics of an invention relate both to the image processing or generation and to its particular use or special adaptation, classification is made in both [G06T](#) and the application place.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Apparatus for radiation diagnosis	A61B 6/00
Aspects of games using an electronically generated display having two or more dimensions	A63F 13/00
Measuring, by optical means, length, thickness or similar linear dimensions, angles, areas, irregularities of surfaces or contours	G01B 11/00
Reading or recognising printed or written characters or recognising patterns, e.g. fingerprints	G06F 18/00 , G06V
Coding, decoding or code conversion	H03M 13/00
Pictorial communication, television systems	H04N 1/00 - H04N 21/00

Special rules of classification

Symbols under [G06T 1/00](#) - [G06T 19/20](#) may only be allocated as invention information.

Whenever possible, additional information should be classified using one or more of the Indexing Codes from the range of [G06T](#).

The indexing codes under [G06T 2200/00](#) - [G06T 2219/2024](#) may only be allocated to documents to which a symbol under [G06T 1/00](#) - [G06T 19/20](#) is allocated as invention information as well.

Special rules of classification

The following list of symbols from the series [G06T 2200/00](#) are for allocation to documents within the whole range of [G06T](#) except [G06T 9/00](#):

G06T 2200/00	Indexing scheme for image data processing or generation, in general - Not used for classification
G06T 2200/04	involving 3D image data - processing of 3D image data, i.e. voxels; relevant for G06T 3/00 , G06T 5/00 , G06T 7/00 or G06T 11/00
G06T 2200/08	involving all processing steps from image acquisition to 3D model generation - complete systems from acquisition to modelling
G06T 2200/12	involving antialiasing - dejagging, staircase effect
G06T 2200/16	involving adaptation to the client's capabilities - adapting the colour or resolution of an image to the client's capabilities
G06T 2200/21	involving computational photography
G06T 2200/24	involving graphical user interfaces [GUIs]
G06T 2200/28	involving image processing hardware - relevant for groups not directly related to hardware; not used in G06T 1/20 , G06T 1/60 , G06T 15/005
G06T 2200/32	involving image mosaicing - image mosaicing, panoramic images
G06T 2200/36	Review paper; Tutorial; Survey - basic documents describing the state of the art.

There are further series of symbols for [G06T](#) whose use is reserved to particular maingroups or ranges of maingroups and whose full list and description are given in the FCRs of the respective maingroups:

[G06T 2201/00](#) for [G06T 1/0021](#) only

[G06T 2207/00](#) for [G06T 5/00](#) and [G06T 7/00](#) only

[G06T 2219/00](#) for [G06T 9/00](#) only

[G06T 2210/00](#) for [G06T 11/00](#) - [G06T 19/00](#) only; see list below

[G06T 2211/40](#) for [G06T 11/003](#) only

[G06T 2213/00](#) for [G06T 13/00](#) only;

[G06T 2215/00](#) for [G06T 15/00](#) only;

[G06T 2219/00](#) for [G06T 19/00](#) only;

[G06T 2219/20](#) for [G06T 19/20](#) only

Symbols from the series [G06T 2210/00](#) for allocation in the range of [G06T 11/00](#) - [G06T 19/00](#) only:

G06T 2210/00	Indexing scheme for image generation or computer graphics - Not used for classification
G06T 2210/04	architectural design, interior design - interior/garden/facade design, architectural layout plans
G06T 2210/08	bandwidth reduction
G06T 2210/12	bounding box - convex hull for polygons or 3D objects
G06T 2210/16	cloth - animation, rendering or modeling of cloth/garment/textile, virtual dressing rooms

G06T 2210/21	collision detection, intersection - intersection/collision detection of 3D objects
G06T 2210/22	cropping - cropping of image borders
G06T 2210/24	fluid dynamics - animation, rendering or modelling of fluid flows
G06T 2210/28	force feedback - virtual force
G06T 2210/32	image data format - conversion between different image or graphics formats
G06T 2210/36	level of detail - level of detail, also for textures (e.g. mip-mapping)
G06T 2210/41	medical - medical applications concerning e.g. heart, lung, brain, tumors
G06T 2210/44	morphing - morphing or warping
G06T 2210/52	parallel processing
G06T 2210/56	particle system, point based geometry or rendering - rendering and animation of particle systems (e.g. fireworks, dust, clouds), point clouds, splatting
G06T 2210/61	scene description - scene graphs, scene description languages, e.g. VRML
G06T 2210/62	semi-transparency - screen-door effect, change of transparency values
G06T 2210/64	weathering - weathering effects like e.g. aging, corrosion

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

2D	Two-dimensional
3D	Three-dimensional
4D	Four-dimensional, 3D in time
CAD	Computer-Aided Design (in computer graphics); Computer-Aided Detection (in image analysis)
MR	Magnetic Resonance (in image analysis); Mixed Reality (in computer graphics)
Stereo	Treatment of the images of exactly two cameras in a pairwise manner

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ANN	Artificial Neural Network
AR	Augmented Reality
CT	Computed Tomography
DCE-MRI	Dynamic Contrast-Enhanced Magnetic Resonance Imaging
DCT	Discrete Cosine Transform
DRR	Digitally Reconstructed Radiograph
DTS	Digital Tomosynthesis
GUI	Graphical User Interface
IC	Integrated Circuit
ICP	Iterative Closest Point
LCD	Liquid Crystal Display

MRF	Markov Random Field
MRI	Magnetic Resonance Imaging
PCB	Printed Circuit Board
RGB	Red, Green, Blue
ROI	Region of Interest
SLAM	Simultaneous Localisation And Mapping
SNR	Signal-to-Noise Ratio
SPECT	Single Photon Emission Computed Tomography
US	Ultrasound
VOI	Volume of Interest
VR	Virtual Reality

G06T 1/00

General purpose image data processing

Definition statement

This place covers:

General purpose image data processing systems and methods.

Special rules of classification

The IPC class **G06T1/40** is not used. The corresponding documents are classified in [G06T 1/20](#).

G06T 1/0007

{Image acquisition}

Definition statement

This place covers:

Capturing or storing images from or to memory

References

Limiting references

This place does not cover:

Scanning, transmission or reproduction of documents or the like	H04N 1/00
Television cameras	H04N 23/00

G06T 1/0014

{Image feed-back for automatic industrial control, e.g. robot with camera (robots [B25J 19/023](#))}

Definition statement

This place covers:

- Machine vision or tool control

Definition statement

- Image feedback for robot navigation or walking
- 3D vision systems.

References

Limiting references

This place does not cover:

Vision controlled manipulators	B25J 9/1697
Accessories fitted to manipulators including video camera means	B25J 19/023
Control of position, course, altitude or attitude of land, water, air or space vehicles using means capturing signals occurring naturally from the environment for determining position or orientation	G05D 1/243

G06T 1/0021

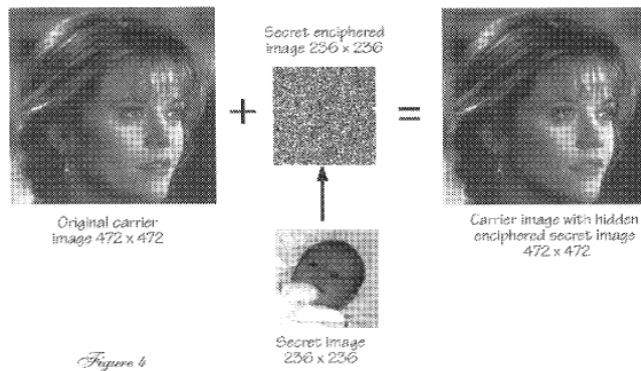
{Image watermarking}

Definition statement

This place covers:

- Image watermarking in general.
- Applications or software packages for watermarking.

Illustrative example - Hiding a digital image (message) into another digital image (carrier) (US6094483 - UNIV NEW YORK STATE RES FOUND):



References

Limiting references

This place does not cover:

Testing specially adapted to determine the identity or genuineness of paper currency or similar valuable papers	G07D 7/1205
Audio watermarking	G10L 19/018
Arrangements for secret or secure communication using encryption of data	H04L 9/06
Arrangements for secret or secure communication using electronic signatures	H04L 9/3247

Informative references

Attention is drawn to the following places, which may be of interest for search:

Security arrangements for protecting computers or computer systems against unauthorised activity	G06F 21/00
Circuits for prevention of unauthorised reproduction or copying	G11B 20/00086
Scanning, transmission or reproduction of documents involving image watermarking	H04N 1/32144

G06T 1/0028

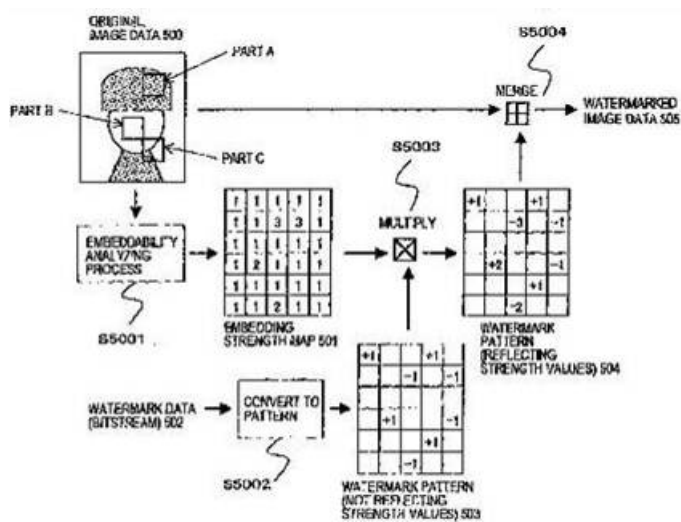
{Adaptive watermarking, e.g. Human Visual System [HVS]-based watermarking}

Definition statement

This place covers:

- Adaptations based on Human Visual System [HVS].
- Perceptual masking.
- Preservation of image quality; Distortion minimization.
- Methods to measure quality of watermarked images.
- Measuring the balance between quality and robustness, i.e., fixed robustness, adapting quality, or vice versa.

Illustrative example - Changing a portion of an image based on an embedding strength map (EP1170938 - HITACHI LTD):



G06T 1/0035

{Output size adaptive watermarking}

Definition statement

This place covers:

- Embedding without modifying the size of input.
- Embedding or modifying the watermark directly in a coded image or video stream, without decoding first.

G06T 1/0042

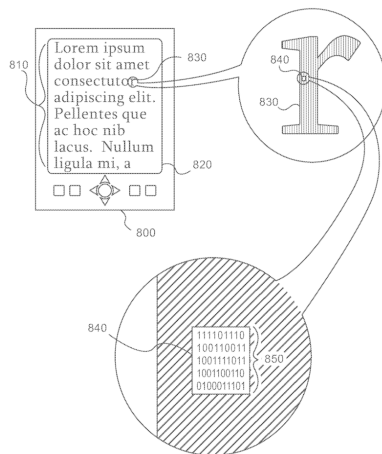
{Fragile watermarking, e.g. so as to detect tampering}

Definition statement

This place covers:

- Birthday attacks.
- Forgery.

Illustrative example - Changing pixels at selected positions according to a replacement table (WO2011021114 - NDS LIMITED):



G06T 1/005

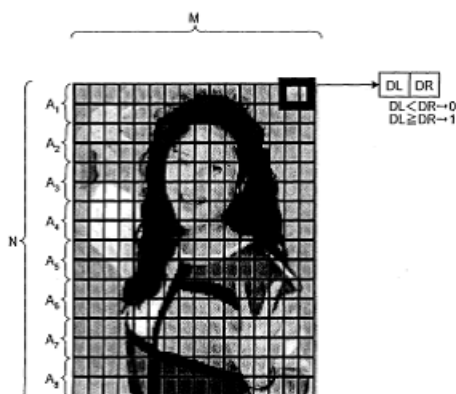
{Robust watermarking, e.g. average attack or collusion attack resistant}

Definition statement

This place covers:

- Resistance; Resistance to attacks or distortions; Distortion compensation.
- Strength.
- Collusion attacks; Average attacks; Averaging.
- Reliable detection, e.g. with reduced likelihood of false positive/negative.

Illustrative example - Watermarking an image using the difference of average intensity of two adjacent blocks (EP1927948 - FUJITSU LTD):

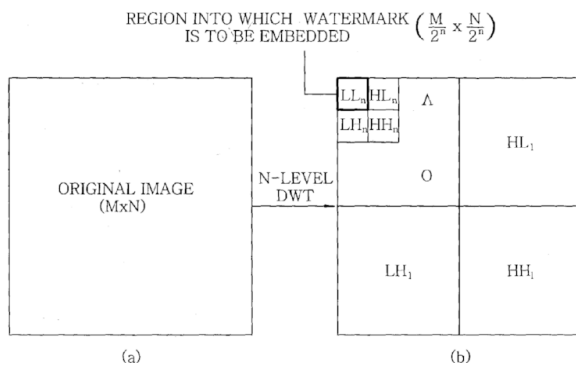


G06T 1/0057**{Compression invariant watermarking}****Definition statement**

This place covers:

Watermarking techniques for JPEG or MPEG or for a wavelet transformed image.

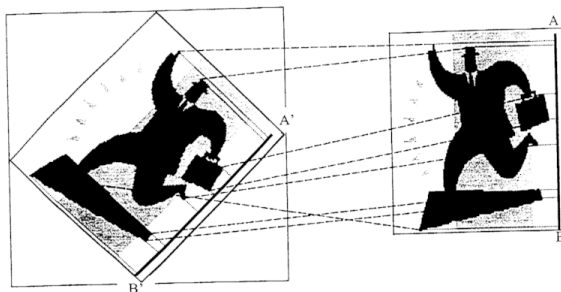
Illustrative example - Embedded a watermark in a DC component region of a wavelet transformed image (US2004047489 - KOREA ELECTRONICS TELECOMM):

**G06T 1/0064****{Geometric transform invariant watermarking, e.g. affine transform invariant}****Definition statement**

This place covers:

- Robust against resizing or rotation or cropping, etc.
- Determining the rescaling factor or rotation angle by using the watermarks so as to compensate the image, i.e. as a calibration signal.
- Desynchronization attacks.

Illustrative example - Combining a reference mark with an identification mark and embedding them in image textures to detect the applied transformations (GB2378602 - CENTRAL RESEARCH LAB LTD):



G06T 1/0071

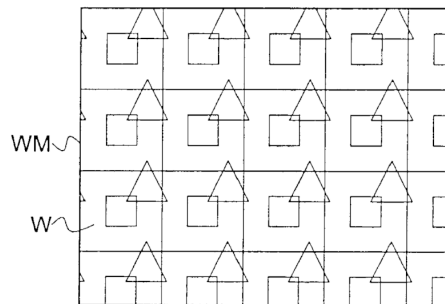
{using multiple or alternating watermarks}

Definition statement

This place covers:

- Many, possibly different, watermarks on the same image, e.g. for copy or distribution control.
- Same watermark repeated on different parts of the image.

Illustrative example - Encoding payload in relative positions and/or polarities of multiple embedded watermarks (WO0111563 - KONINKL PHILIPS ELECTRONICS NV):



G06T 1/0078

{using multiple thresholds}

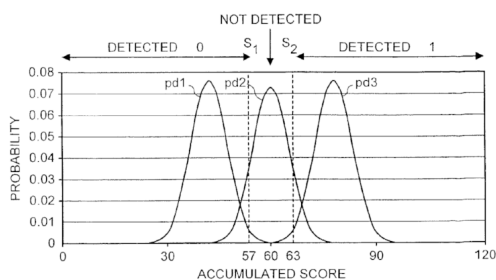
Definition statement

This place covers:

Using thresholds to define ranges of detection probability or ranges of robustness.

Illustrative example - Multiple thresholds for reducing false detection likelihood

(EP1271401 - SONY UK LTD):



G06T 1/0085

{Time domain based watermarking, e.g. watermarks spread over several images}

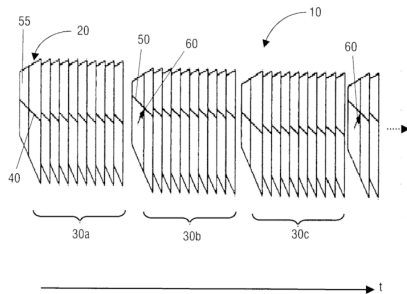
Definition statement

This place covers:

Watermarks spread over several images or frames or a sequence.

Definition statement

Illustrative example - Alternating watermark patterns (e.g. by translation, mirror, rotation) to improve the reliability of scale factor measurement (WO2005109338 - KONINKL PHILIPS ELECTRONICS NV):



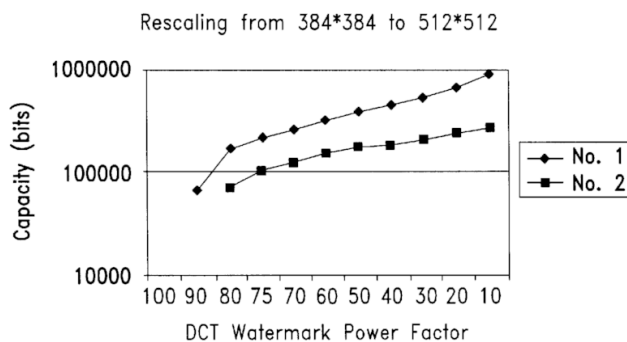
G06T 1/0092

{Payload characteristic determination in a watermarking scheme, e.g. number of bits to be embedded}

Definition statement

This place covers:

Illustrative example - Calculating capacity of DCT coefficients of a digital image file and selecting the ones apted to embedding, thereby providing robustness (US6724913 - HSU WEN-HSING):



G06T 1/20

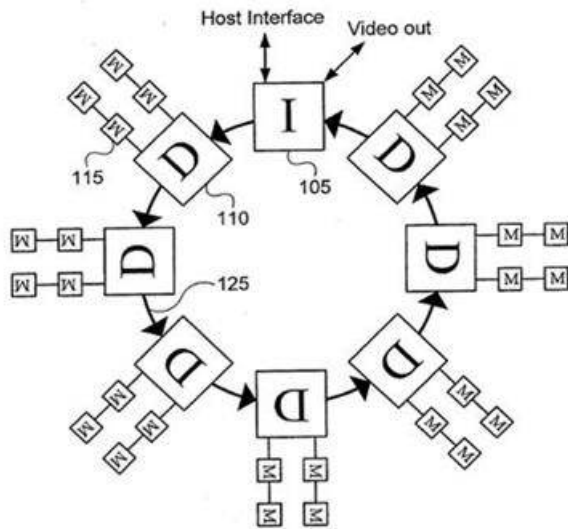
Processor architectures; Processor configuration, e.g. pipelining

Definition statement

This place covers:

- Graphics accelerators; Graphic processing units (GPUs).
- Graphics pipelines.
- Parallel or massively parallel data bus specially adapted for image data processing.
- Architecture or signal processor specially adapted for image data processing.
- VLSI or SIMD or fine-grained machines specially adapted for image data processing.
- Multiprocessor or multicomputer or multi-core specially adapted for image data processing.

Illustrative example - Ring architecture for image data processing:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Architectures of general purpose stored program computers	G06F 15/76
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Pipelining	the use of a sequence (pipeline) of image processing stages for execution of instructions in a series of units, arranged so that several units can be used for simultaneously processing appropriate parts of several instructions.
Multiprocessor	processor arrangements comprising a computer system consisting of two or more processors for the simultaneous execution of two or more programs or sequences of instructions.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

GPU	Graphics Processing Unit
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G06T 1/60

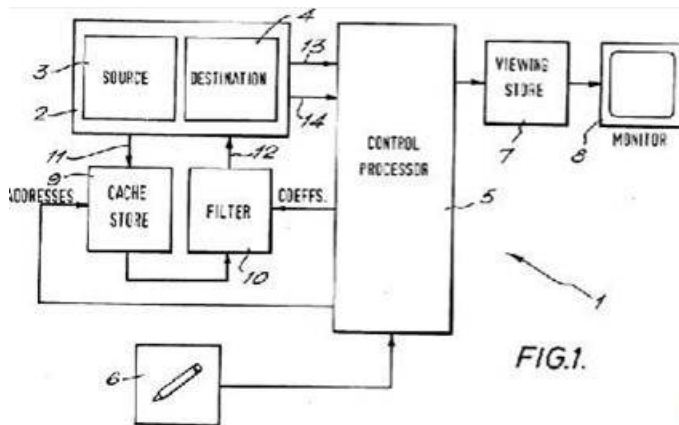
Memory management

Definition statement

This place covers:

- Address generation or addressing circuit or BitBlit for image data processing.
- 3D or virtual or cache memory specially adapted for image data processing.
- Frame or screen or image memory specially adapted for image data processing.

Illustrative example - Cache memory for image processing (EP0589724 - QUANTEL LTD)



References

Limiting references

This place does not cover:

Accessing, addressing or allocating within memory systems or architectures	G06F 12/00
Ping-pong buffers	G09G 5/399
Arrangements for selecting an address in a digital store	G11C 8/00
Digital stores characterised by the use of particular electric or magnetic storage elements	G11C 11/00

G06T 3/00

Geometric image transformations in the plane of the image

Definition statement

This place covers:

Geometric image transformations in the plane of the image.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric transformations for image enhancements	G06T 5/00
Image animations	G06T 13/00
Geometric effects for 3D image rendering	G06T 15/10
Perspective computation for 3D image rendering	G06T 15/20
Geographic models	G06T 17/05
Matrix or vector computation	G06F 17/16
Conversion of standard for television systems	H04N 7/01

G06T 3/02

Affine transformations (for image registration [G06T 3/147](#); for image mosaicing [G06T 3/4038](#))

Definition statement

This place covers:

Scaling and rotation.

References

Limiting references

This place does not cover:

Affine transformations for image registration, e.g. elastic snapping	G06T 3/147
Affine transformations for image mosaicing	G06T 3/4038

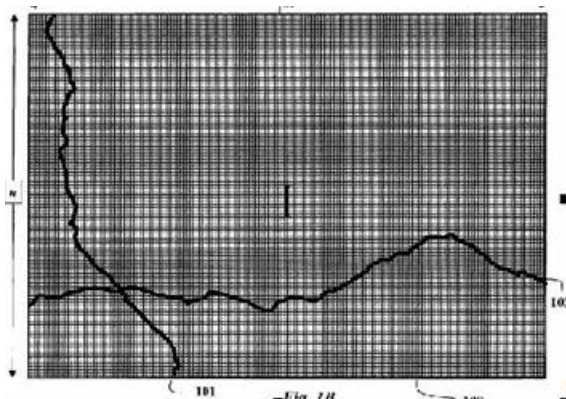
G06T 3/04

Context-preserving transformations, e.g. by using an importance map (panospheric to cylindrical image transformations [G06T 3/12](#))

Definition statement

This place covers:

- Selective warping according to an importance map; Smart image reduction.
- Seam carving; Liquid resizing; Image retargeting.



References

Limiting references

This place does not cover:

Panospheric to cylindrical image transformation	G06T 3/12
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G06T 3/047

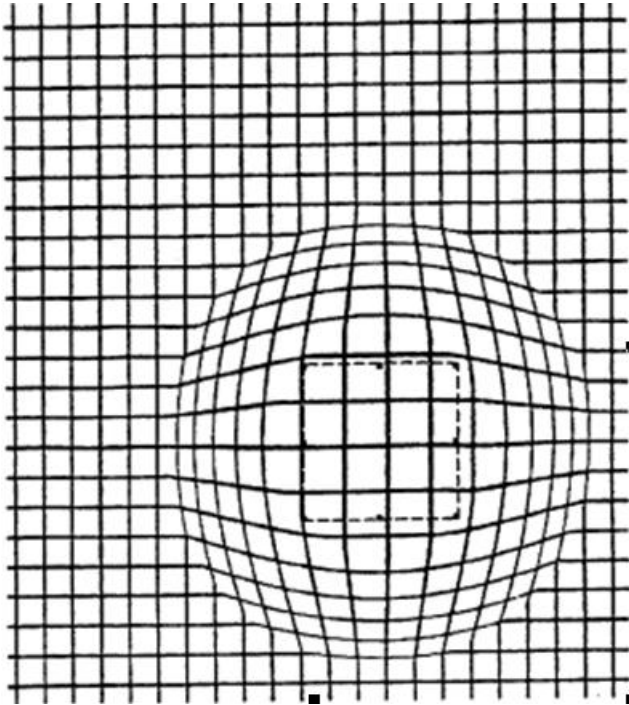
Fisheye or wide-angle transformations

Definition statement

This place covers:

Establishing a lens for a region-of-interest.

Illustrative example:



G06T 3/053

Detail-in-context presentations (fisheye or wide-angle transformations [G06T 3/047](#))

Definition statement

This place covers:

- Side or corner panels; Perspective wall.
- Document lens.

Illustrative example:

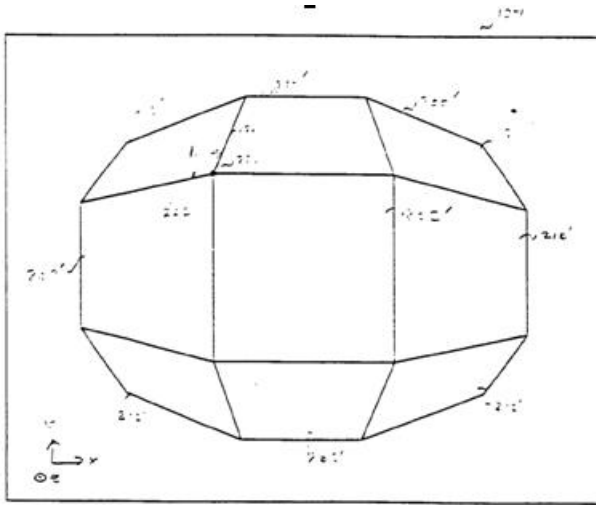


FIG. 5

References

Limiting references

This place does not cover:

Fisheye, wide-angle transformation	G06T 3/047
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G06T 3/06

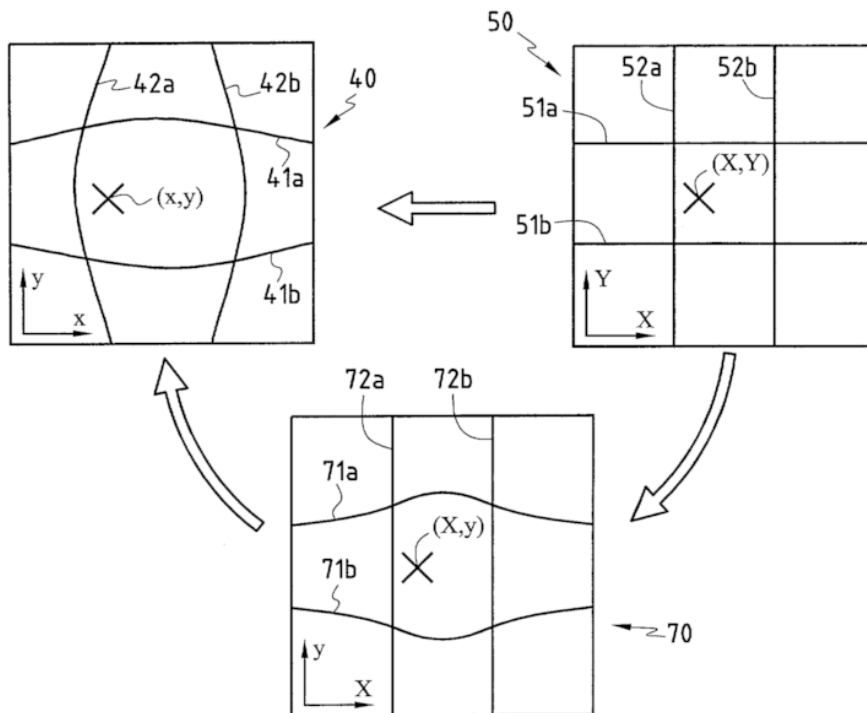
Topological mapping of higher dimensional structures onto lower dimensional surfaces

Definition statement

This place covers:

Flattening the scanned image of a bound book.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Panospheric to cylindrical image transformation	G06T 3/12
Texture mapping	G06T 15/04
Manipulating 3D models or images for computer graphics	G06T 19/00

G06T 3/067

Reshaping or unfolding 3D tree structures onto 2D planes

Definition statement

This place covers:

Curved planar reformation [CPR].

G06T 3/073

Transforming surfaces of revolution to planar images, e.g. cylindrical surfaces to planar images

Definition statement

This place covers:

Mapping a surface of revolution to a plane, e.g. mapping a pot or a can to a plane.

Illustrative example:

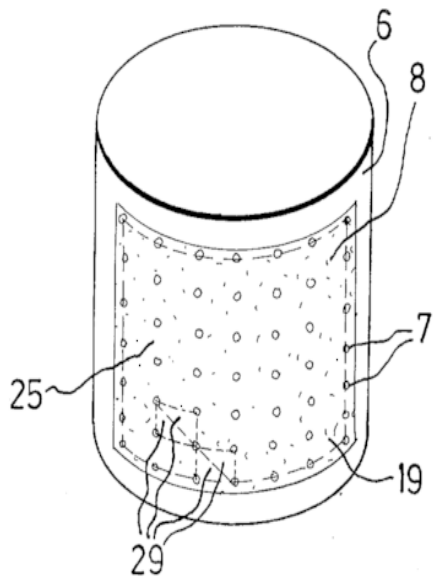


Fig 8

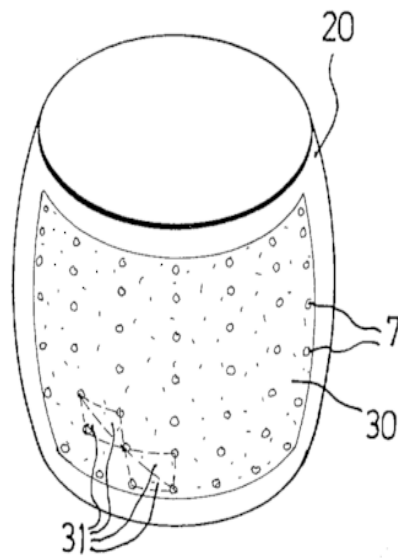
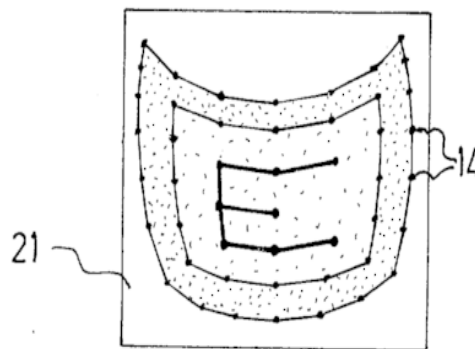
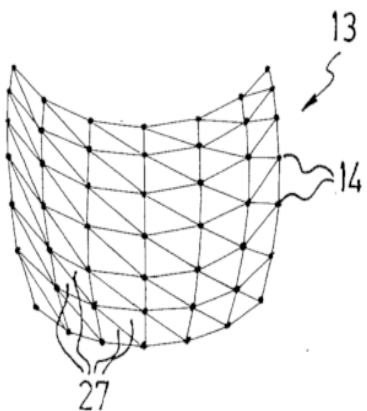


Fig 9



G06T 3/08

Projecting images onto non-planar surfaces, e.g. geodetic screens

Definition statement

This place covers:

- Geometric image transformation for projecting an image on a multi-projectors system or on a geodetic screen; Dome imaging.
- Geometric image transformation for projecting an image through multi-planar displays.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Texture mapping	G06T 15/04
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G06T 3/10

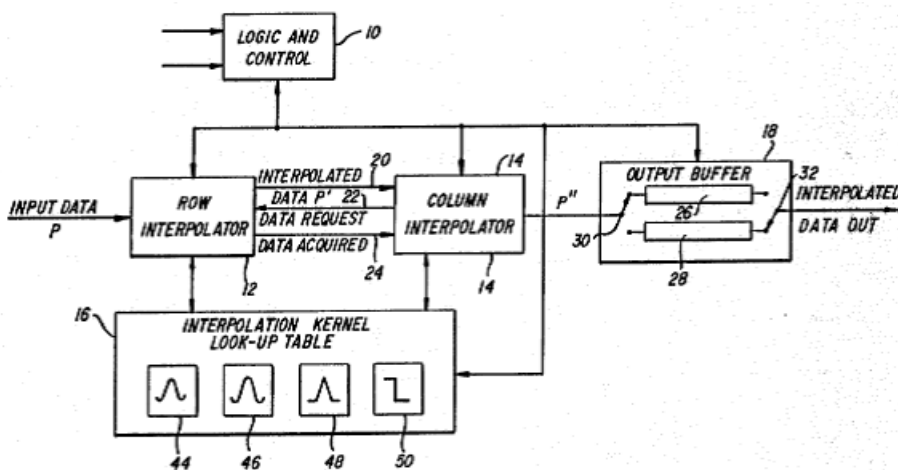
Selection of transformation methods according to the characteristics of the input images

Definition statement

This place covers:

- Selection of the interpolation method depending on the scale factor.
- Selection of the interpolation method depending on media type or image appearance characteristics.

Illustrative example:



G06T 3/12

Panospheric to cylindrical image transformations

Definition statement

This place covers:

- Omnidirectional or hyperboloidal to cylindrical image transformation or mapping; Catadioptric transformation, e.g. images from surveillance cameras.
- Panospheric image transformation or mapping by using the output of a multiple cameras system.

Illustrative example:

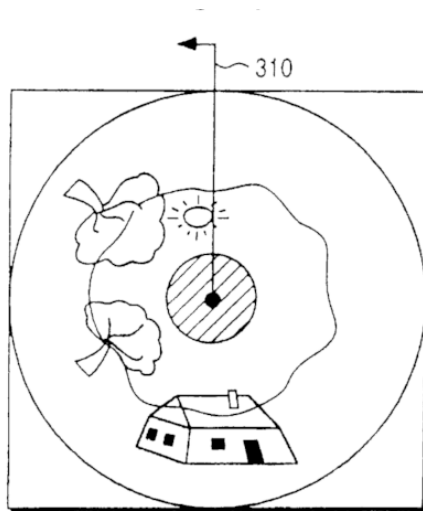
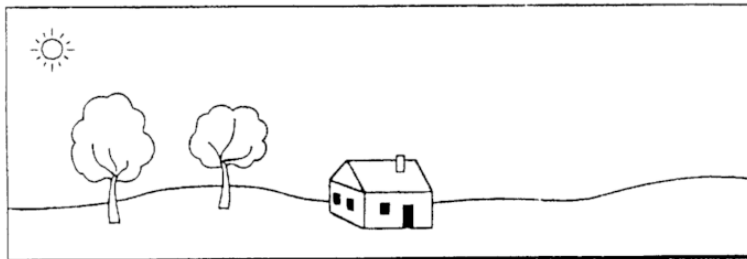


FIG. 3B



G06T 3/14

Transformations for image registration, e.g. adjusting or mapping for alignment of images

Definition statement

This place covers:

Geometric image transformation for

- iterative image registration
- spline-based image registration
- mutual-information-based registration
- phase correlation or FFT-based methods
- using fiducial points, e.g. landmarks
- maximised mutual information-based methods

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determination of transform parameters for the alignment of images, i.e. image registration	G06T 7/30
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G06T 3/153

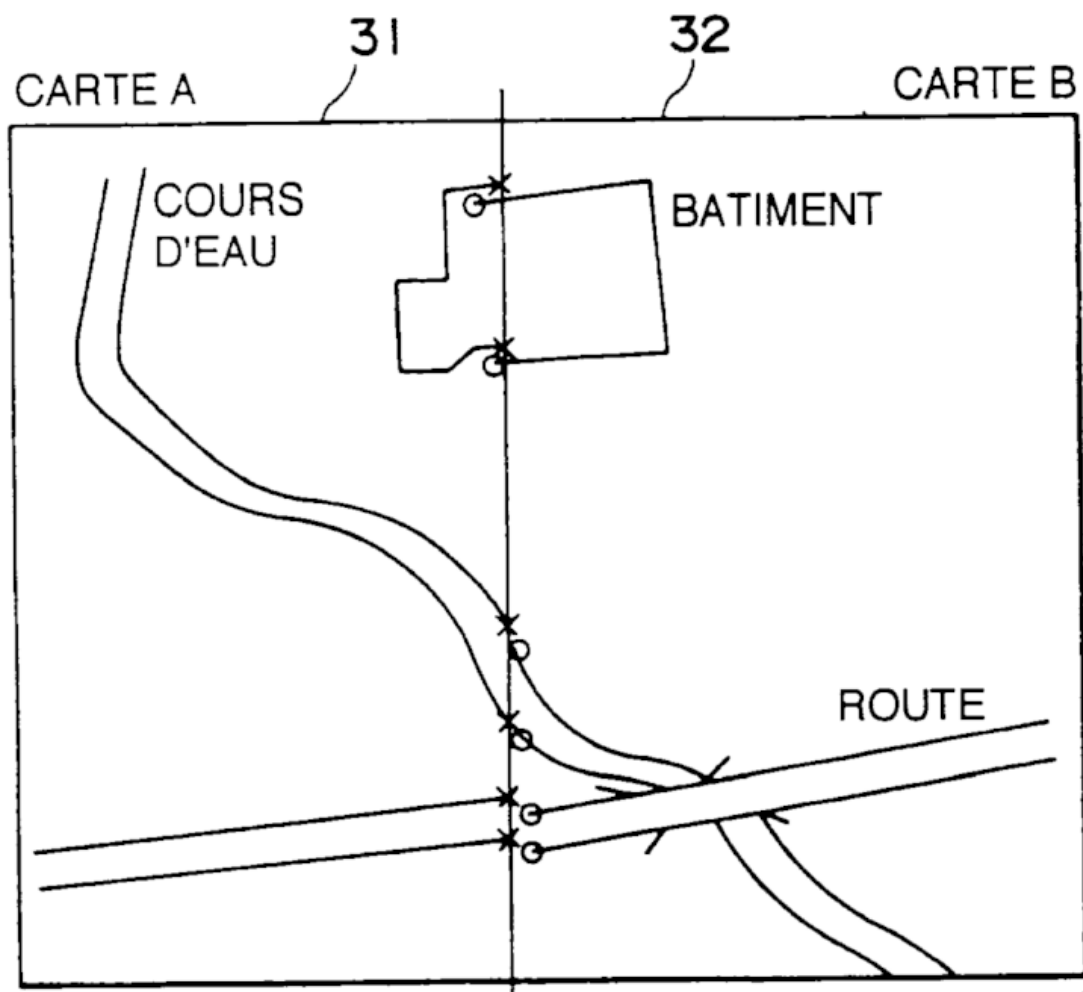
using elastic snapping

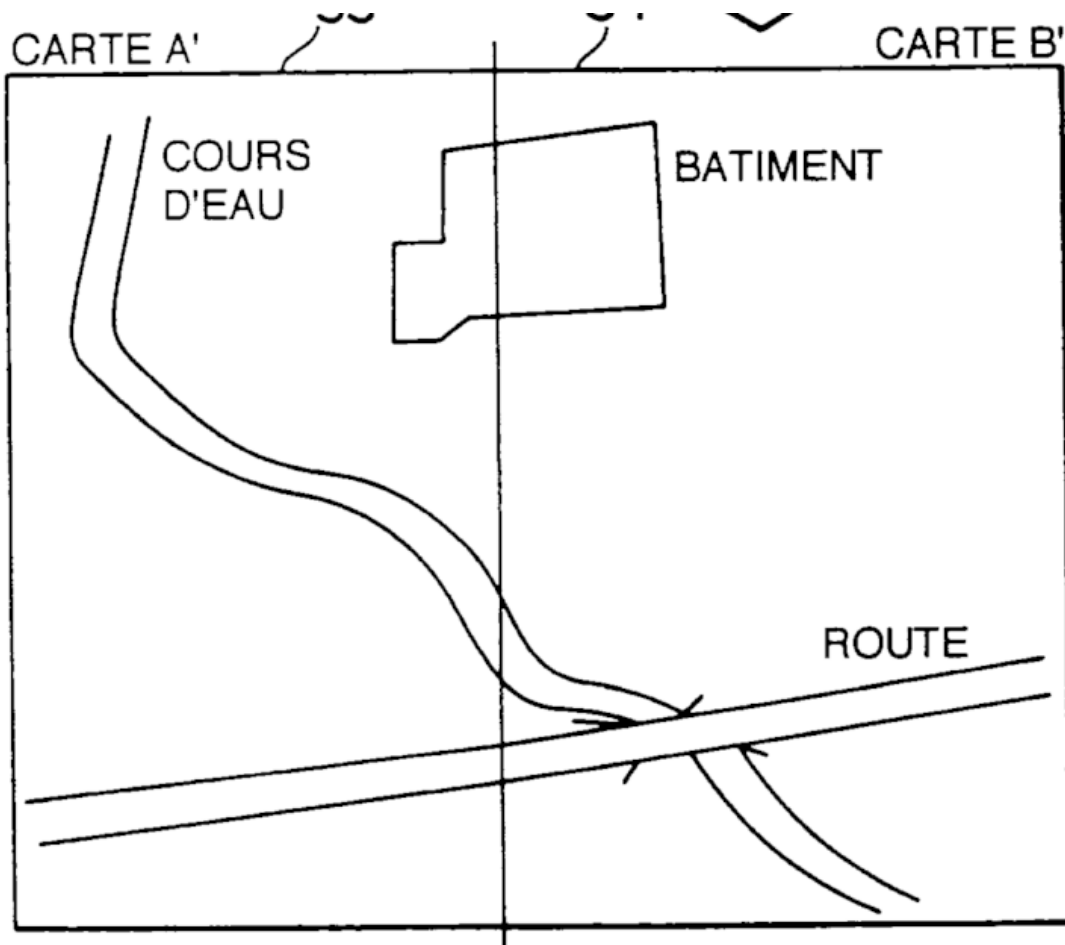
Definition statement

This place covers:

- Elastic mapping or snapping or matching; Deformable mapping.
- Diffeomorphic representations of deformations to control the image registration process.

Illustrative example:





G06T 3/16

Spatio-temporal transformations, e.g. video cubism

Definition statement

This place covers:

- Video cubism; Video cube.
- Dynamic panoramic video.
- Stylized video cubes.

G06T 3/18

Image warping, e.g. rearranging pixels individually

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image animation	G06T 13/00
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G06T 3/40

Scaling of whole images or parts thereof, e.g. expanding or contracting

Definition statement

This place covers:

- Resampling; Resolution conversion.
- Zooming or expanding or magnifying or enlarging or upscaling.
- Shrinking or reducing or compressing or downscaling.
- Pyramidal partitions; Storing sub-sampled copies.
- Area based or weighted interpolation; Scaling by surface fitting, e.g. piecewise polynomial surfaces or B-splines or Beta-splines.
- Two-steps image scaling, e.g. by stretching.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Polynomial surface description for image modeling	G06T 17/30
Scanning, transmission or reproduction of documents involving modification of image resolution	H04N 1/393 ; H04N 1/3875 ; H04N 1/40068
Studio circuits for television systems involving alteration of picture size or orientation	H04N 5/2628
Frame rate conversion; De-interlacing	H04N 7/01

G06T 3/4007

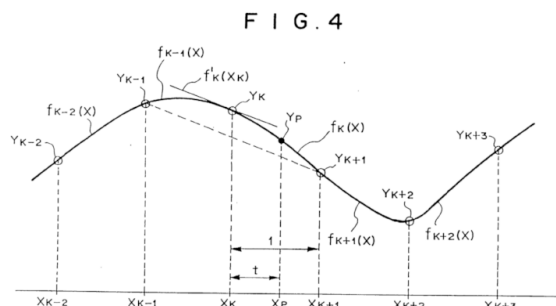
based on interpolation, e.g. bilinear interpolation (image demosaicing [G06T 3/4015](#); edge-driven or edge-based scaling [G06T 3/403](#))

Definition statement

This place covers:

- Linear or bi-linear or tetrahedral or cubic image interpolation.
- Adaptive interpolation, e.g. the coefficients of the interpolation depend on the pattern of the local structure.

Illustrative example - Third order spline interpolation:



References

Limiting references

This place does not cover:

Demosaicing, e.g. colour filter array [CFA], Bayer pattern	G06T 3/4015
Edge-driven scaling	G06T 3/403

G06T 3/4015

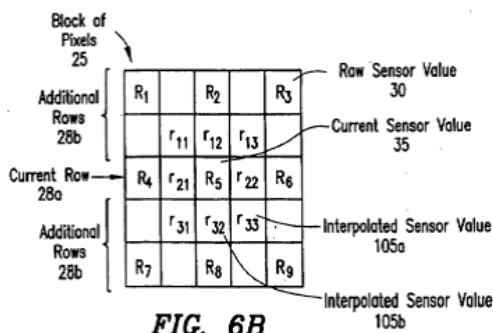
Image demosaicing, e.g. colour filter arrays [CFA] or Bayer patterns

Definition statement

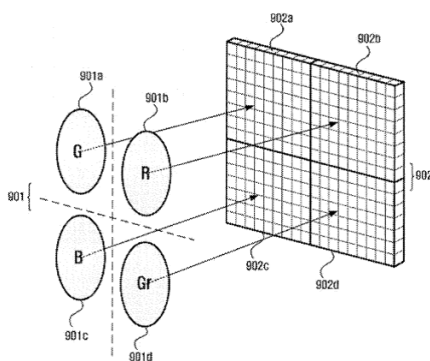
This place covers:

- CFA demosaicing or demosaicking or interpolating.
- Bayer pattern.
- Colour-separated images, i.e. one colour in each image quadrant.

Illustrative examples - Image demosaicing:



- Colour-separated image:



G06T 3/4023

based on decimating pixels or lines of pixels; based on inserting pixels or lines of pixels

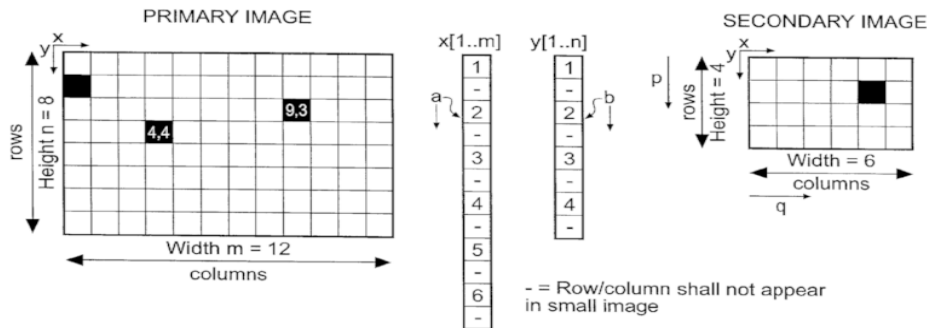
Definition statement

This place covers:

- Pixel or row deletion or removal.
- Pixel or row insertion or duplication or replication.

- Decimating FIR filters.
- Array indexes or tables, e.g. LUT.

Illustrative example - Decimating by using two array of indexes:



G06T 3/403

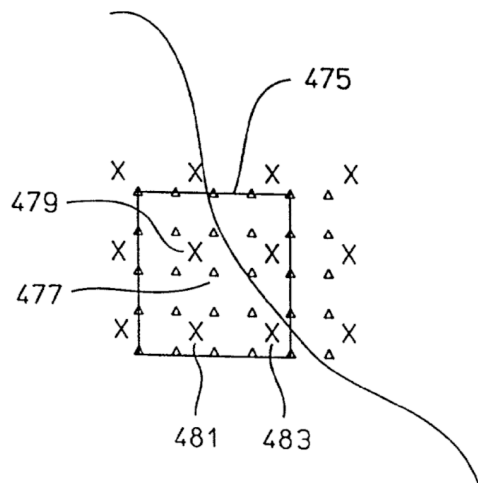
Edge-driven scaling; Edge-based scaling

Definition statement

This place covers:

- Edge adaptive or directed or dependent or following or preserving interpolation; Edge preservation.
- Edge map injecting or projecting or combining or superimposing.

Illustrative example - Correcting for abnormalities next to boundaries:



G06T 3/4038

Image mosaicing, e.g. composing plane images from plane sub-images

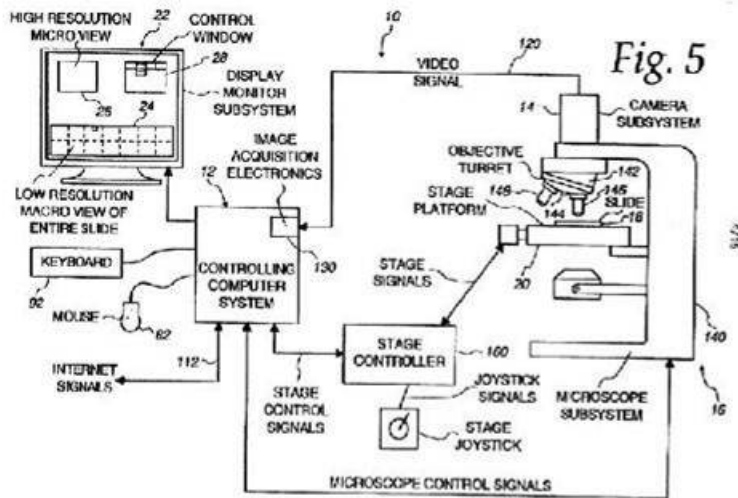
Definition statement

This place covers:

- Image mosaicing or mosaiking.
- Panorama views.

- Mosaic of video sequences; Salient video still; Video collage or synopsis.

Illustrative example - Image mosaicing for microscopy applications:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image processing arrangements associated with discharge tubes with provision for introducing objects or material to be exposed to the discharge	H01J 37/222
---	-----------------------------

G06T 3/4046

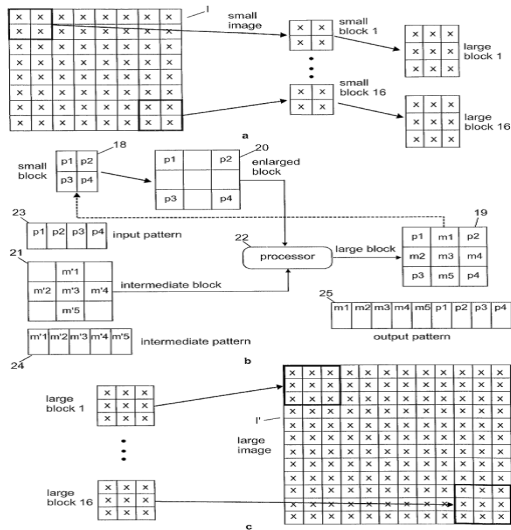
using neural networks

Definition statement

This place covers:

- Using neural networks specially adapted for image interpolation.
- Using neural networks specially adapted for interpolation coefficient selection.

Illustrative example - Using a neural network to select the coefficients of a polynomial interpolation:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Computing arrangements using neural networks	G06N 3/02
--	---------------------------

G06T 3/4053

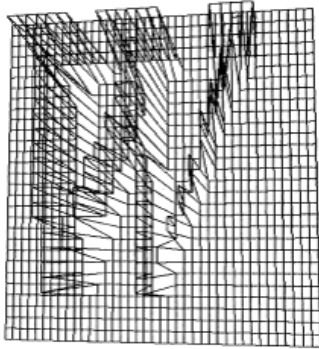
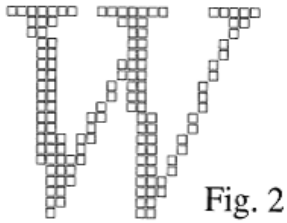
based on super-resolution, i.e. the output image resolution being higher than the sensor resolution

Definition statement

This place covers:

- Super resolution by fitting the pixel intensity to a mathematical function.
- Super resolution from image sequences; Images or frames addition or coaddition or combination.
- Super resolution by iteratively applying constraints, e.g. energy reduction, on the transform domain and inverse transforming.

Illustrative example - fitting a mathematical function and resampling:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image enhancement or restoration using two or more images, e.g. averaging or subtraction	G06T 5/50
--	---------------------------

G06T 3/4061

by injecting details from different spectral ranges

Definition statement

This place covers:

Multisensor or multiband images fusion.

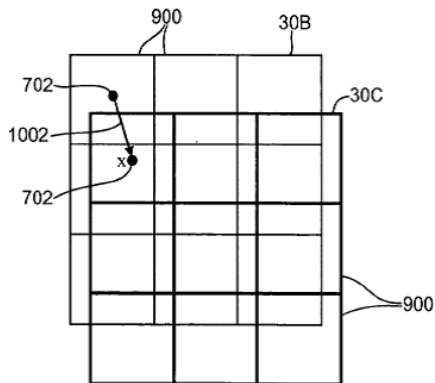
G06T 3/4069

by subpixel displacements

Definition statement

This place covers:

Illustrative example of subject matter covered in this group - Displaying sub-frames at spatially offset positions:



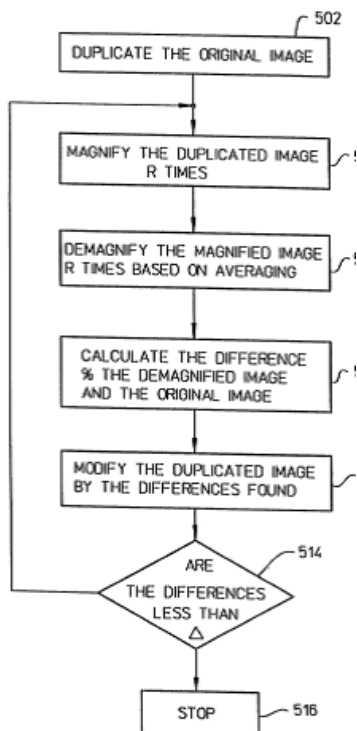
G06T 3/4076

using the original low-resolution images to iteratively correct the high-resolution images

Definition statement

This place covers:

Illustrative example of subject matter classified in this group - Iterative correction of the high-resolution image:

**G06T 3/4084**

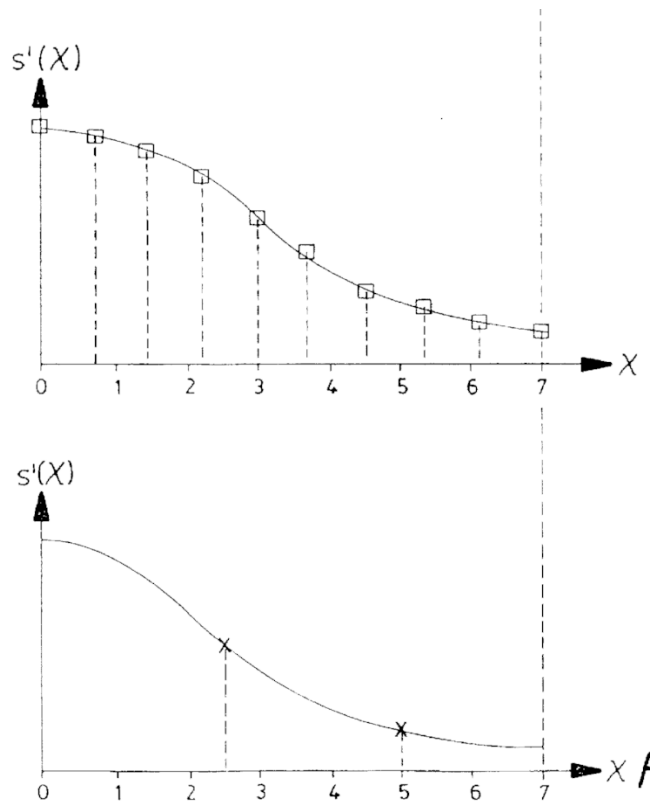
in the transform domain, e.g. fast Fourier transform [FFT] domain scaling

Definition statement

This place covers:

- DCT coefficients decimation or insertion for image scaling.
- Zero padding DCT coefficients for image scaling.
- Downscaling by selecting a specific Wavelet subband.

Illustrative example - Enlargement / reduction through DCT interpolation / decimation:



G06T 3/4092

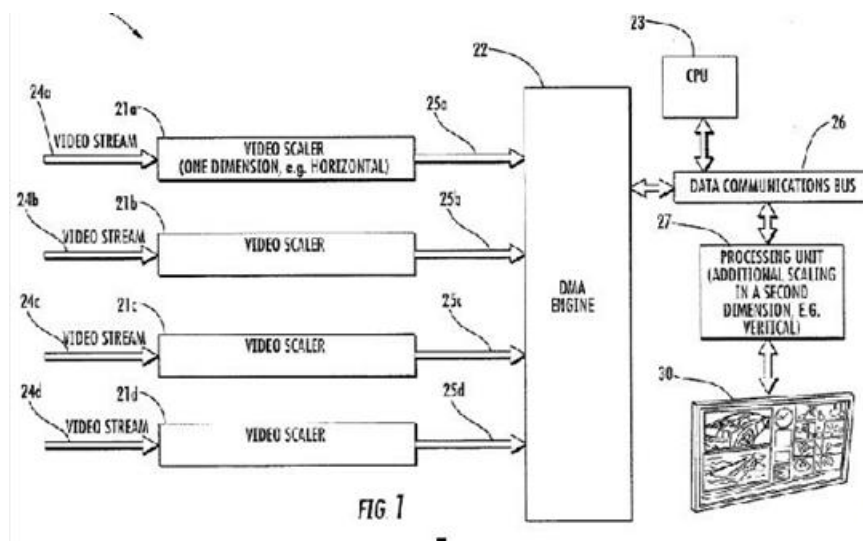
Image resolution transcoding, e.g. by using client-server architectures

Definition statement

This place covers:

Adapting the image resolution to the client's capabilities.

Illustrative example - The processing unit is coupled downstream from video cross-point switcher for generating additionally scaled video streams by additional video scaling on initially scaled video stream:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Server components or server architectures for processing of video elementary streams by altering the spatial resolution.	H04N 21/234363; H04N 21/2356; H04N 21/4356; H04N 21/440263
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G06T 3/60

Rotation of whole images or parts thereof

Definition statement

This place covers:

- Transpose or continuous write-transpose-read.
- Mirror.
- Rung-length (RL) rotation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Scanning, transmission or reproduction of documents involving image rotation.	H04N 1/3877
Studio circuits for television systems involving alteration of picture size or orientation.	H04N 5/2628

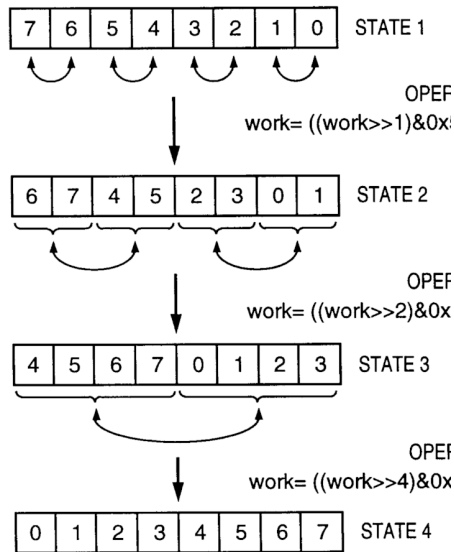
G06T 3/602

by block rotation, e.g. by recursive reversal or rotation

Definition statement

This place covers:

Illustrative example - Rotation by recursive reversing:



G06T 3/606

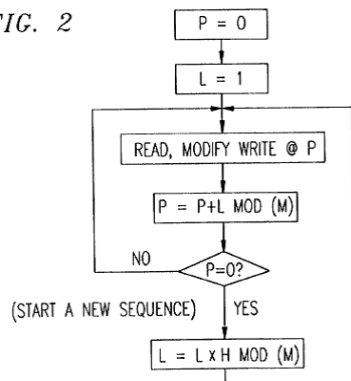
by memory addressing or mapping

Definition statement

This place covers:

Illustrative example - Continuous read-transpose-write:

FIG. 2



G06T 3/608

by skew deformation, e.g. two-pass or three-pass rotation

Definition statement

This place covers:

- Shift processing
- Rotation by shearing.

Illustrative example - Image rotation by two-pass de-skewing:

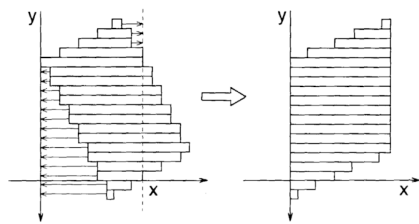
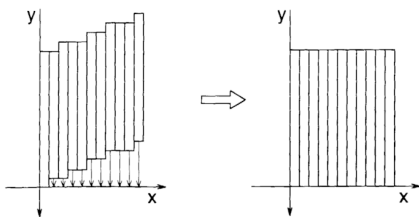


FIG. 3 (c)

FIG. 3 (d)



G06T 5/00

Image enhancement or restoration

Definition statement

This place covers:

Image enhancement or restoration using:

- using non-spatial domain filtering
- using local operators
- using morphological operators, i.e. erosion or dilatation
- using histogram techniques
- using two or more images, e.g. averaging or subtraction
- using machine learning, e.g. neural networks
- Denoising; Smoothing
- Deblurring; Sharpening
- Unsharp masking
- Retouching; Inpainting; Scratch removal
- Geometric correction
- Dynamic range modification of images or parts thereof

Relationships with other classification places

[G06T 5/00](#) is the function place for image enhancement or restoration. Image enhancement or restoration specially adapted for a particular application is classified in the relevant application field, e.g. [G06V](#) or [H04N](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Neural networks	G06N 3/02
Image preprocessing for image or video recognition or understanding	G06V 10/20
Image processing adapted to be used in scanners, printers, photocopying machines, displays or similar devices, including composing, repositioning or otherwise modifying originals	H04N 1/387
Picture signal circuits adapted to be used in scanners, printers, photocopying machines, displays or similar devices	H04N 1/40
Processing of colour picture signals in scanners, printers, photocopying machines, displays or similar devices	H04N 1/56
Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	H04N 23/70
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	H04N 23/80
Computational photography systems, e.g. light-field imaging systems	H04N 23/95
Noise processing, e.g. detecting, correcting, reducing or removing noise in circuitry of solid-state image sensors [SSIS]	H04N 25/60

Special rules of classification

This group focuses on image processing algorithms. Although such algorithms sometimes need to consider characteristics of the underlying image acquisition apparatus, inventions to the image acquisition apparatus per se are outside the scope of this group.

Whenever possible, additional information should be classified using one or more of the indexing codes from the ranges of [G06T 2200/00](#) (see definitions re. [G06T](#)) or [G06T 2207/00](#) (see definitions re. [G06T 2207/00](#)).

The classification symbol [G06T 5/00](#) should be allocated to documents concerning:

- Interactive / multiple choice image processing, e.g. choosing outputs from multiple enhancement algorithms
- Image restoration based on properties or models of the human vision system [HVS]

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

HDR	High dynamic range
HDRI	High dynamic range imaging
HMM	Hidden Markov model
PSF	Point spread function
SDR	Standard dynamic range

G06T 5/10

using non-spatial domain filtering

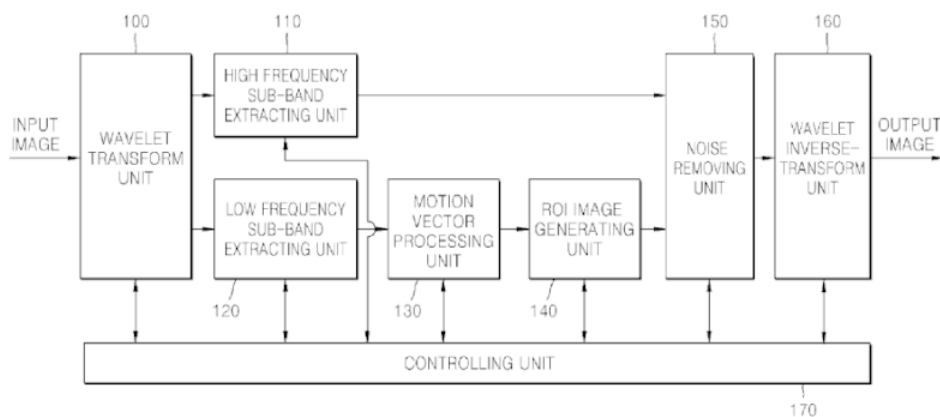
Definition statement

This place covers:

All transform domain-based enhancement methods, e.g. using:

- Fourier transform, discrete Fourier transform [DFT] or fast Fourier transform [FFT] (add the indexing code [G06T 2207/20056](#))
- Hadamard transform
- discrete cosine transform [DCT] (add the indexing code [G06T 2207/20052](#))
- Wavelet transform, discrete wavelet transform [DWT] (add the indexing code [G06T 2207/20064](#))

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	H04N 5/253
Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	H04N 23/70
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	H04N 23/80
Noise processing, e.g. detecting, correcting, reducing, or removing noise in circuitry of solid-state image sensors [SSIS]	H04N 25/60

G06T 5/20

using local operators

Definition statement

This place covers:

- Convolution with a mask or kernel in the spatial domain
- High-pass filter, low-pass filter

Definition statement

- Gauss filter, Laplace filter
- Averaging filter, mean filter, blurring filter
- Differential filters (e.g. Sobel operator)
- Median filter (add the indexing code [G06T 2207/20032](#))
- Bilateral filter (add the indexing code [G06T 2207/20028](#))
- Minimum, maximum or and rank filtering
- Wiener filter
- Phase-locked loops, detectors, mixers
- Recursive filter
- Distance transforms
- Local image processing architectures

Illustrative example:

-1	0	+1
-2	0	+2
-1	0	+1

FIG. 2a

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	H04N 5/253
Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	H04N 23/70
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	H04N 23/80
Noise processing, e.g. detecting, correcting, reducing, or removing noise in circuitry of solid-state image sensors [SSIS]	H04N 25/60

Informative references

Attention is drawn to the following places, which may be of interest for search:

Applying local operators for during image preprocessing for image or video recognition or understanding	G06V 10/36
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G06T 5/30

Erosion or dilatation, e.g. thinning

Definition statement

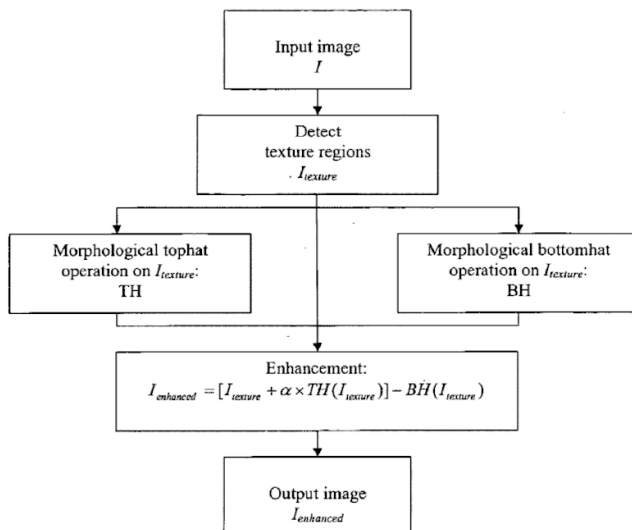
This place covers:

All morphology-based operations for image enhancement, e.g.:

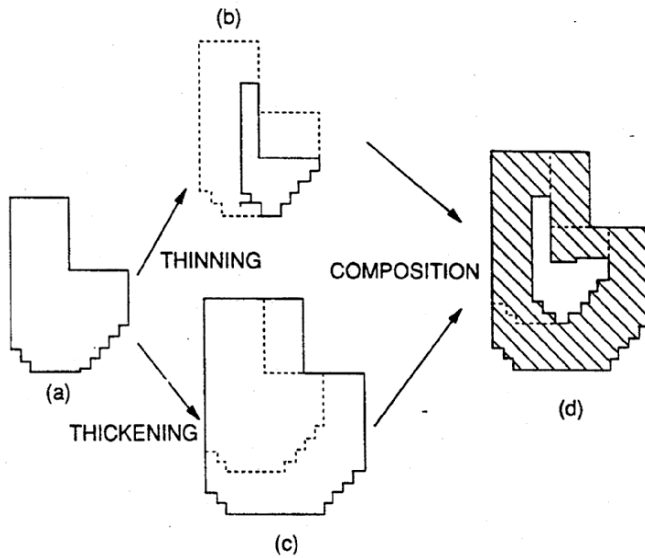
- Thickening, thinning
- Opening, closing
- Erosion, dilation
- Structuring elements
- Skeletons
- Geodesic transforms

Illustrative examples:

1.



2.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection involving morphological operators	G06T 7/155
Smoothing or thinning of patterns during image preprocessing for image or video recognition or understanding	G06V 10/34

G06T 5/40

using histogram techniques

Definition statement

This place covers:

All histogram-based image enhancement methods

Illustrative example:

FIG. 3A

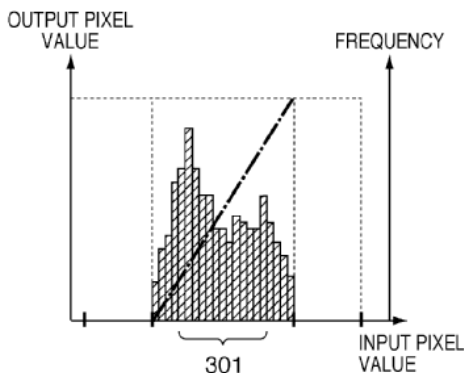
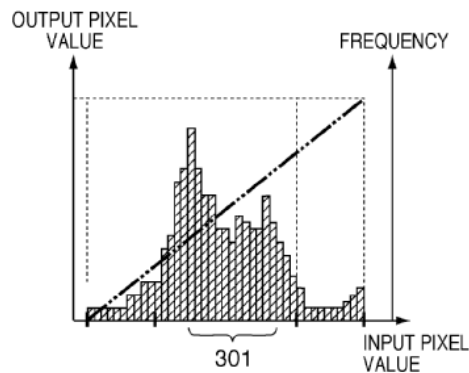


FIG. 3B



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	H04N 23/70
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	H04N 23/80

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dynamic range modification	G06T 5/90
Histogram techniques adapted to be used in scanners, printers, photocopying machines, displays or similar devices	H04N 1/4074
Equalising the characteristics of different image components, e.g. their average brightness or colour balance, in stereoscopic or multi-view video systems	H04N 13/133

G06T 5/50

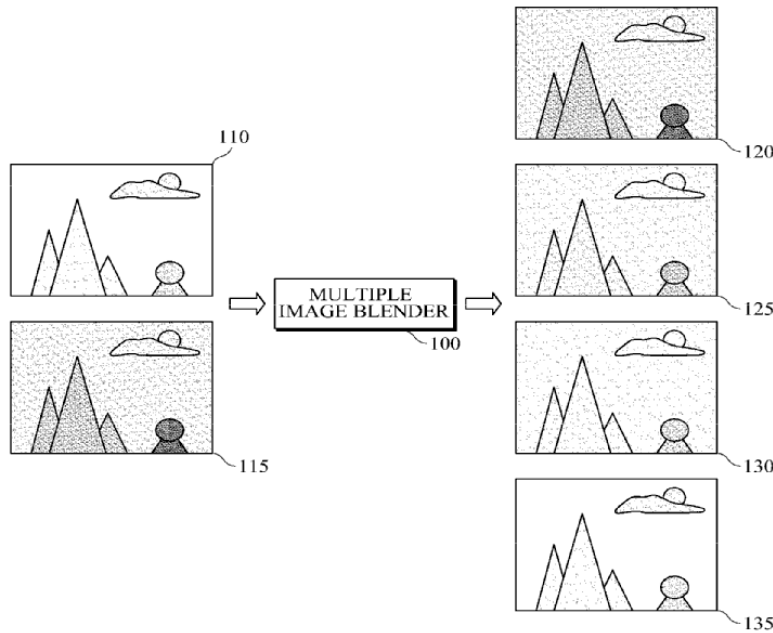
using two or more images, e.g. averaging or subtraction

Definition statement

This place covers:

- Image averaging (add the indexing code [G06T 2207/20216](#))
- Image fusion, image merging: (add the indexing code [G06T 2207/20221](#))
- Image subtraction (add the indexing code [G06T 2207/20224](#))
- Enhanced final image by combining multiple, e.g. degraded, images, while maintaining the same number of pixels (for increased number of pixels: see [G06T 3/40](#))
- Full-field focus from multiple of depth-of-field images, e.g. from confocal microscopy
- Processing of synthetic aperture radar [SAR] images
- Energy subtraction
- Bright field, dark field processing
- Angiography image processing
- High dynamic range [HDR] image processing (add the indexing code [G06T 2207/20208](#))
- Multispectral image processing
- Computational photography, e.g. coded aperture imaging (add the indexing code [G06T 2200/21](#))

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene in cameras or camera modules comprising electronic image sensors	H04N 23/70
Camera processing pipelines in cameras or camera modules comprising electronic image sensors	H04N 23/80

Informative references

Attention is drawn to the following places, which may be of interest for search:

Scaling of whole images or parts thereof based on super-resolution	G06T 3/4053
Unsharp masking	G06T 5/75
Radar or analogous systems, specially adapted for mapping or imaging using synthetic aperture techniques	G01S 13/90
Spatial compounding in short-range sonar imaging systems	G01S 15/8995
Confocal scanning microscopes	G02B 21/0024
Computational photography systems, e.g. light-field imaging systems	H04N 23/95

G06T 5/60

using machine learning, e.g. neural networks

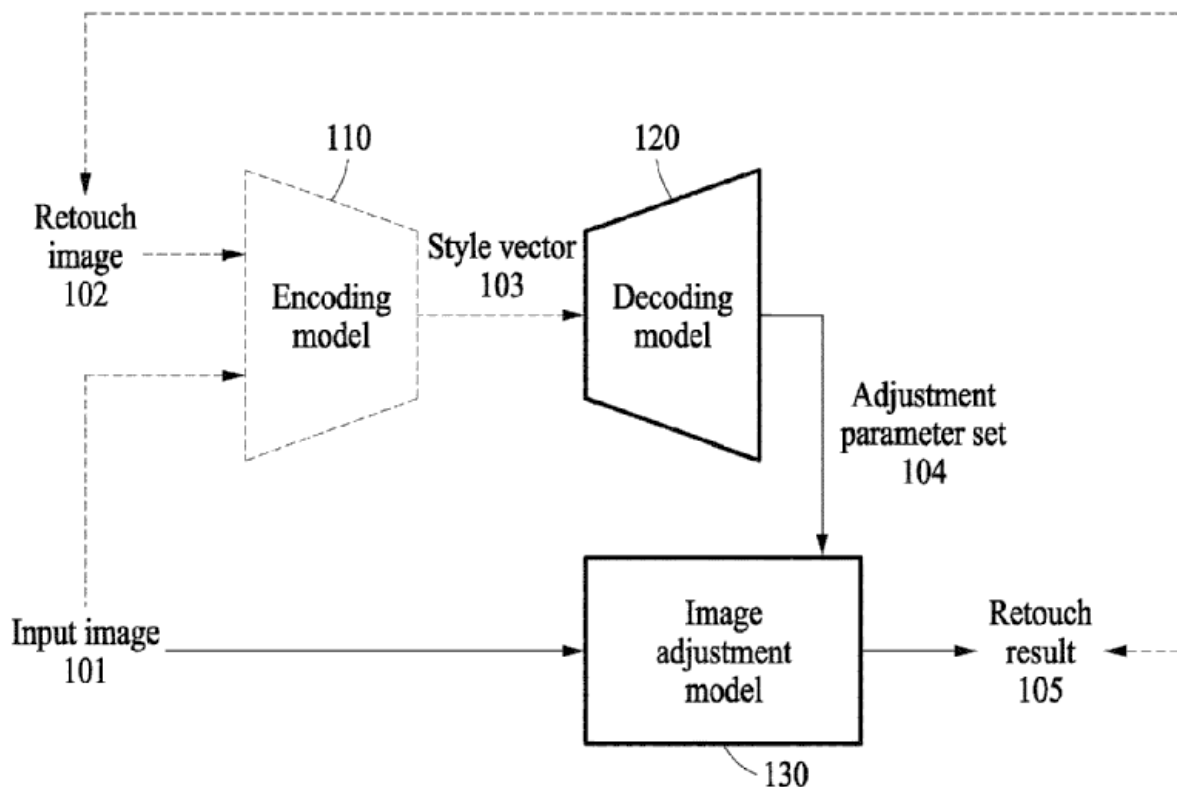
Definition statement

This place covers:

All machine learning-based image enhancement methods, e.g. using:

- artificial neural networks [ANN] (add the indexing code [G06T 2207/20084](#)), convolutional neural networks [CNN], generative adversarial networks [GAN], deep learning
- decision trees
- support-vector machines
- regression analysis
- bayesian networks
- gaussian processes
- genetic algorithms

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Neural networks	G06N 3/02
Learning methods	G06N 3/08
Machine learning	G06N 20/00

Arrangements for image or video recognition or understanding using pattern recognition or machine learning using neural networks	G06V 10/82
Arrangements for image or video recognition or understanding using pattern recognition or machine learning using probabilistic graphical models from image or video features, e.g. Markov models or Bayesian networks	G06V 10/84

G06T 5/70

Denoising; Smoothing

Definition statement

This place covers:

- Removing noise from images
- Temporal denoising, spatio-temporal noise filtering (add the indexing code [G06T 2207/20182](#))
- Removing pattern noise from images
- Image smoothing
- Image blurring, adding motion blur to images, adding blur to images
- Edge-adaptive smoothing (add the indexing code [G06T 2207/20192](#))
- Smoothing of depth map in stereo or range images
- Antialiasing by image filtering
- Denoising or smoothing using singular value decomposition [SVD]

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Camera processing pipelines for suppressing or minimising disturbance in the image signal generation	H04N 23/81
Noise processing in circuitry of solid-state image sensors [SSIS], e.g. detecting, correcting, reducing or removing noise	H04N 25/60

Informative references

Attention is drawn to the following places, which may be of interest for search:

Antialiasing during drawing of lines	G06T 11/20
--------------------------------------	----------------------------

Antialiasing during filling a planar surface by adding surface attributes, e.g. colour or texture	G06T 11/40
Noise filtering in image pre-processing for image or video recognition or understanding	G06V 10/30
Noise or error suppression in colour picture communication systems	H04N 1/58
Processing image signals for flicker reduction in stereoscopic or multi-view video systems	H04N 13/144

Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/70](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/73

Deblurring; Sharpening

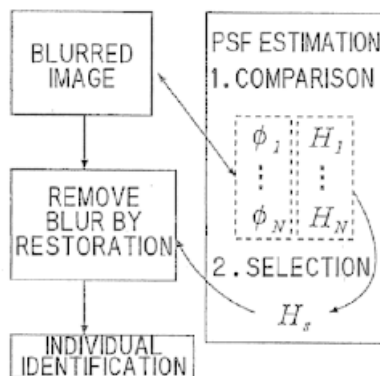
Definition statement

This place covers:

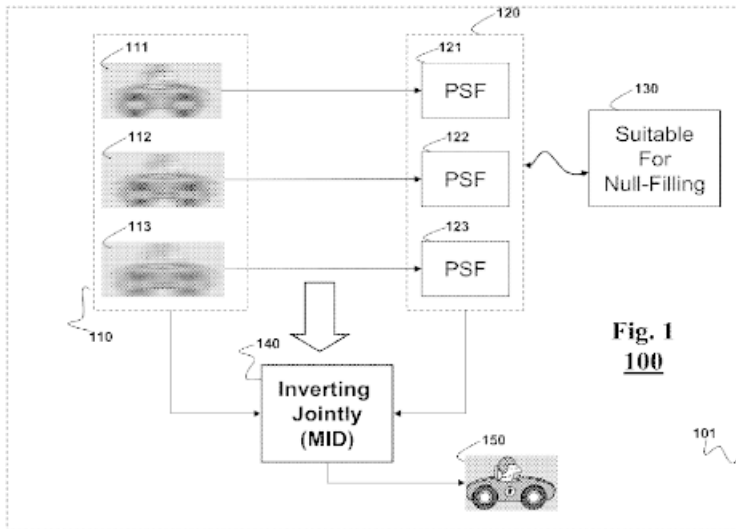
- Deblurring
- Removing motion blur from images (add the indexing code [G06T 2207/20201](#))
- Point-spread function [PSF] model of blurring
- Deconvolution
- Modulation transfer function [MTF]
- Sharpening, crispening
- Edge enhancement, edge boosting (add the indexing code [G06T 2207/20192](#))

Illustrative examples:

1.



2.



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Vibration or motion blur correction for stable pick-up of the scene in cameras or camera modules comprising electronic image sensors	H04N 23/682
--	-----------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Edge-driven scaling	G06T 3/403
Edge or detail enhancement for scanning, transmission or reproduction of documents or the like, e.g. facsimile transmission	H04N 1/4092
Edge or detail enhancement in colour picture communication systems	H04N 1/58

Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/73](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/75

Unsharp masking

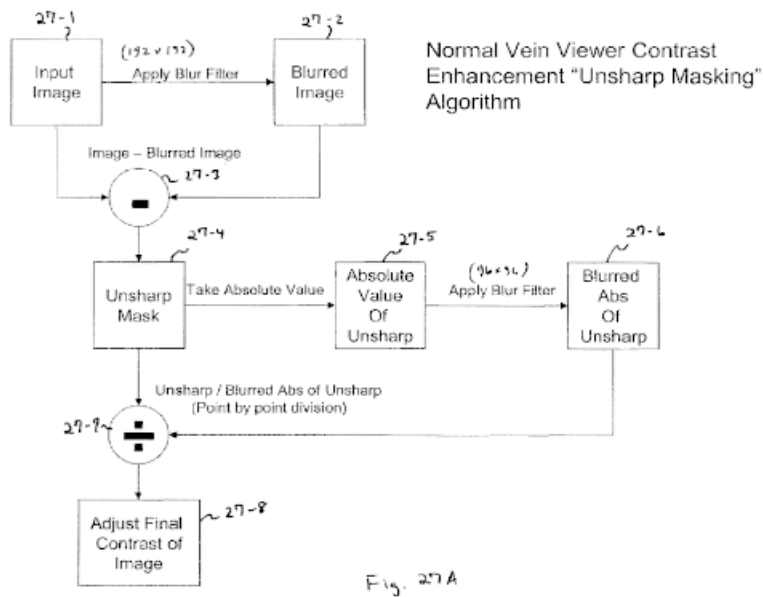
Definition statement

This place covers:

- Unsharp masking
- Adding or subtracting a processed version of an image to or from the image

Definition statement

Illustrative example:



Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/75](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/77

Retouching; Inpainting; Scratch removal

Definition statement

This place covers:

- Concealing defective pixels in images
- Scratch removal
- Inpainting by image filtering or by replacing patches within an image using a generated image or texture patch, or a patch retrieved from another source, e.g. image databases or the Internet
- Correcting redeye defects (add the indexing code [G06T 2207/30216](#))

Illustrative examples:

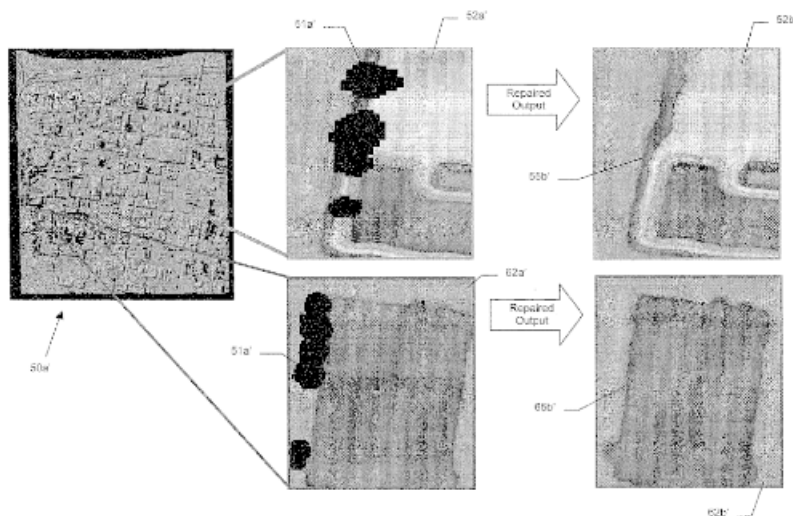


FIG. 6

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Scratch removal adapted to be used in scanners, printers, photocopying machines, displays or similar devices	H04N 1/4097
Picture signal generating by scanning motion picture films or slide opaques, e.g. for telecine	H04N 5/253
Noise processing, e.g. detecting, correcting, reducing or removing noise in circuitry of solid-state image sensors [SSIS]	H04N 25/60

Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection in image analysis	G06T 7/10
Analysis of geometric attributes in image analysis	G06T 7/60
Determining position or orientation of objects or cameras in image analysis	G06T 7/70
Determination of colour characteristics in image analysis	G06T 7/90
Texture generation as such	G06T 11/001
Recognition of eye characteristics	G06V 40/18
Retouching monochrome or colour images adapted to be used in scanners, printers, photocopying machines, displays or similar devices	H04N 1/40093 , H04N 1/62
Redeye correction adapted to be used in scanners, printers, photocopying machines, displays or similar devices	H04N 1/624

Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/77](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/80

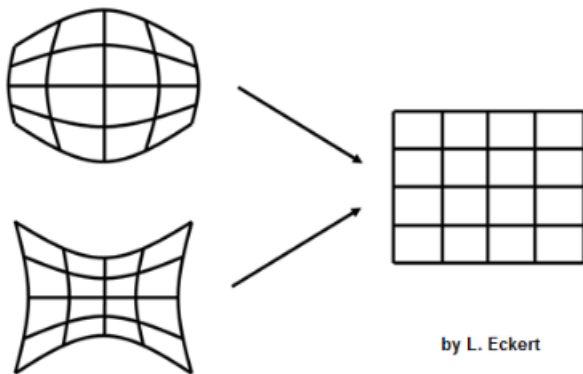
Geometric correction

Definition statement

This place covers:

- Correcting lens distortions or aberrations
- Correcting pincushion, barrel, trapezoidal or fish-eye distortions
- Calibrating parameters of lens distortion
- Reference grids, coordinate mapping

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transformations in the plane of the image	G06T 3/00
Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration	G06T 7/80
Normalisation of the pattern dimension during image preprocessing for image or video recognition	G06V 10/32

Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/80](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/90

Dynamic range modification of images or parts thereof

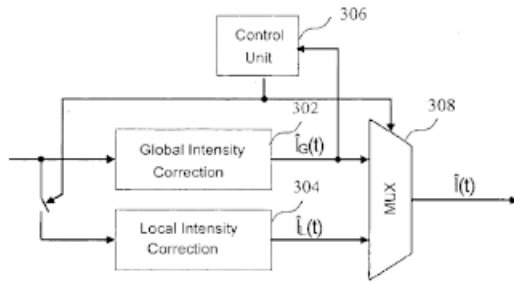
Definition statement

This place covers:

- Contrast enhancement based on a combination of local and global properties

Illustrative examples:

1.



2.

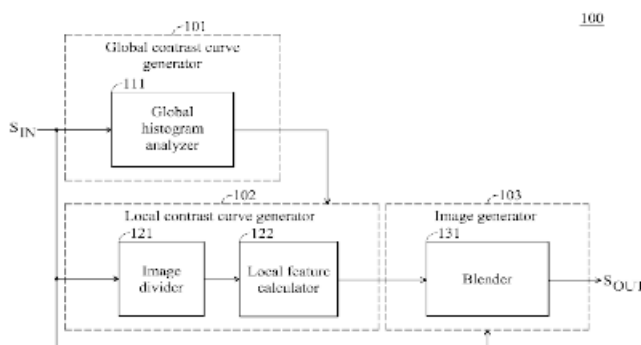


FIG. 1

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Circuitry for compensating brightness variation in the scene by increasing the dynamic range of the image compared to the dynamic range of the electronic image sensors	H04N 23/741
Bracketing, i.e. taking a series of images with varying exposure conditions	H04N 23/743

Informative references

Attention is drawn to the following places, which may be of interest for search:

Equalising the characteristics of different image components of stereoscopic or multi-view image signals, e.g. their average brightness or colour balance	H04N 13/133
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Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/90](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/92

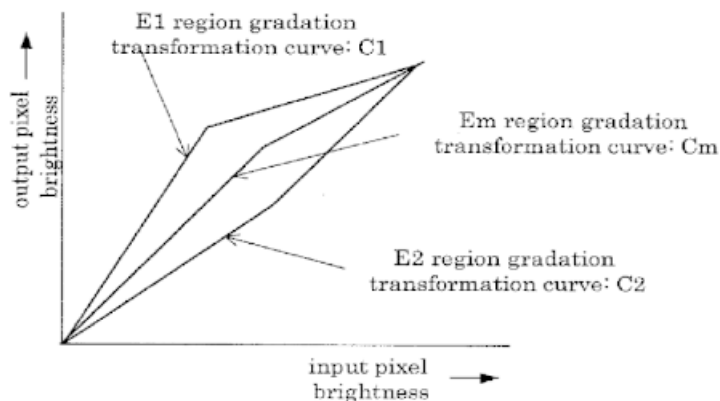
based on global image properties

Definition statement

This place covers:

- Global contrast enhancement or tone mapping to increase the dynamic range of an image, based on properties of the whole image, e.g. global statistics or histograms
- Contrast stretching, brightness equalisation
- Gamma and gradation correction in general
- Tone mapping for high dynamic range [HDR] imaging (add the indexing code [G06T 2207/20208](#))
- Intensity mapping, e.g. using lookup tables [LUT]

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Picture signal circuitry for controlling amplitude response in television systems	H04N 5/20
Gamma control in television systems	H04N 5/202
Circuitry for compensating brightness variation in the scene	H04N 23/70
Camera processing pipelines comprising electronic image sensors	H04N 23/80

Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/92](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 5/94

based on local image properties, e.g. for local contrast enhancement

Definition statement

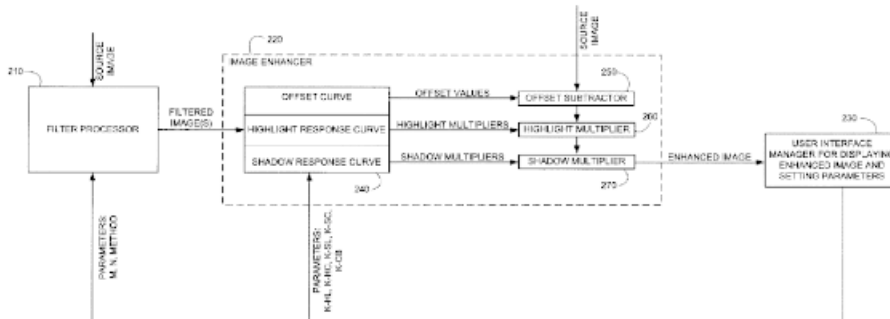
This place covers:

- Local contrast enhancement, e.g. locally adaptive filtering

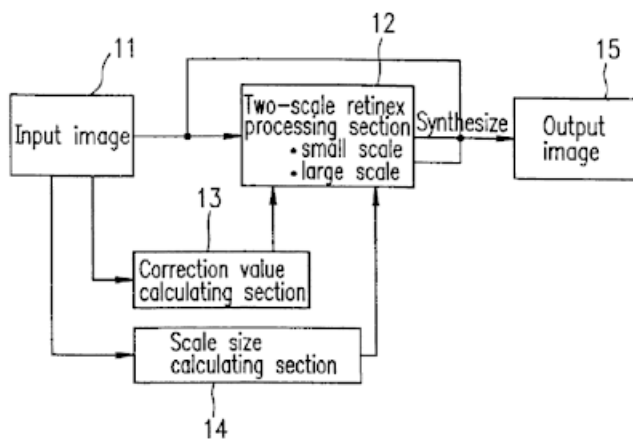
- Retinex processing

Illustrative examples:

1.



2.



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Unsharp masking	G06T 5/75
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Special rules of classification

Whenever possible or appropriate, documents classified in group [G06T 5/94](#) should additionally be classified in groups [G06T 5/10](#) - [G06T 5/60](#).

G06T 7/00

Image analysis

Definition statement

This place covers:

- Analysis of motion, i.e. determining motion of an image subject, or of the camera having acquired the images; Tracking; Change detection; e.g. by block matching, feature-based methods, gradient-based methods, hierarchical or stochastic approaches, motion estimation from a sequence of stereo images.

Definition statement

- Analysis of texture, i.e. analysis of colour or intensity features which represent a perceived image texture, e.g. based on statistical or structural descriptions.
- Analysis of geometric attributes, e.g. area, perimeter, diameter, volume, convexity, concavity, centre of gravity, moments or symmetry.
- Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration; Calibration of stereo cameras, e.g. determining the transformation between left and right camera coordinate systems
- Computational analysis of images to determine information, e.g. parameters or characteristics, therefrom
- Inspection-detection on images, e.g. flaw detection; Industrial image inspection using e.g. a design-rule based approach or an image reference. Industrial image inspection checking presence / absence; Biomedical image inspection.
- Segmentation, i.e. partitioning an image into regions, or edge detection, i.e. detection of edge features in an image, e.g. involving probabilistic or graph-based approaches, deformable models, morphological operators, transform domain-based approaches or the use of more than two images.
- Motion-based segmentation.
- Determination of transform parameters for the alignment of images, i.e. image registration, e.g. by correlation-, feature- or transform domain-based or statistical approaches.
- Depth or shape recovery, i.e. determination of scene depth parameters by consideration of image characteristics; Depth or shape recovery from shading, specularities, texture, perspective effects, e.g. vanishing points, or line drawings; Depth or shape recovery from multiple images involving amongst others contours, focus, motion, multiple light sources, photometric stereo or stereo images.
- Determining the position or orientation of objects, e.g. by feature- or transform domain-based or statistical approaches.
- Determination of image colour characteristics.

Relationships with other classification places

[G06T 7/00](#) covers the details of image analysis algorithms, insofar as it deals with the related image processing algorithms per se. Documents which merely mention the general use of image analysis, without details of the underlying image analysis algorithms, are classified in the application place. Where the image analysis is functionally linked and restricted to specific image acquisition or display hardware or processes, it is classified in the application place; otherwise, it is classified in [G06T 7/00](#). Where the essential technical characteristics relate both to the image analysis detail and to its particular use or special adaptation, classification is made in both [G06T 7/00](#) and the application place.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Computed tomography	A61B 6/03
Signal processing for Nuclear Magnetic Resonance (NMR) imaging systems	G01R 33/54
ICT specially adapted for processing medical images, e.g. editing 30/40	G16H 30/40
Scanning, transmission or reproduction of documents or the like	H04N 1/00
Stereoscopic television systems	H04N 13/00
Methods of arrangements for coding, decoding, compressing or decompressing digital video signals	H04N 19/00

Transforming light or analogous information into electric information using solid-state image sensors	H04N 25/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Image Acquisition	G06T 1/0007
Processor architectures; Processor configuration, e.g. pipelining	G06T 1/20
Processing seismic data	G01V 1/28
Methods or arrangements for reading or recognising printed or written characters or for recognising patterns	G06F 18/00 , G06V 10/00
Bioinformatics	G16B
Medical informatics	G16H

Special rules of classification

Where the essential technical characteristics of the invention relate both to the image analysis detail and to its particular use or special adaptation, classification is made in both [G06T 7/00](#) and the relevant application place in other subclasses.

[G06T 7/00](#) focuses on image processing algorithms. Although such algorithms sometimes need to take into account characteristics of the underlying image acquisition apparatus, inventions to the image acquisition apparatus per se are outside the scope of this group.

Additional information should be classified using one or more of the Indexing Codes from the ranges of [G06T 2200/00](#) or [G06T 2207/00](#). Their use is obligatory.

The classification symbol [G06T 7/00](#) is allocated to documents concerning:

- Architectures of image analysis systems, if not provided for elsewhere
- Extraction of MPEG7 descriptors, if not provided for elsewhere

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Stereo	Treatment of two images, e.g. from two cameras or a single camera that is displaced, in a pairwise manner
Feature	a significant image region or pixel with certain characteristics, for example a feature point, landmark, edge, corner or blob, typically determined by image operators.
Image analysis	the extraction of information from images through the use of image processing techniques acting upon image data, such as intensity, colour, motion and spatial frequency characteristics.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

AAM	Active appearance model
ASM	Active shape model
HMM	Hidden Markov Model
LBP	Local Binary Pattern

LPE	ligne de partage des eaux (French expression for watershed segmentation)
RANSAC	Random Sampling (and) Consensus
CAD	Computer-Aided Detection
SLAM	Simultaneous Localization and Mapping

G06T 7/0002

{Inspection of images, e.g. flaw detection}

Definition statement

This place covers:

- Quality, conformity control
- Defects, abnormality, incompleteness
- Acceptability determination
- User interface for automated visual inspection
- Database-to-object inspection
- Image quality inspection

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining position or orientation of objects	G06T 7/70
Validation, performance evaluation or active pattern learning techniques	G06F 18/217
Pattern matching criteria, e.g. proximity measures	G06F 18/22
Clustering techniques for pattern recognition	G06F 18/23
Classification techniques for pattern recognition	G06F 18/24
Image or video pattern matching	G06V 10/74
Pattern recognition or machine learning using clustering within arrangements for image or video recognition or understanding	G06V 10/762 , G06V 10/764
Detection or correction of errors in pattern recognition	G06V 10/98
Evaluation of the quality of the acquired pattern in pattern recognition	G06V 10/993

Special rules of classification

In relation to the remaining, function-oriented groups of [G06T 7/00](#), this subgroup is an application-oriented group. Therefore, documents classified herein should also be classified in a function-oriented group under [G06T 7/00](#), if they contain a considerable contribution on the respective function.

For image quality inspection [G06T 2207/30168](#) (Image quality inspection) should be added.

G06T 7/0004

{Industrial image inspection}

Definition statement

This place covers:

- Quality, conformity control in industrial context
- Defects, abnormality in industrial context
- Acceptability determination in industrial context
- User interfaces for automated visual inspection in industrial context
- "Teaching" (macros for inspection algorithms)
- Database-to-object inspection in industrial context
- Printing quality

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Investigating the presence of flaws or contamination on materials	G01N 21/88
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Contactless testing using optical radiation for printed circuits	G01R 31/309
Contactless testing using optical radiation for individual semiconductor devices	G01R 31/311
Photolithography mask inspection	G03F 7/7065
Component placement (in PCB manufacturing)	H05K 3/0008

Special rules of classification

When classifying in this group, the use of the indexing scheme [G06T 2207/30108](#) - [G06T 2207/30164](#) is mandatory for additional information related to industrial image inspection.

For user interfaces for automated visual inspection in industrial context, Indexing code [G06T 2200/24](#) (involving graphical user interfaces [GUIs]) should be added.

G06T 7/0006

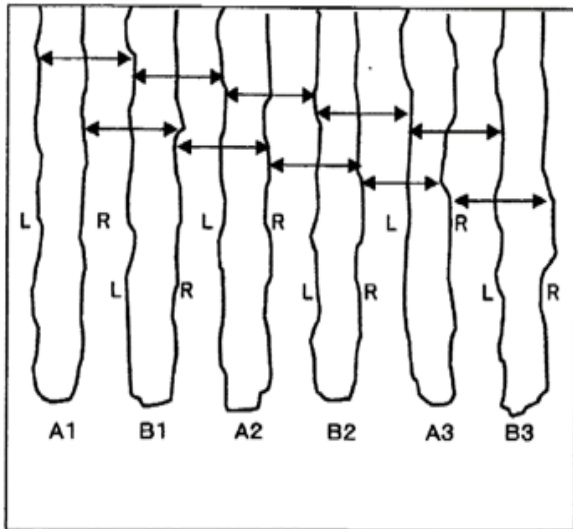
{using a design-rule based approach}

Definition statement

This place covers:

Verifying geometric design rules or known geometric parameters, e.g. width or spacing of structures, repetitive patterns

Illustrative example:



G06T 7/0008

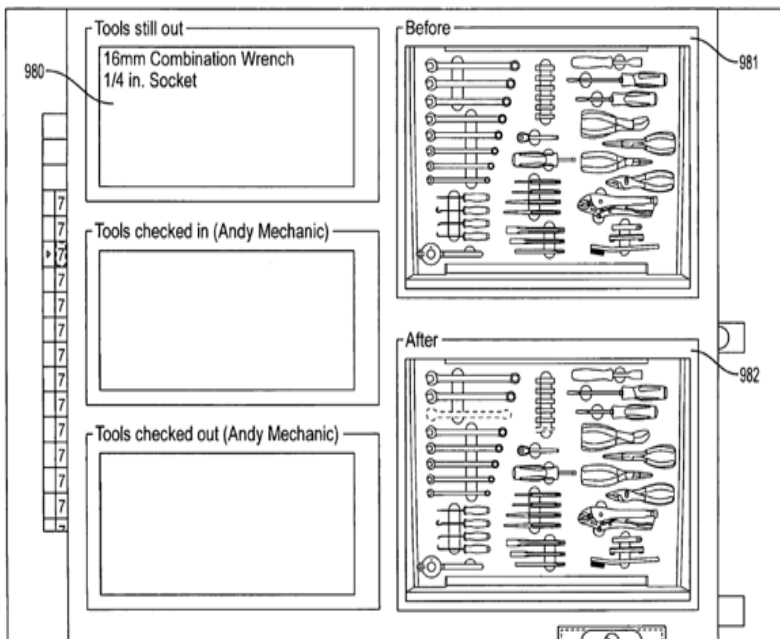
{checking presence/absence}

Definition statement

This place covers:

- Detecting the absence of an item that should be there
- Detecting incompleteness

Illustrative examples:



G06T 7/001

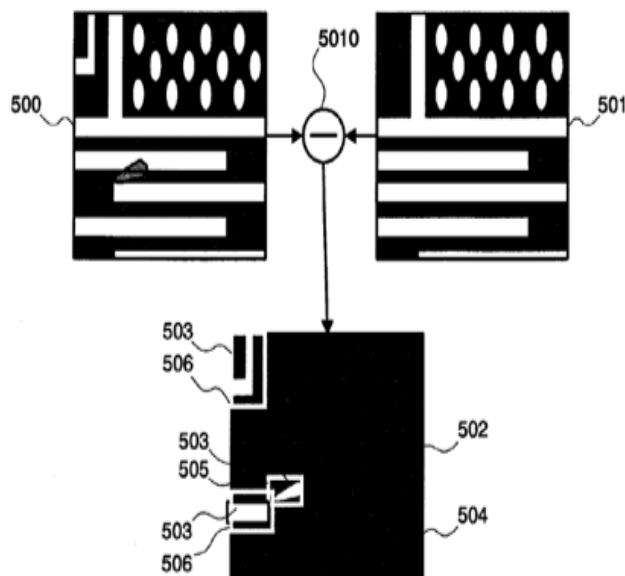
{using an image reference approach}

Definition statement

This place covers:

- Industrial image inspection where an image is compared to a reference image, standard image, ground truth image, gold standard: either by image comparison at image level, e.g. by image correlation, or by comparison of parameters extracted from the images
- Reference images originated from an image acquisition apparatus or derived from computer-aided design data

Illustrative examples:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining representative reference patterns or generating dictionaries	G06F 18/28
Determining representative reference patterns or generating dictionaries for image or video recognition or understanding	G06V 10/772

G06T 7/0012

{Biomedical image inspection}

Definition statement

This place covers:

Defects, abnormality in biomedical context

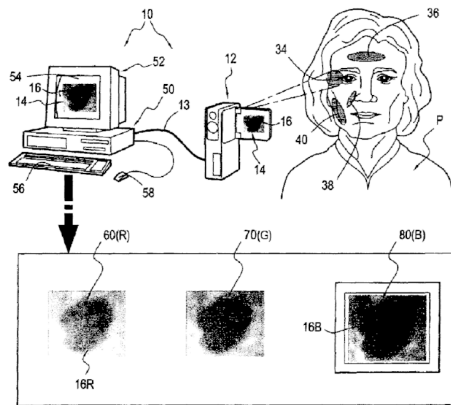
Computer-aided detection [CAD]

Detecting, measuring, scoring, grading of

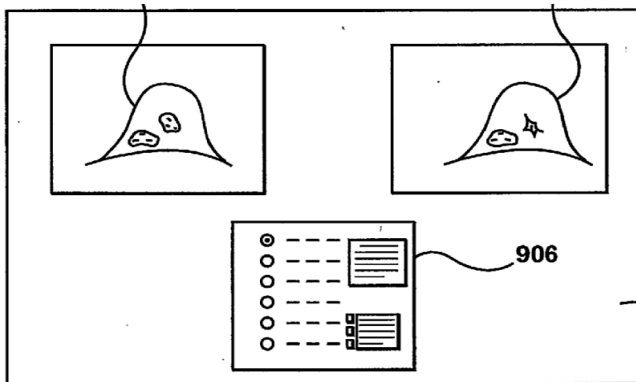
Definition statement

- Disease, pathology, lesions
- Cancer, tumor, tumour, malignancy, nodule
- Emphysema
- Microcalcifications
- Polyps
- Scar, non-viable tissue
- Osteoporosis, fracture risk prediction, Arthritis
- Alzheimer disease
- Scoring wrinkles, ageing
- Tissue abnormalities in microscopic images, e.g. inflammation, deformations
- Grading of living plants

Illustrative examples:



Characterising skin imperfections



Evaluating spine balance

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Apparatus for radiation diagnostics	A61B 6/00
Diagnosis using ultrasound	A61B 8/00
Signal processing for Nuclear Magnetic Resonance (NMR) imaging systems	G01R 33/54

Ultrasound imaging	G01S 7/52017 , G01S 15/8906
ICT specially adapted for processing medical images, e.g. editing	G16H 30/40

Informative references

Attention is drawn to the following places, which may be of interest for search:

Recognising microscopic objects	G06V 20/69
Bioinformatics	G16B
Medical informatics	G16H

Special rules of classification

When classifying in this group, the use of the indexing scheme [G06T 2207/30004](#) - [G06T 2207/30104](#) is mandatory for additional information related to biomedical image processing.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Biomedical	biological or medical
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G06T 7/0014

{using an image reference approach}

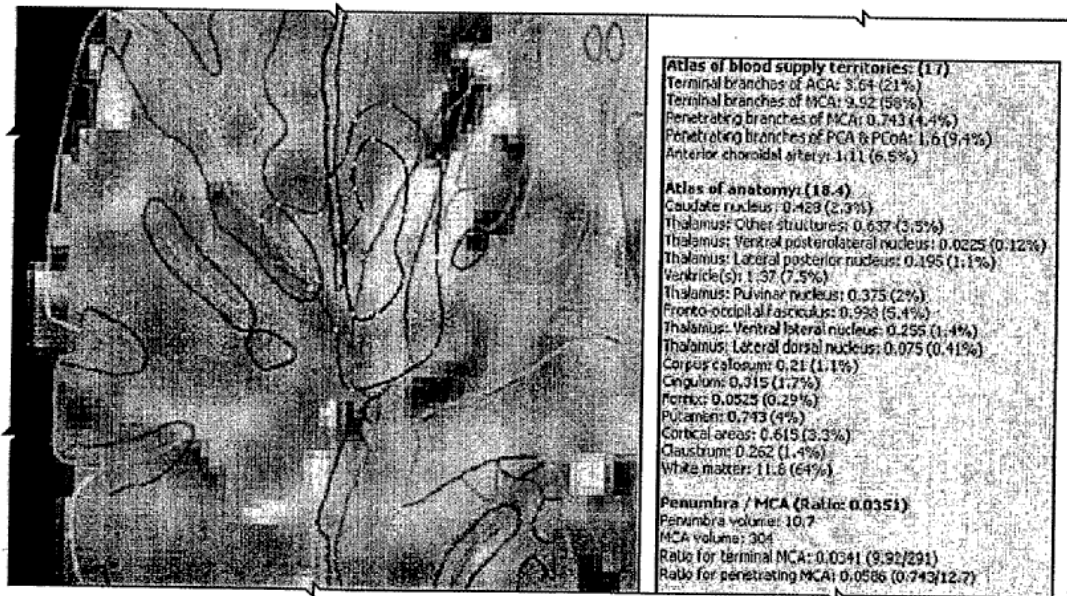
Definition statement

This place covers:

- Comparison to a reference image, standard image, atlas...
- Reference image taken from different patient or patients, or reference image taken from spatially different anatomical regions of the same patient, e.g. comparison of left and right body parts.

Illustrative examples

Superposition of a perfusion image and the brain atlas images in contour representation



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining representative reference patterns or generating dictionaries	G06F 18/28
Determining representative reference patterns or generating dictionaries for image or video recognition or understanding	G06V 10/772

G06T 7/0016

{involving temporal comparison}

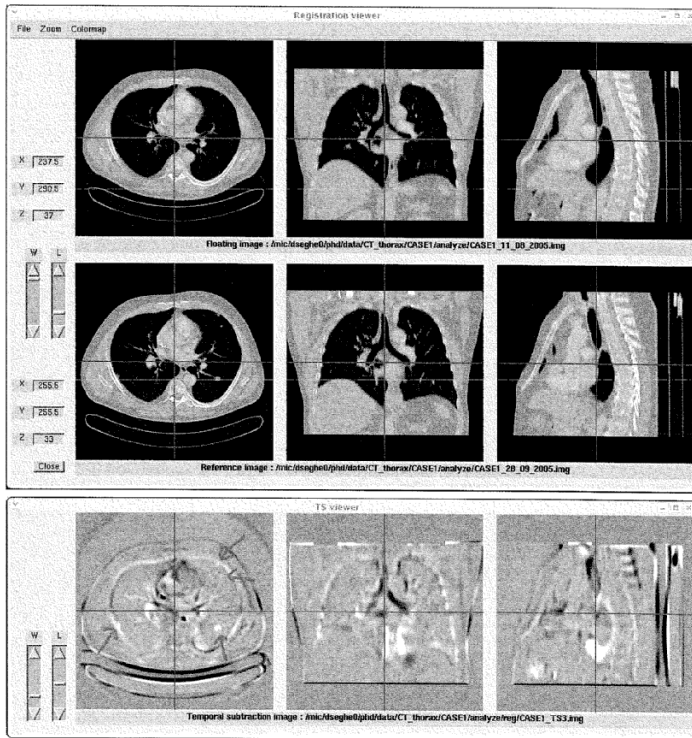
Definition statement

This place covers:

- Follow-up studies, comparison of images from different points of time, temporal difference images, temporal subtraction images, biomedical change detection.
- Reference image taken from the same patient and the same anatomical region.
- Subtraction angiography for abnormality detection.
- Assessment of dynamic contrast enhancement, wash-in/wash-out for abnormality detection.
- Plethysmography based on image analysis

Illustrative example:

Floating image, reference image and temporal subtraction image



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of motion, e.g. change detection in general	G06T 7/20
Pattern matching criteria, e.g. proximity measures	G06F 18/22
Temporal feature extraction for image or video recognition or understanding	G06V 10/62
Image or video pattern matching	G06V 10/74

Special rules of classification

For plethysmography based on image analysis, Indexing Code [G06T 2207/30076](#) should be added.

G06T 7/10

Segmentation; Edge detection (motion-based segmentation [G06T 7/215](#))

Definition statement

This place covers:

- Segmentation, i.e. partitioning an image into regions
- Edge detection, i.e. detection of edge features in an image

References

Limiting references

This place does not cover:

Motion-based segmentation	G06T 7/215
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Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Separation of touching or overlapping patterns for pattern recognition, e.g. character segmentation for optical character recognition (OCR)	G06V 10/26
Extraction of image features/characteristics for pattern recognition	G06V 10/40
Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	G06V 10/44

Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of texture	G06T 7/40
Determination of colour characteristics	G06T 7/90
Clustering techniques in pattern recognition	G06F 18/23
Classification techniques in pattern recognition	G06F 18/24
Feature extraction related to colour, for pattern recognition	G06V 10/56
Pattern recognition or machine learning using clustering within arrangements for image or video recognition or understanding	G06V 10/762 , G06V 10/764

G06T 7/11

Region-based segmentation

Definition statement

This place covers:

Methods evaluating properties or features of image regions to determine the segmentation result, e.g.:

- Thresholding, fixed threshold binarisation, multiple and histogram-derived thresholds
- Region growing, splitting and merging
- Colour-based segmentation
- Texture-based segmentation

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition	G06V 10/28
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Extraction of features or characteristics of the image related to colour, for pattern recognition	G06V 10/56
Cutting or merging image elements, e.g. region growing, watershed, clustering-based techniques, for pattern recognition	G06V 40/23

Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of texture	G06T 7/40
Determination of colour characteristics	G06T 7/90

G06T 7/12

Edge-based segmentation

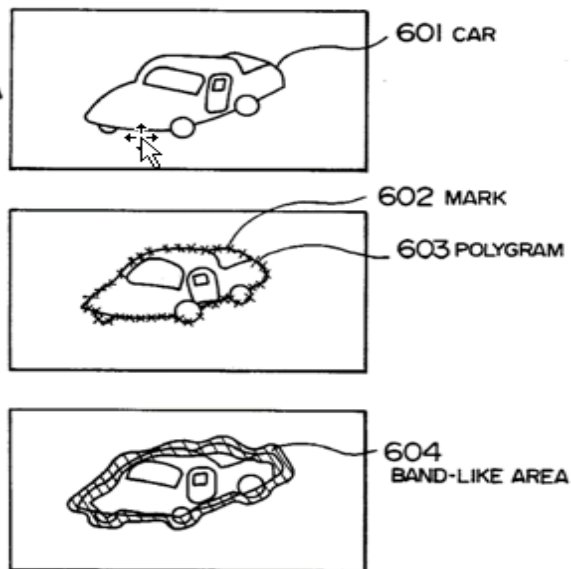
Definition statement

This place covers:

Methods evaluating (closed) contours, edges or outlines of image portions to determine the segmentation result, e.g.:

- Contour-based segmentation
- Detection of straight edge-lines (e.g. buildings or roads from aerial images) which partition an image into regions
- Finding and linking edge candidate points or segments (edgels)

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	G06V 10/44
Extraction of features or characteristics of the image by coding the contour of a pattern, for pattern recognition	G06V 10/46

G06T 7/13

Edge detection

Definition statement

This place covers:

In contrast to [G06T 7/12](#), this group covers documents pertaining purely to edge-detection without partitioning an image into regions, e.g.:

- Derivative methods (first-order or gradient, second order, e.g. Laplacian)
- Zero crossing
- Corner detection

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns, e.g. edges or contours, or configurations, e.g. loops, corners, strokes, intersections, for pattern recognition	G06V 10/44
Extraction of features or characteristics of the image by coding the contour of a pattern, for pattern recognition	G06V 10/46

G06T 7/136

involving thresholding

References**Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition	G06V 10/28
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G06T 7/143

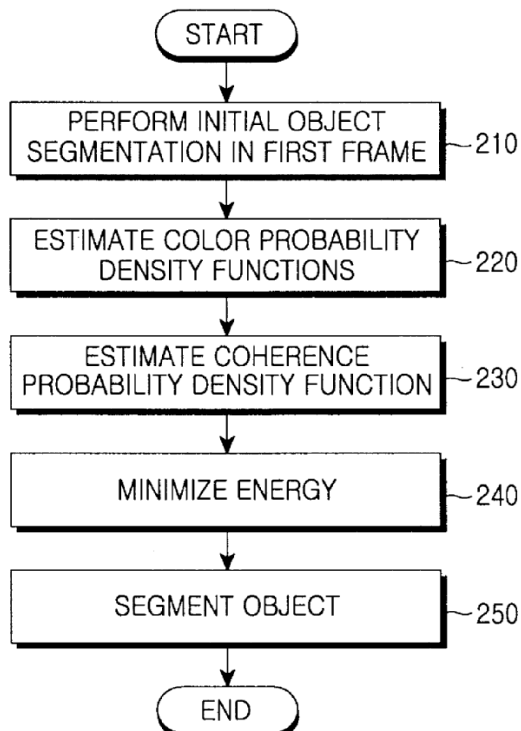
involving probabilistic approaches, e.g. Markov random field [MRF] modelling

Definition statement

This place covers:

- Statistical/Probabilistic methods for segmentation

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Classification techniques based on a parametric (probabilistic) model, for pattern recognition	G06F 18/2415
Markov models or related models, Markov random fields or networks embedding Markov models for pattern recognition	G06F 18/295
Detecting partial patterns or configurations by analysing connectivity relationship of elements of the pattern, for pattern recognition	G06V 10/457
Pattern recognition or machine learning using classification within arrangements for image or video recognition or understanding	G06V 10/764

G06T 7/149

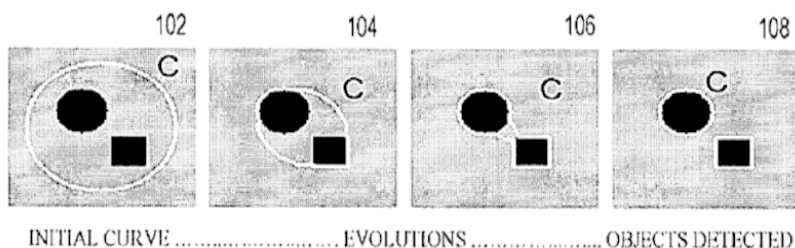
involving deformable models, e.g. active contour models

Definition statement

This place covers:

- Model-based segmentation (in particular when applied to biomedical images)
- Methods based on active shape models
- Methods based on active appearance models
- Methods based on active contours, active surfaces, snakes or deformable templates

Illustrative example:



Evolution of Image Segmentation

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Pattern recognition techniques involving a deformation of the sample or reference pattern or elastic matching	G06V 10/754
Matching of contours based on a local optimisation criterion, e.g. snakes or active contours, for pattern recognition	G06V 10/755
Matching based on shape statistics, e.g. active shape models, for pattern recognition	G06V 10/7553

Matching based on statistics of image patches, e.g. active appearance models, for pattern recognition	G06V 10/7557
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Special rules of classification

For Active shape model [ASM], Indexing Code [G06T 2207/20124](#) should be added.

For Active appearance model [AAM], Indexing Code [G06T 2207/20121](#) should be added.

For Active contour; Active surface; Snakes, Indexing Code [G06T 2207/20116](#) should be added.

G06T 7/155

involving morphological operators

Definition statement

This place covers:

- Morphological methods
- Watersheds
- Toboggan-based methods

Illustrative examples:

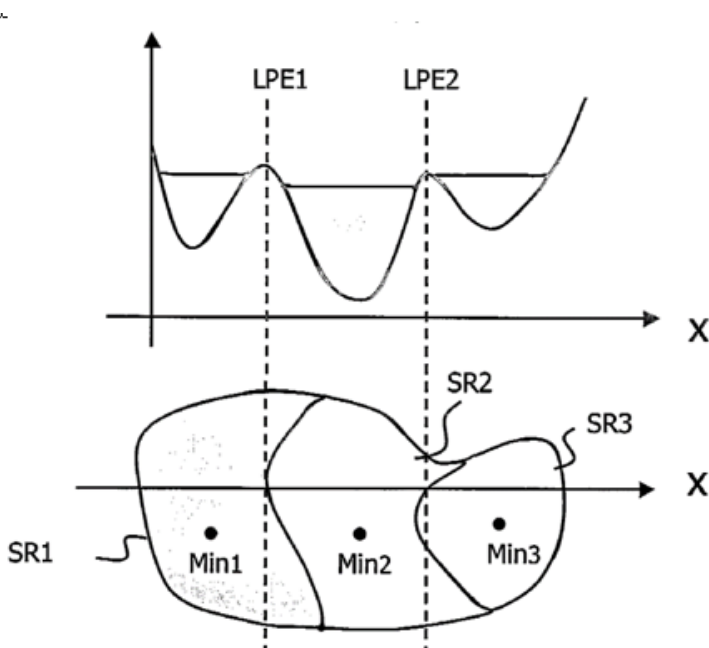


Figure 1. The 1D profile $I(x)$ representing the intensity of a dark object of interest on a light background, forms three basins which correspond to local minima Min1, Min2 and Min3 of the intensity

of the segmented region. The three basins give rise to two watershed lines LPE1 and LPE2, which divide the segmented region into three sub-regions SR1, SR2 and SR3.

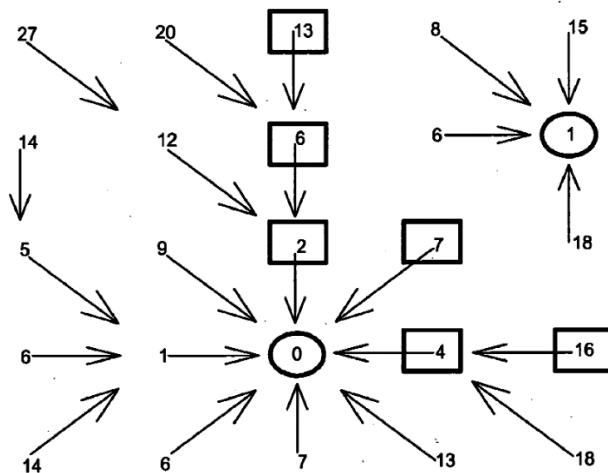


Figure 2. Toboggan-based object segmentation

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Smoothing or thinning the pattern, e.g. by morphological operators, for pattern recognition	G06V 10/34
Combinations of pre-processing functions using a local operator, for pattern recognition	G06V 10/36
Cutting or merging image elements, e.g. region growing, watershed, for pattern recognition	G06V 40/23

Special rules of classification

For Morphological image processing, an Indexing Code from the range of [G06T 2207/20036](#) - [G06T 2207/20044](#) should be added.

G06T 7/162

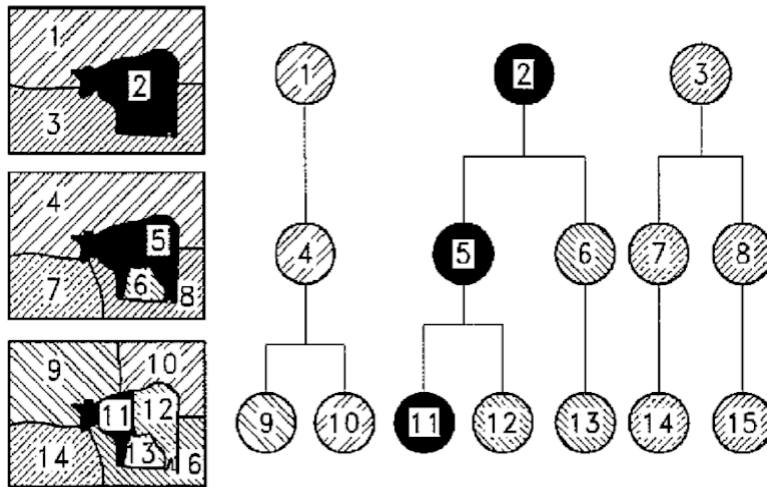
involving graph-based methods

Definition statement

This place covers:

- Graph-cut methods

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Feature extraction by graphical representation, e.g. directed attributed graphs, for pattern recognition	G06V 10/426
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Hierarchical clustering techniques, for pattern recognition	G06F 18/231
Non-hierarchical partitioning techniques based on graph theory, for pattern recognition	G06F 18/2323
Graph matching, for pattern recognition	G06V 30/1988

G06T 7/168

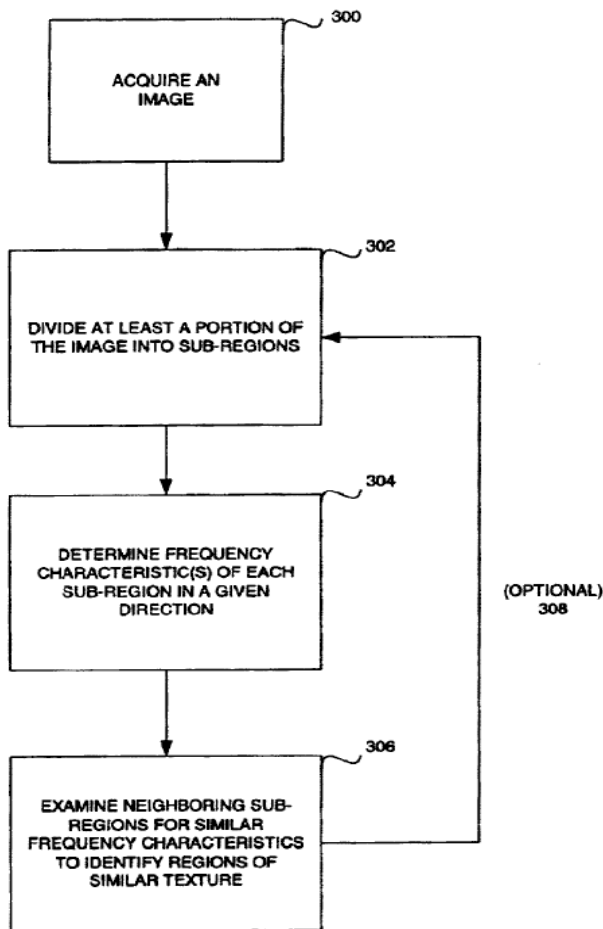
involving transform domain methods

Definition statement

This place covers:

- Fourier-, FFT-, Wavelet-based methods
- Gabor-, Laplace-transform-based methods
- Discrete cosine transform [DCT]-based methods
- Walsh-Hadamard transform [WHT]-based methods
- Hough transform

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	G06V 10/431
Detecting partial patterns using transforms (e.g. Hough transform), for pattern recognition	G06V 10/48
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	G06V 10/52

Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

G06T 7/174

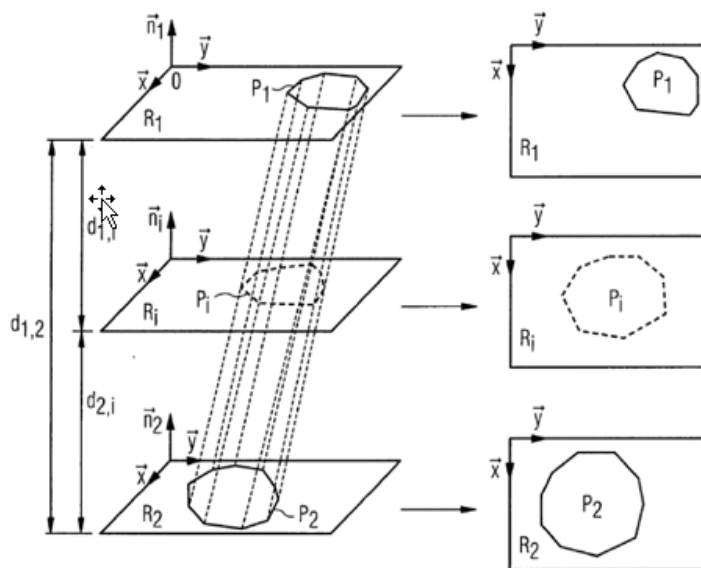
involving the use of two or more images

Definition statement

This place covers:

- Using information from multiple images to determine segmentation result
- Segmentation based on several images taken under varying illumination, focus, exposure, etc.
- Segmentation of a video frame involving several image frames of the video sequence, e.g. neighbouring frames
- Temporal and spatio-temporal segmentation, if not based on motion information
- Segmentation using several (neighbouring) slices of a tomographic data set (CT, MRI, PET, etc.), propagation of segmentation results between neighbouring slices
- Hierarchical segmentation methods (including wavelet-based schemes), if final segmentation result is derived from (partial) results at different resolution levels
- Multispectral image segmentation using information from different spectral bands (beyond the visible spectrum)

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Motion-based segmentation	G06T 7/215
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G06T 7/181

involving edge growing; involving edge linking

Definition statement

This place covers:

Image segmentation or edge detection methods based on

Definition statement

- edge growing
- edge linking
- edge following

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns by analysis of the connectivity relationships of elements of the pattern, e.g. by edge linking, connected component or neighbouring slice analysis, for pattern recognition	G06V 10/457
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G06T 7/187**involving region growing; involving region merging; involving connected component labelling****Definition statement**

This place covers:

Image segmentation methods based on

- region growing; region merging
- split-and-merge
- connected component labelling

Illustrative example:

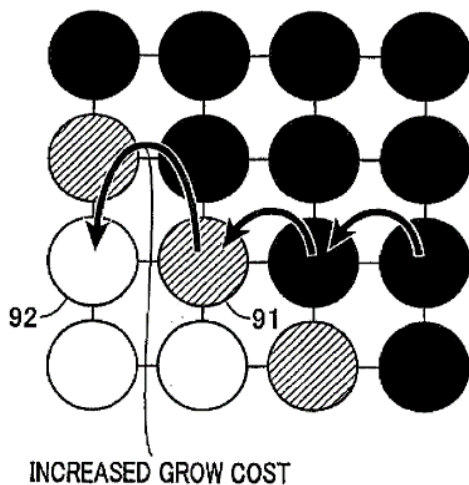


Figure 1. Region growing method which accumulates costs along a pixel path and as soon as the accumulated costs between neighbouring pixels (91, 92) become higher than a threshold, the growing is stopped.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Detecting partial patterns by analysis of the connectivity relationships of elements of the pattern, e.g. by edge linking, connected component or neighbouring slice analysis, for pattern recognition	G06V 10/457
Segmentation of touching or overlapping patterns, cutting or merging image elements, e.g. region growing, watersheds, for pattern recognition	G06V 40/23

G06T 7/194

involving foreground-background segmentation

Definition statement

This place covers:

Image segmentation or edge detection methods based on a separation of foreground, i.e. relevant parts, and background, i.e. non-relevant parts of an image.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Quantising the analogue image signal, e.g. histogram thresholding for discrimination between background and foreground patterns, for pattern recognition	G06V 10/28
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G06T 7/20

Analysis of motion (motion estimation for coding, decoding, compressing or decompressing digital video signals [H04N 19/43](#), [H04N 19/51](#))

Definition statement

This place covers:

- Image analysis algorithms for determining motion of an image subject, or of the camera having acquired the images. Determination of scene movement and between image frames, e.g. Change detection
- Tracking
- Motion capture
- Determining camera ego-motion add the Indexing Code [G06T 2207/30244](#): Camera pose
- Medical motion analysis, e.g. of the left ventricle of the heart add the Indexing Code [G06T 2207/30048](#): Heart; Cardiac
- Trajectory representation add the Indexing Code: [G06T 2207/30241](#) Trajectory
- Stabilisation of video sequences (see also [G06T 7/30](#))

References

Limiting references

This place does not cover:

Motion estimation for coding, decoding, compressing or decompressing digital video signals	H04N 19/43 , H04N 19/51
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Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Scene recognition	G06V 20/00
Recognising video content	G06V 20/52
Recognising scenes under surveillance	G06V 20/52
Recognising scenes perceived from a vehicle	G06V 20/56
Recognising scenes inside a vehicle	G06V 20/59
Gesture recognition	G06V 40/20
Burglar, theft or intruder alarms using cameras and image comparison	G08B 13/196

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determination of transform parameters for the alignment of images, i.e. image registration	G06T 7/30
Depth or shape recovery from motion	G06T 7/579
Determining position or orientation of objects	G06T 7/70
Video games	A63F 13/00
Target following using TV type tracking systems	G01S 3/7864
Light barriers	G01V 8/20
Data indexing of video sequences	G06F 16/50
Surveillance systems using closed-circuit television systems (CCTV)	H04N 7/18

Special rules of classification

For camera pose, Indexing Code [G06T 2207/30244](#) should be added. For heart, cardiac, Indexing Code [G06T 2207/30048](#) should be added. For trajectory details, Indexing Code [G06T 2207/30241](#) should be added. For sports video, sports image, Indexing Code [G06T 2207/30221](#) should be added

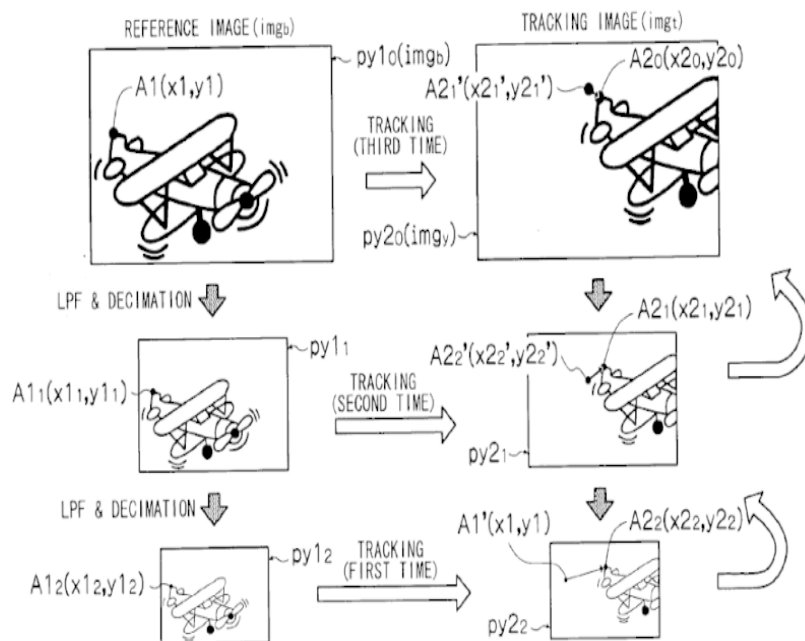
G06T 7/207

for motion estimation over a hierarchy of resolutions (multi-resolution motion estimation or hierarchical motion estimation for coding, decoding, compressing or decompressing digital video signals [H04N 19/53](#))

Definition statement

This place covers:

Illustrative example:



References

Limiting references

This place does not cover:

Multi-resolution motion estimation or hierarchical motion estimation for coding, decoding, compressing or decompressing digital video signals	H04N 19/53
---	----------------------------

G06T 7/215

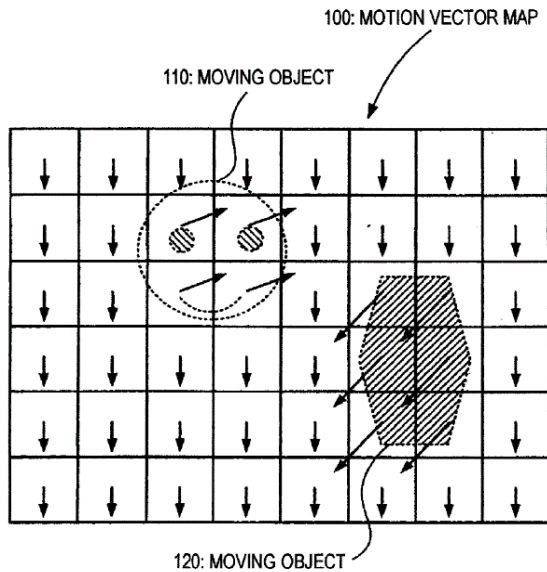
Motion-based segmentation

Definition statement

This place covers:

- Figure-ground segmentation by detection of moving object(s) from dense motion representation
- Partitioning an image into regions of homogenous 2D (apparent) motion
- Based on analysis of motion vector field or motion flow
- Grouping from optical flow

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Retrieval of video data using motion, e.g. objection motion	G06F 16/786
Segmenting video sequences, e.g. scene change analysis	G06V 20/49
Scene change analysis	H04N 5/147

Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation; Edge detection	G06T 7/10
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G06T 7/223

using block-matching

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Movement estimation for television pictures	H04N 5/144
Predictive coding in television systems using temporal prediction with motion detection	H04N 19/503

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image coding using predictors	G06T 9/004
Use of motion vectors for image compression, coding using predictors, video coding	H04N 19/52

G06T 7/231

using full search

Definition statement

This place covers:

Full, exhaustive, brute force search

Illustrative example:

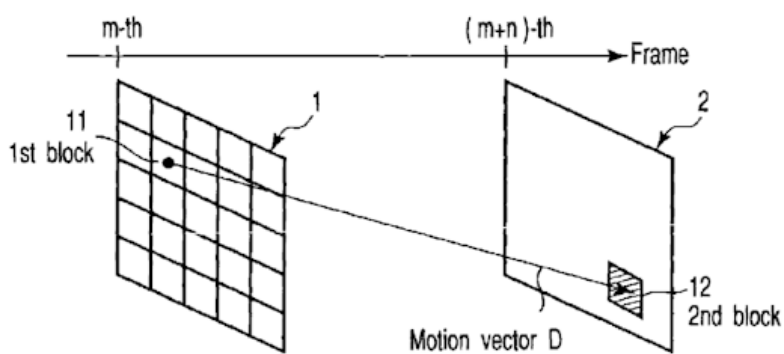


Figure 1. A motion vector between the m-th frame (1) and the (m+n)-th frame (2) is detected. At first, the image data of the m-th frame 1 is divided into a plurality of first blocks 11, and the first blocks 11 are extracted sequentially. The second block 12 of the same size and shape as the extracted first block 11 is extracted from the image data of the (m+n)-th frame 2. The absolute difference value of the corresponding pixels of the extracted first block 11 and the extracted second block 12 is computed every pixel.

G06T 7/238

using non-full search, e.g. three-step search

Definition statement

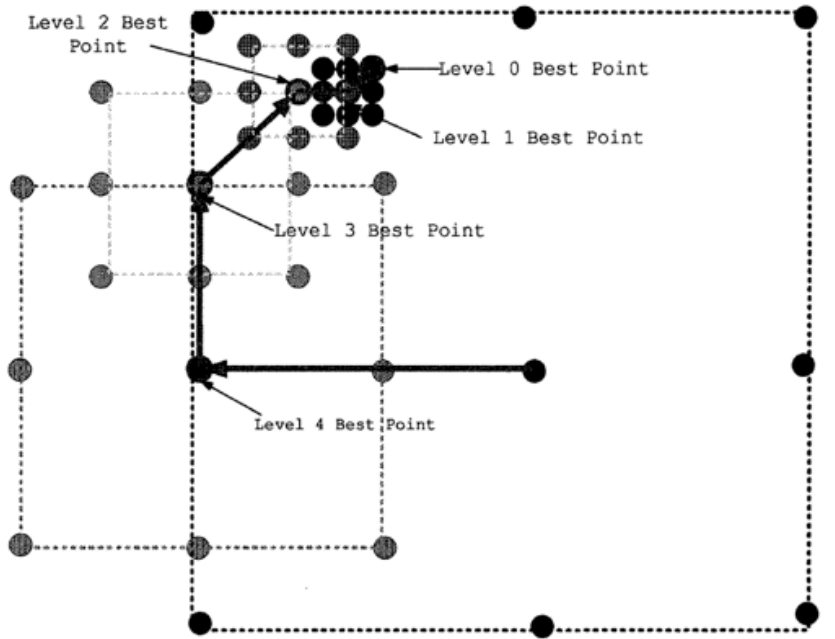
This place covers:

- Non-full, layered structure, fast, adaptive, efficient search
- Three-Step, New Three-Step, Four-Step Search
- Simple and Efficient Search
- Binary Search
- Spiral Search
- Two-Dimensional Logarithmic Search
- Cross Search Algorithm
- Adaptive Rood Pattern Search

Definition statement

- Orthogonal Search
- One-at-a-Time Algorithm
- Diamond Search
- Hierarchical search
- Spatial dependency check

Illustrative example of an hierarchical search:



Special rules of classification

For Hierarchical, coarse-to-fine, multiscale or multiresolution image processing; Pyramid transform, Indexing Code [G06T 2207/20016](#) should be added.

G06T 7/246

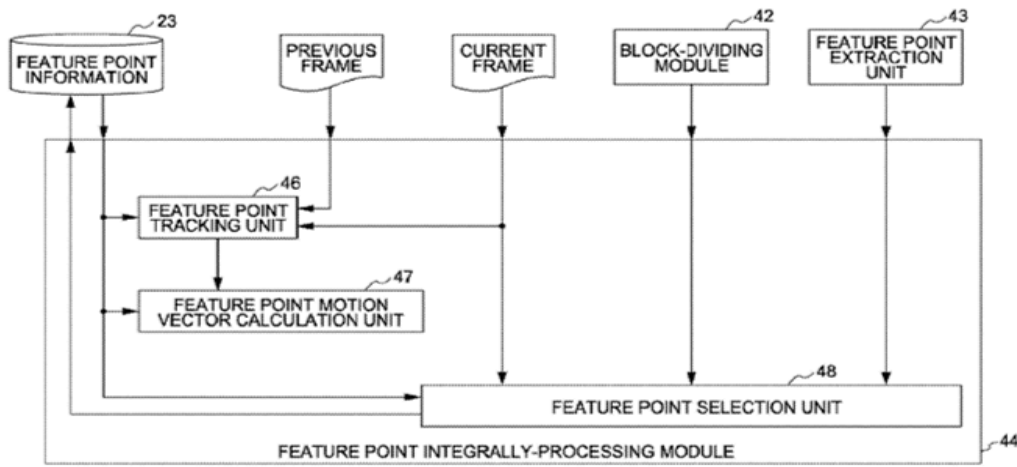
using feature-based methods, e.g. the tracking of corners or segments

Definition statement

This place covers:

- Feature points, e.g. determined by image operators; also matching of point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Illustrative example:



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Feature	a significant image region or pixel with certain characteristics
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G06T 7/248

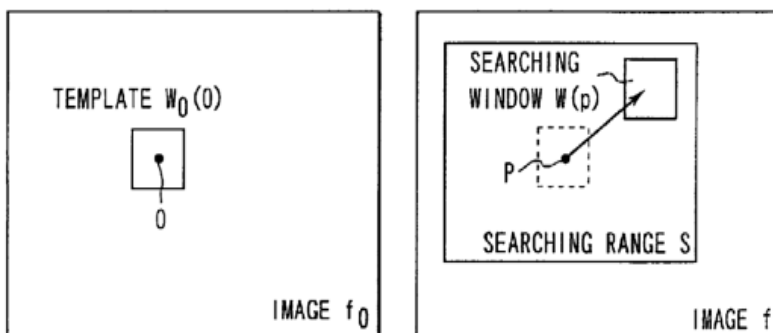
{involving reference images or patches}

Definition statement

This place covers:

- Involving correlation of "true to reality" image patches, templates, regions of interest
- Correlation used for 1) finding features in each image or for 2) finding regions of interest from one image in the other images

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Face recognition using comparisons between temporally consecutive images	G06V 40/167
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of motion using block-matching (where blocks are arbitrarily defined by a grid, not as a significant image region)	G06T 7/223
Image matching for pattern recognition or image matching in general	G06V 40/167

G06T 7/251

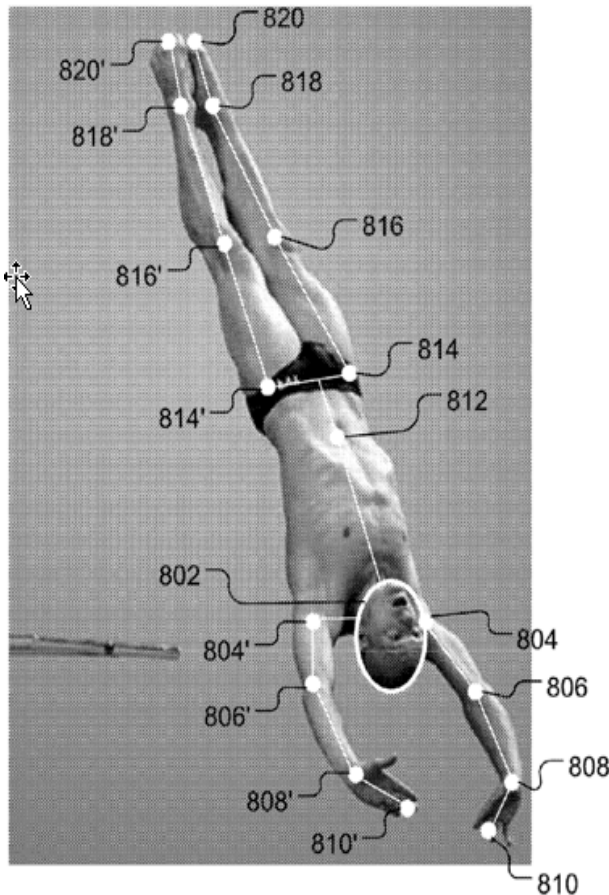
{involving models}

Definition statement

This place covers:

- Involving matching of intermediary 2D or 3D models extracted from each image before motion analysis, e.g. skeletons, stick models, ellipses, geometric models of all kinds, polygon models, active appearance and shape models, as opposed to reference images or patches
- Model matching used for 1) finding features in each image or for 2) finding structure of interest from one image in the other images

Illustrative example:



For each frame of a captured video sequence, a basic human body model 800 for diving competitions is superimposed on the frame and adjusted to provide an accurate representation of the diver's positioning in that frame, the sequence of adjusted models describing the entire motion sequence of the diver.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching of contours in general or matching of contours for pattern recognition	G06V 10/752
Syntactic or structural pattern recognition, e.g. symbolic string recognition	G06V 30/1983

G06T 7/254

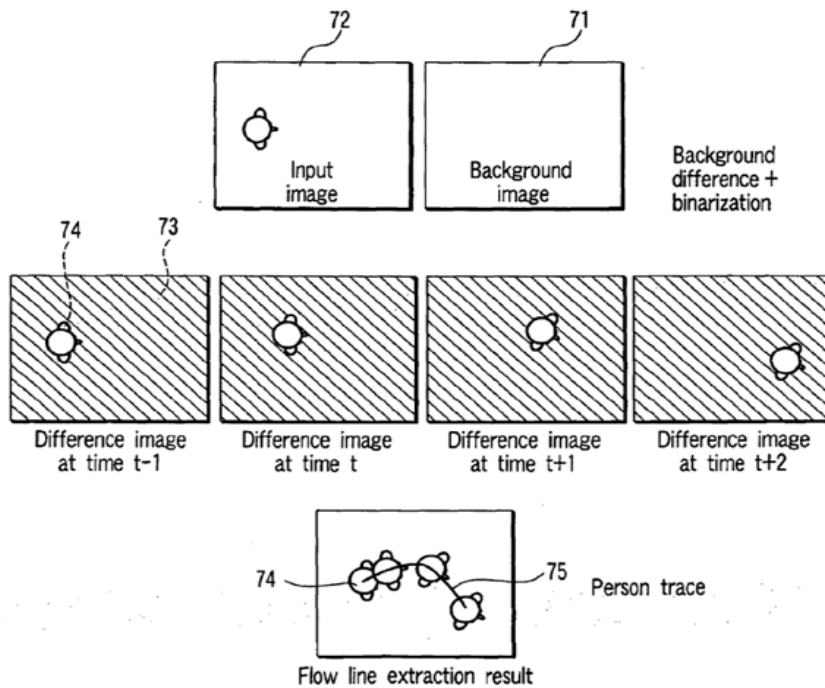
involving subtraction of images

Definition statement

This place covers:

- Subtraction of previous image
- Subtraction of background image, background maintenance, background models therefor
- Also involving ratio or more general comparison of corresponding pixels in successive frames

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Burglar, theft or intruder alarms using cameras and image comparison	G08B 13/196
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Change detection in biomedical image inspection	G06T 7/0014
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G06T 7/262

using transform domain methods, e.g. Fourier domain methods

Definition statement

This place covers:

- Fourier, DCT, Wavelet, Gabor, etc.
- Using phase correlation

Illustrative examples:

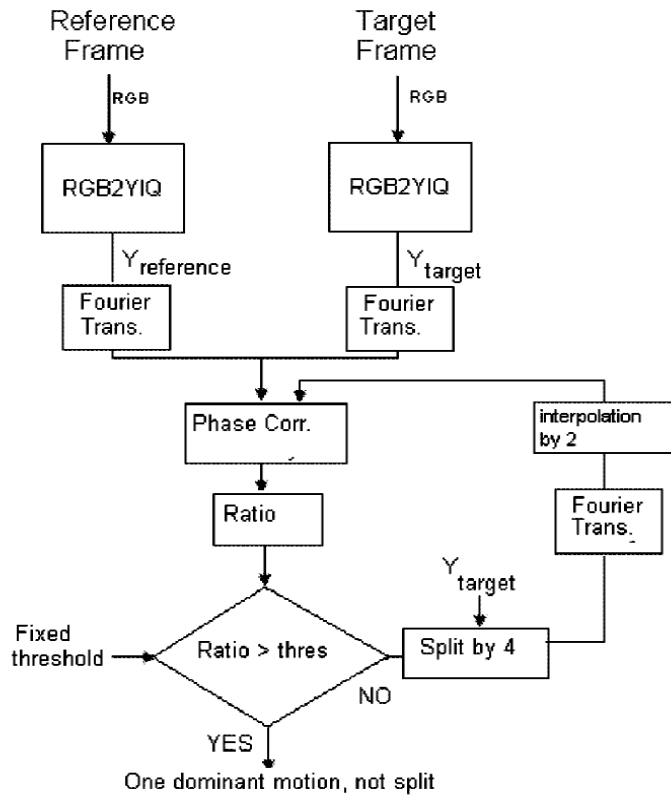


Figure 1.

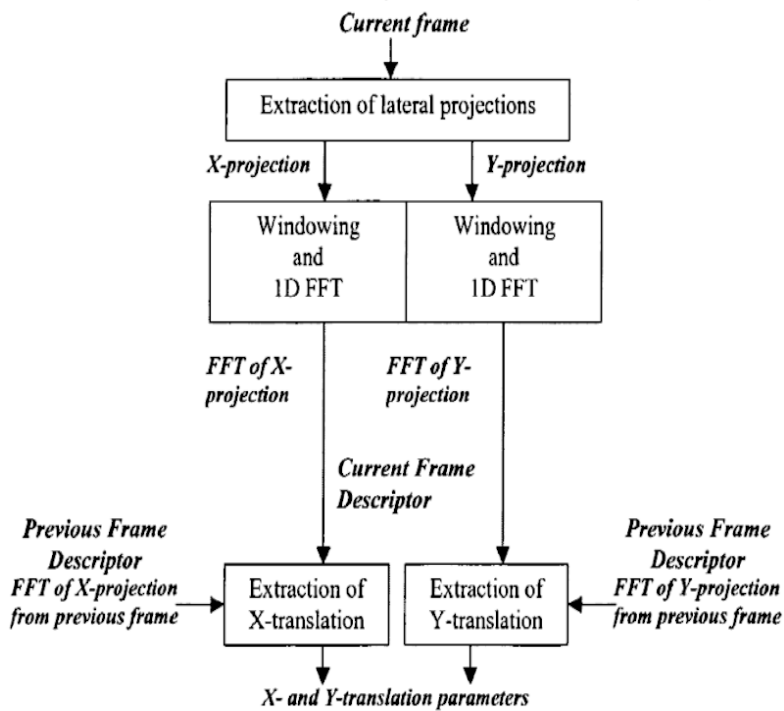


Figure 2.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	G06V 10/431
Detecting partial patterns using Hough transform for pattern recognition	G06V 10/48
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	G06V 10/52

Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

G06T 7/269

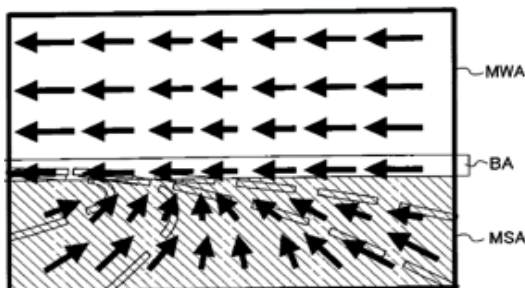
using gradient-based methods

Definition statement

This place covers:

Optic (optical) flow involving the calculation of spatial and temporal gradient

Illustrative example:



G06T 7/277

involving stochastic approaches, e.g. using Kalman filters

Definition statement

This place covers:

- Bayesian methods
- HMM
- Particle filtering

Illustrative examples:

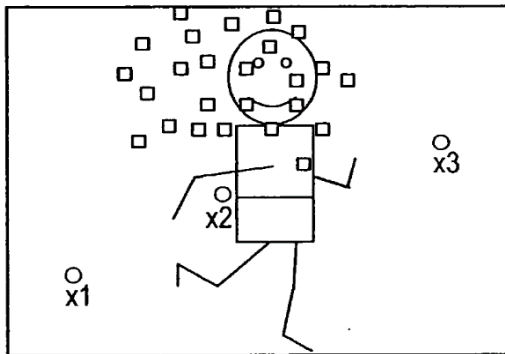


Figure 1.

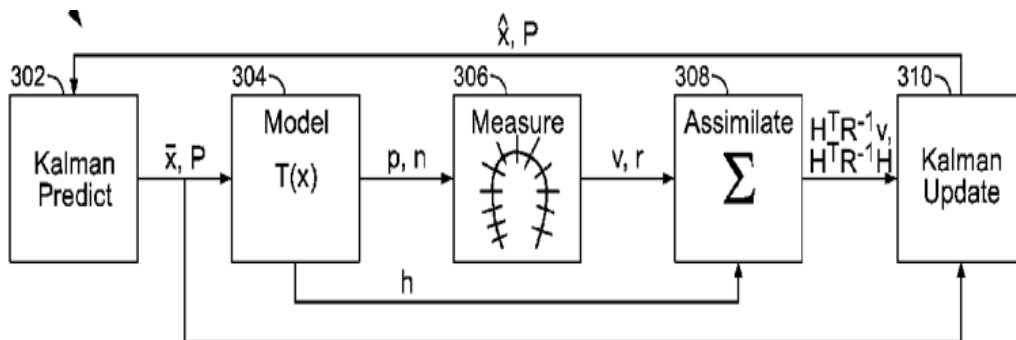


Figure 2. Kalman filter-based tracking of 3D heart model

Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/20](#).

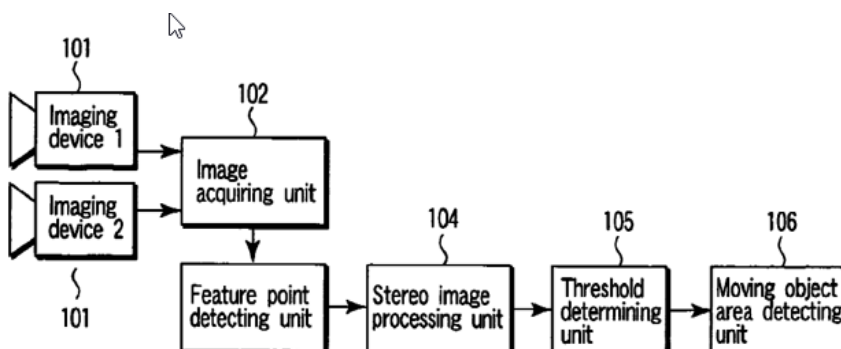
G06T 7/285

using a sequence of stereo image pairs

Definition statement

This place covers:

Illustrative example:



G06T 7/292

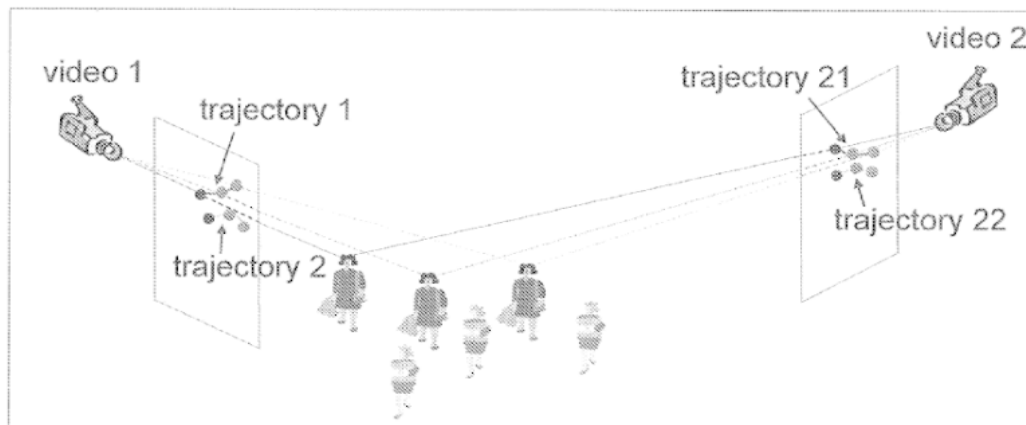
Multi-camera tracking

Definition statement

This place covers:

- Algorithms for camera networks
- Interaction, cooperation between trackers
- Multi-view tracking, multi-camera tracking
- The cameras view the same scene (cooperation, e.g. by voting, fusion)
- The cameras view different scenes (cooperation, e.g. by handover, tracklet joining, trajectory joining)

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Classification of unknown faces, i.e. recognising the same non-enrolled faces, e.g. recognising the unknown faces across different face tracks	G06V 40/173
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of motion using a sequence of stereo pairs, e.g. cooperative motion analysis from a single stereo camera pair or motion analysis from at least three views, wherein at least one pair of views is processed as stereo pair	G06T 7/285
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Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/20](#).

In particular, in the case of motion analysis from multiple monocular views with subsequent merging or joining of analysis results, details about the respective analysis algorithm per view should be classified in the subgroups of [G06T 7/20](#) as well.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Multi-camera	Treatment of multiple image sequences, not in a pairwise manner
Stereo	Treatment of two images, e.g. from two cameras or a single camera that is displaced, in a pairwise manner

G06T 7/30

Determination of transform parameters for the alignment of images, i.e. image registration

Definition statement

This place covers:

Image analysis algorithms for determining geometric transformations required to register (i.e. align) separate images. The process involves the estimation of transform parameters. Registration means determining the alignment of images or finding their relative position.

- Registration of image subparts for the construction of mosaics image
- Multi-modal, cross-modal, across-modal registration of medical image data sets
- Registration with medical atlas Registration of pre-operative and intra-operative medical image data sets
- Registration for change detection in biomedical or remote sensing images (change detection see also [G06T 7/20](#))
- Registration of models
- Registration of a model with an image
- Registration of range data, point clouds (ICP algorithm)
- 2D/2D, 2D/3D, 3D/3D registration
- Interactive registration

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Segmentation involving deformable models	G06T 7/149
Recognising three-dimensional objects, e.g. range data matching for pattern recognition	G06V 20/64

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transformation in the plane of the image for image registration	G06T 3/14
Analysis of motion	G06T 7/20
Combining images from different aspect angles, e.g. spatial compounding	G01S 15/8995

Pattern matching criteria, e.g. proximity measures	G06F 18/22
Image or video pattern matching	G06V 10/74
Comparing pixel values or logical combinations thereof, e.g. template matching	G06V 10/751

Special rules of classification

For registration of medical image data, an Indexing Code from the range of [G06T 2207/30004-G06T 2207/30104](#)(Biomedical image processing) should be added.

For involving image mosaicing, Indexing Code [G06T 2200/32](#) should be added.

For Interactive image processing based on input by user, an Indexing Code from the range of [G06T 2207/20092-G06T 2207/20108](#) should be added.

Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

Recalage (French)	Registration (English)
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G06T 7/32

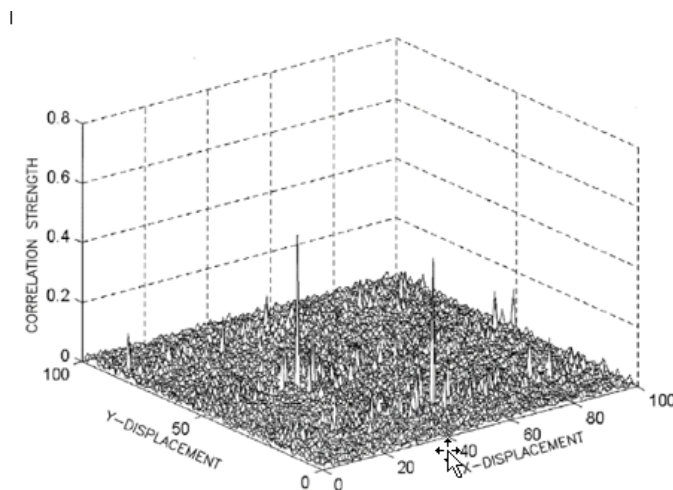
using correlation-based methods

Definition statement

This place covers:

- Global correlation
- Block-matching like correlation, if not for motion analysis

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Analysis of motion using block-matching	G06T 7/223
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G06T 7/33

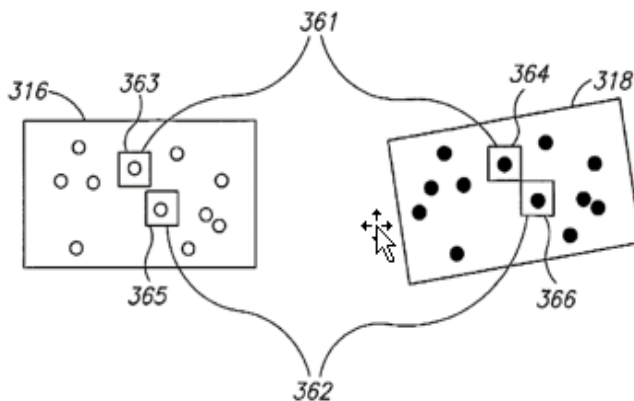
using feature-based methods

Definition statement

This place covers:

- Feature points, e.g. determined by image operators; also matching of point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Extraction of features or characteristics of the image, for pattern recognition	G06V 10/40
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Feature	significant image region or pixel with certain characteristics
---------	--

G06T 7/337

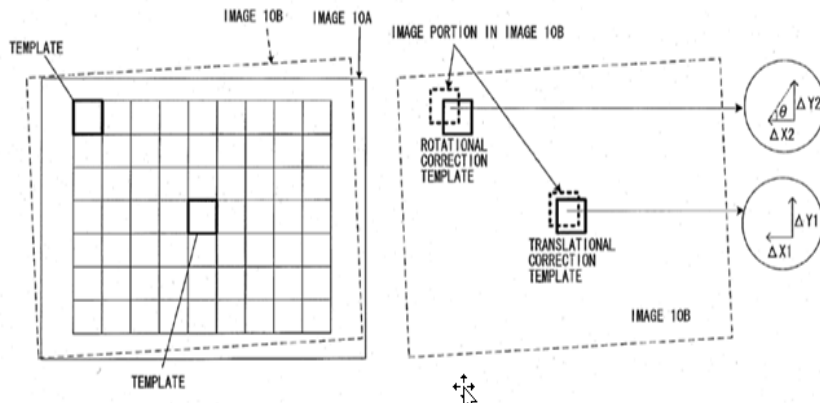
{involving reference images or patches}

Definition statement

This place covers:

Involving correlation with "true to reality" image patches, templates, regions of interest; correlation used for 1) finding features in each image, or for 2) finding regions of interest from one image in the other image.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image registration using correlation of complete images or block-matching-like registration (where blocks are arbitrarily defined by a grid, not as a significant image region, region of interest)	G06T 7/32
Pattern matching criteria, e.g. proximity measures	G06F 18/22
Image or video pattern matching	G06V 10/74

G06T 7/344

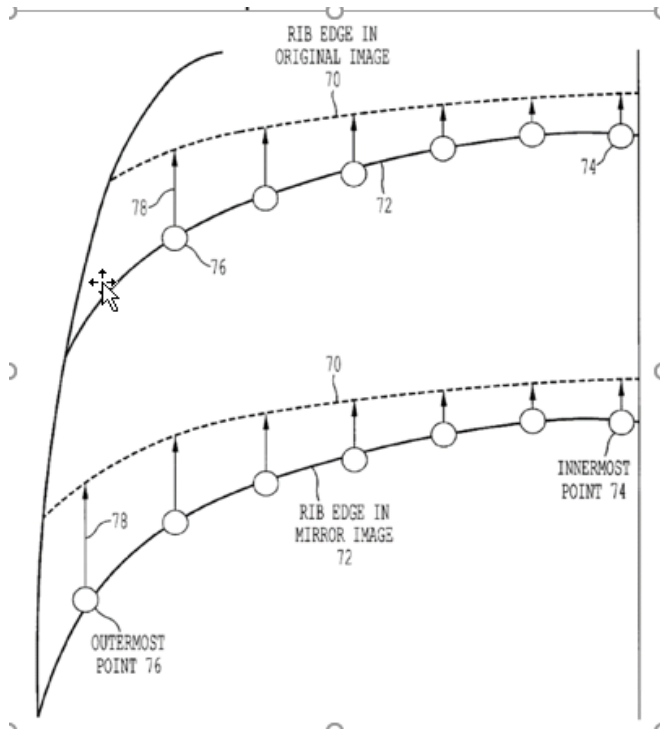
{involving models}

Definition statement

This place covers:

- Involving matching of intermediary 2D or 3D models extracted from each image before registration, e.g. geometric models of all kinds, polygon models, active appearance and shape models, as opposed to reference images or patches
- Corresponding models are adapted to each image to be registered, respectively, transform parameters between the images are determined from a comparison/matching of the adapted models
- Model matching used for 1) finding features in each image, or for 2) finding structure of interest from one image in the other image

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching of contours	G06V 10/752
Syntactic or structural pattern recognition, e.g. symbolic string recognition	G06V 30/1983

G06T 7/35

using statistical methods

Definition statement

This place covers:

- Involving probabilistic feature points, statistical features or reference images / patches, statistical models, statistical matching
- Approaches based on mutual information
- RANSAC

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Matching configurations of points or features for pattern recognition, e.g. using RANSAC	G06V 10/757
Image matching by comparing statistics of regions for pattern recognition	G06V 10/758

Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/30](#).

G06T 7/37

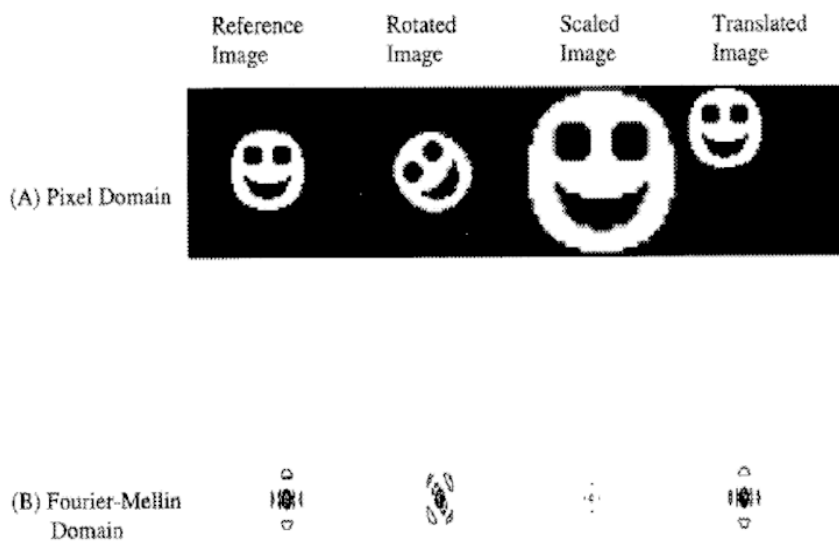
using transform domain methods

Definition statement

This place covers:

Fourier, DCT, Wavelet, Gabor, etc.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	G06V 10/431
Detecting partial patterns using transforms (e.g. Hough transform) for pattern recognition	G06V 10/48
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	G06V 10/52

Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

G06T 7/38

Registration of image sequences

Definition statement

This place covers:

- Aligning one image sequence or image set to the other, i.e. finding spatially or temporally corresponding frames between one image sequence and the other (inter-sequence alignment), as opposed to spatial alignment of image frames within a single image sequence (intra-sequence alignment)
- Temporal alignment = alignment along the t-axis, e.g. alignment of two video sequences
- Spatial alignment = alignment along the z-axis, e.g. alignment of two stacks of CT slices
- Additionally, spatially aligning the temporally or spatially corresponding frames in the x-y-plane (intra-sequence alignment) is possible
- Source sequences can be of any orientation

Illustrative examples:

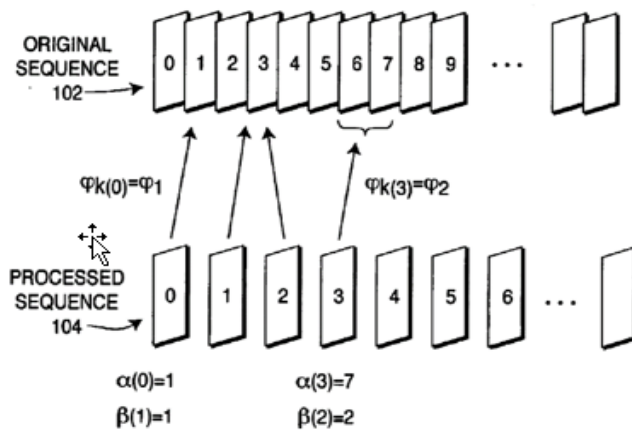


Figure 1. Spatial alignment

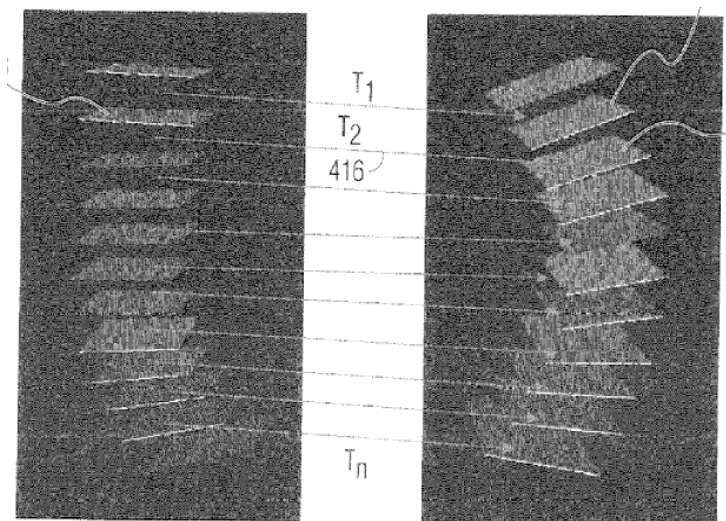


Figure 2.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Matching video sequences for pattern recognition	G06V 20/48
Document matching for pattern recognition	G06V 30/418

Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/30](#).

G06T 7/40

Analysis of texture (depth or shape recovery from texture [G06T 7/529](#))

Definition statement

This place covers:

Analysis of the spatial arrangement of image colour or intensity characteristics representative of a perceived image texture.

References

Limiting references

This place does not cover:

Depth or shape recovery from texture	G06T 7/529
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation; Edge detection	G06T 7/10
Depth or shape recovery from shading	G06T 7/507
Filling a planar surface by adding texture in 2D image generation	G06T 11/40
Texture mapping in 3D image rendering	G06T 15/04

G06T 7/41

based on statistical description of texture

Definition statement

This place covers:

Analysis of texture using:

- First-order statistics
- Global histogram-based measures: mean, variance, skewness, kurtosis, energy, entropy
- Autocorrelation
- Run-length based algorithms

G06T 7/42

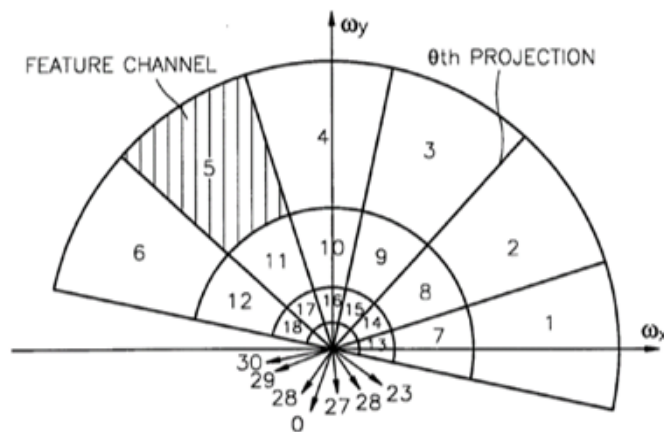
using transform domain methods

Definition statement

This place covers:

Fourier, DCT, Wavelet, Gabor, etc.

Illustrative example:



Texture-based image retrieval method using a Gabor filter in the frequency domain, wherein the frequency domain representation is divided according to a predetermined layout for extracting texture descriptors of respective feature channels.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Feature extraction by deriving mathematical or geometrical properties, frequency domain transformations, for pattern recognition	G06V 10/431
Detecting partial patterns using transforms (e.g. Hough transform), for pattern recognition	G06V 10/48
Feature extraction by deriving mathematical or geometrical properties, scale-space transformation, e.g. wavelet transform, for pattern recognition	G06V 10/52

Special rules of classification

For Transform domain processing, an Indexing Code from the range of [G06T 2207/20052](#) - [G06T 2207/20064](#) should be added.

G06T 7/44

using image operators, e.g. filters, edge density metrics or local histograms

Definition statement

This place covers:

- Laws texture energy measure

Definition statement

- Texture analysis using edge operators
- Texture analysis using difference of Gaussians
- Texture analysis using local linear transforms
- Local Binary Pattern [LBP]
- Grey level difference method
- Local rank order correlation

G06T 7/45

using co-occurrence matrix computation

Definition statement

This place covers:

- Second-order statistics
- Generalised co-occurrence matrix

G06T 7/46

using random fields

Definition statement

This place covers:

- Markov Random Fields, Gaussian Random Fields, Gibbs Random Fields
- Autoregressive Model

G06T 7/48

using fractals

Definition statement

This place covers:

- fractal texture analysis methods
- fractal dimension
- box counting methods

G06T 7/49

based on structural texture description, e.g. using primitives or placement rules

Definition statement

This place covers:

- Shape chain grammars, graph grammars
- Grouping of primitives in hierarchical textures

Illustrative example:

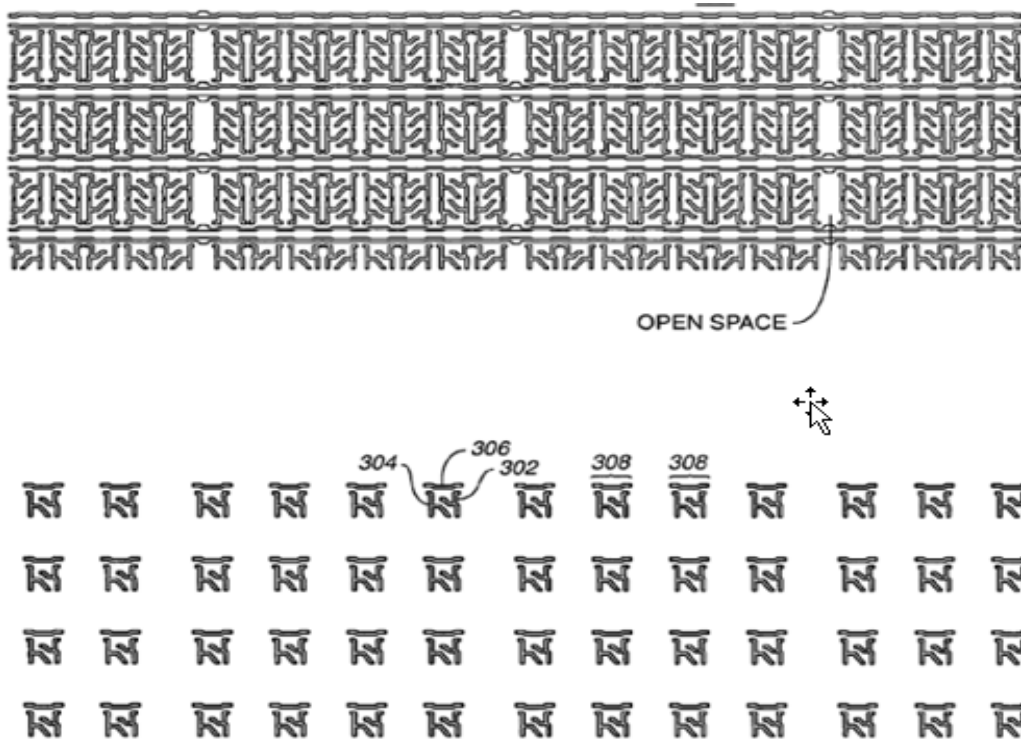


Figure 1 (top) and 2 (bottom). Method for finding periodic structures in a layer of an integrated circuit that have identical optical properties. Fig. 2 illustrates a geometric hierarchy of the periodic elements in the cell layer of Fig. 1.

G06T 7/50

Depth or shape recovery

Definition statement

This place covers:

- Image analysis algorithms for determining scene depth parameters from image characteristics.
- Shape from X
- Depth map determination
- Disparity calculation for shape recovery

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Picture taking arrangements specially adapted for photogrammetry or photographic surveying	G01C 11/02
LIDAR systems for mapping or imaging	G01S 17/89

G06T 7/507

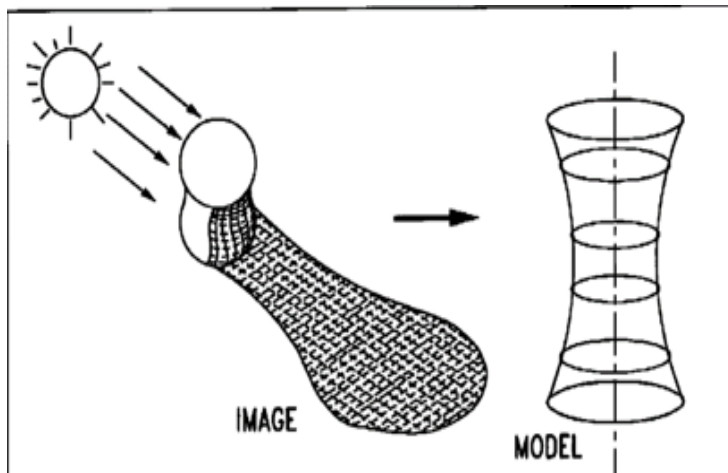
from shading ([G06T 7/586](#) takes precedence)

Definition statement

This place covers:

Shape from shading or shadows

Illustrative example:

**References****Limiting references**

This place does not cover:

Depth or shape recovery from multiple light sources, e.g. photometric stereo	G06T 7/586
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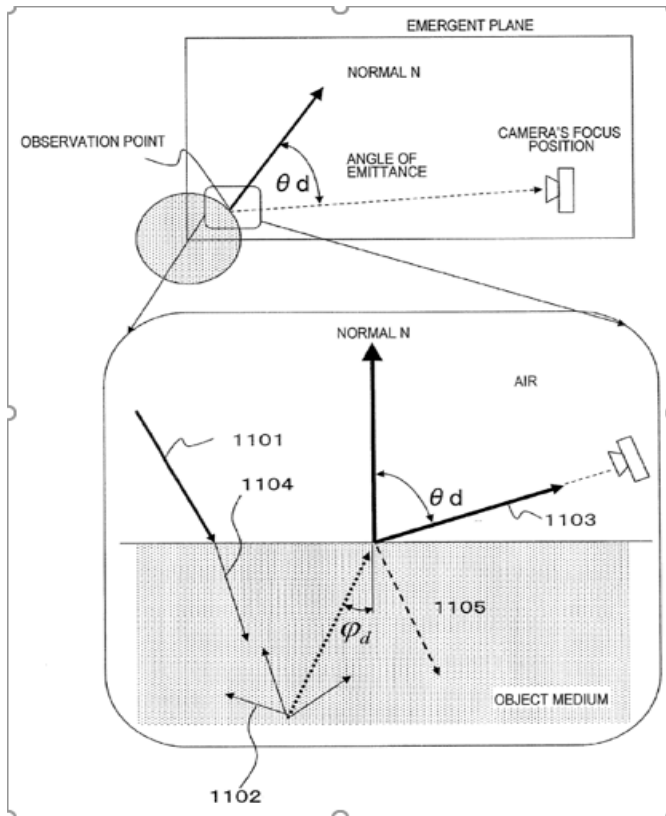
G06T 7/514

from specularities

Definition statement

This place covers:

Illustrative example:



G06T 7/521

from laser ranging, e.g. using interferometry; from the projection of structured light

Definition statement

This place covers:

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image acquisition and arrangements for measuring contours or curvatures of an object by projecting a pattern thereupon	G01B 11/25
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Structured	characterises the illumination
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G06T 7/529

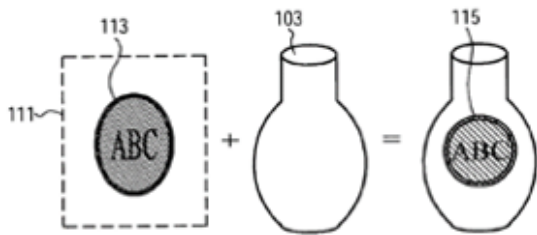
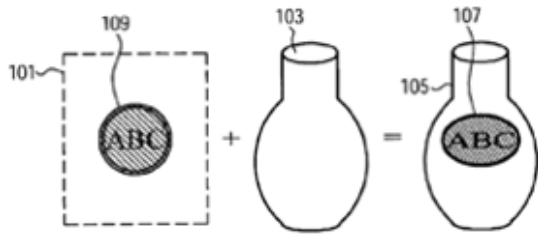
from texture

Definition statement

This place covers:

- shape from texture
- shape from blur in a single image

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from focus	G06T 7/571
------------------------------------	----------------------------

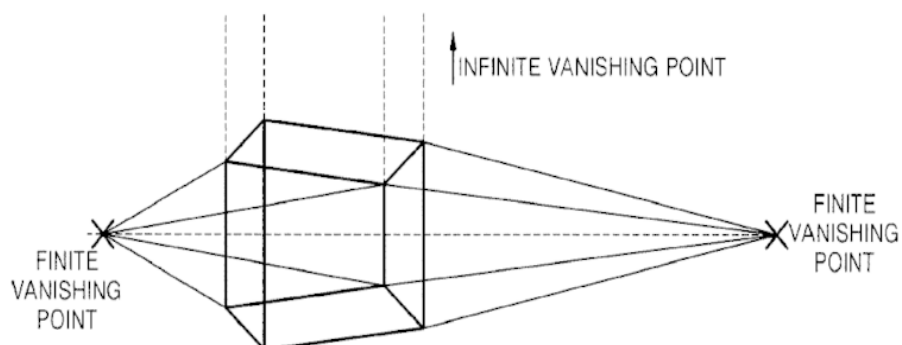
G06T 7/536

from perspective effects, e.g. by using vanishing points

Definition statement

This place covers:

Illustrative example:



G06T 7/543

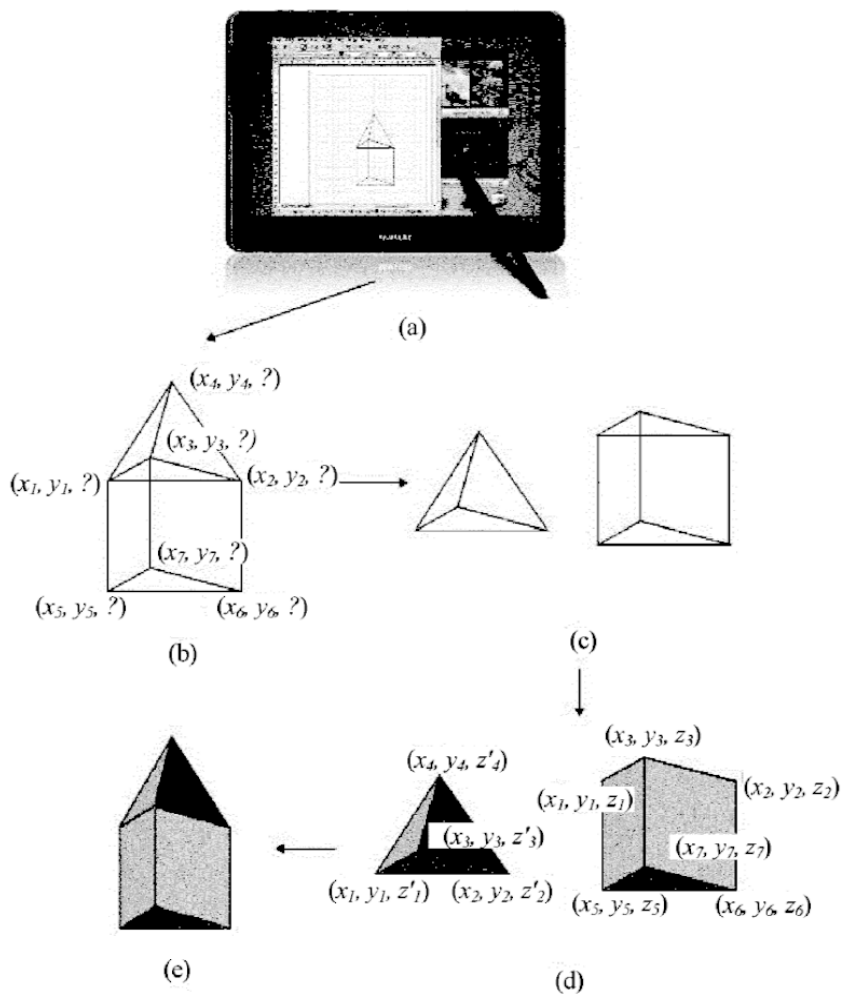
from line drawings

Definition statement

This place covers:

- shape from line drawings
- shape from contours in a single image

Illustrative example:



G06T 7/55

from multiple images

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Volumetric display with depth sampling, i.e. the volume being constructed from a stack or sequence of 2D image planes

H04N 13/388

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining parameters from multiple pictures, e.g. disparity calculation as such	G06T 7/97
---	---------------------------

Special rules of classification

For documents concerning trilinear computations, trifocal tensor: add the Indexing Code [G06T 2207/20088](#): Trinocular vision calculations; trifocal tensor.

G06T 7/557

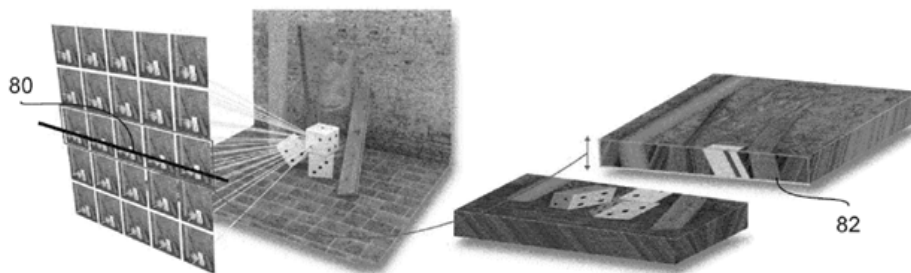
from light fields, e.g. from plenoptic cameras

Definition statement

This place covers:

Depth reconstruction using, or based on, light field representations, i.e. 5D plenoptic function, 4D light field, lumigraph, ray space; such light field representations may originate, e.g. from plenoptic cameras, light field cameras, cameras with a lenslet array or integral imaging.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth using trinocular vision calculations/trifocal tensor	G06T 7/55 , G06T 2207/20088
Depth from focus	G06T 7/571
Depth from motion	G06T 7/579
Depth from multiple light sources	G06T 7/586
Depth from stereo images	G06T 7/593

G06T 7/564

from contours

Definition statement

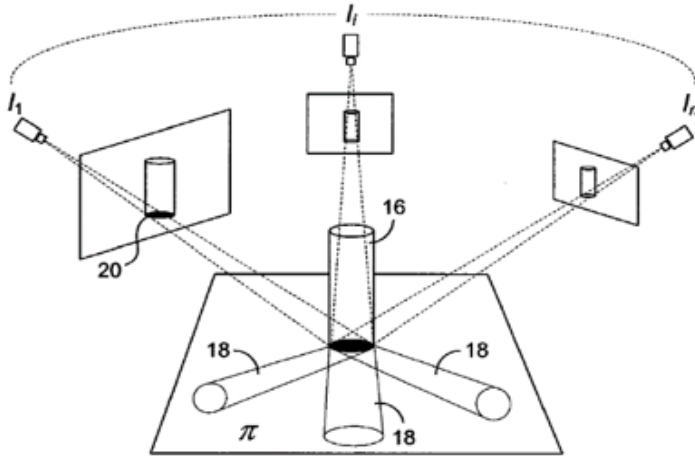
This place covers:

- Shape from contours

Definition statement

- Shape from silhouettes
- Shape from visual hulls

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from line drawings, e.g. shape from contours involving one image only	G06T 7/543
---	----------------------------

G06T 7/571

from focus

Definition statement

This place covers:

- Shape from focus
- Shape from defocus of multiple images

Illustrative example:

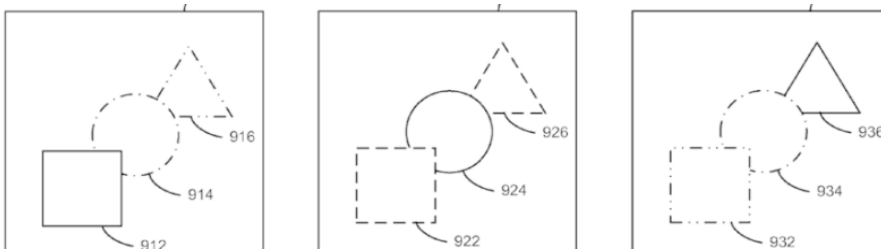


Figure 1

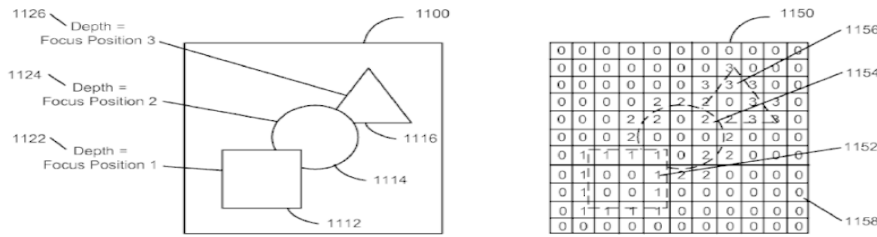


Figure 2

Figure 1 and 2. Input image sequence and resulting depth map

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Shape from texture, e.g. shape from blur in a single image	G06T 7/529
Systems for automatic generation of focusing signals	G02B 7/28
Focusing aids for cameras; Autofocus systems for cameras	G03B 13/00

G06T 7/579

from motion

Definition statement

This place covers:

- Shape from motion, structure from motion
- Extracting the shape of a scene from the spatial and temporal changes occurring in an image sequence (camera or scene moves)
- Simultaneous Localisation and Mapping [SLAM]

Illustrative examples:

Figure 1

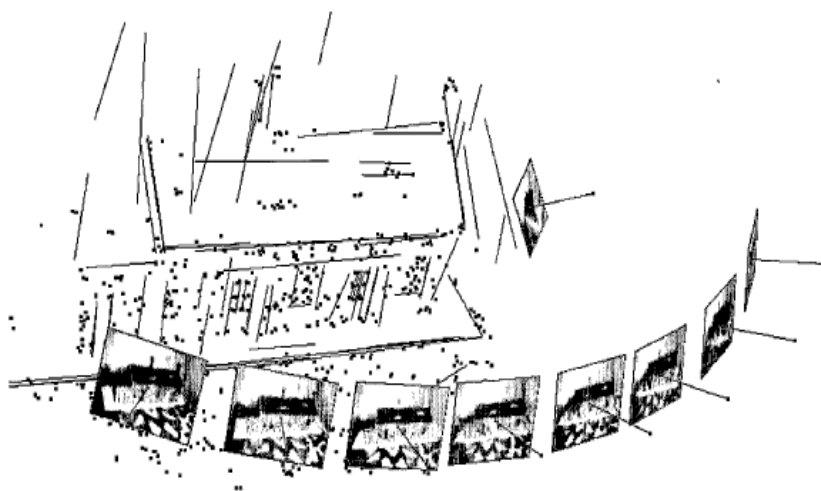
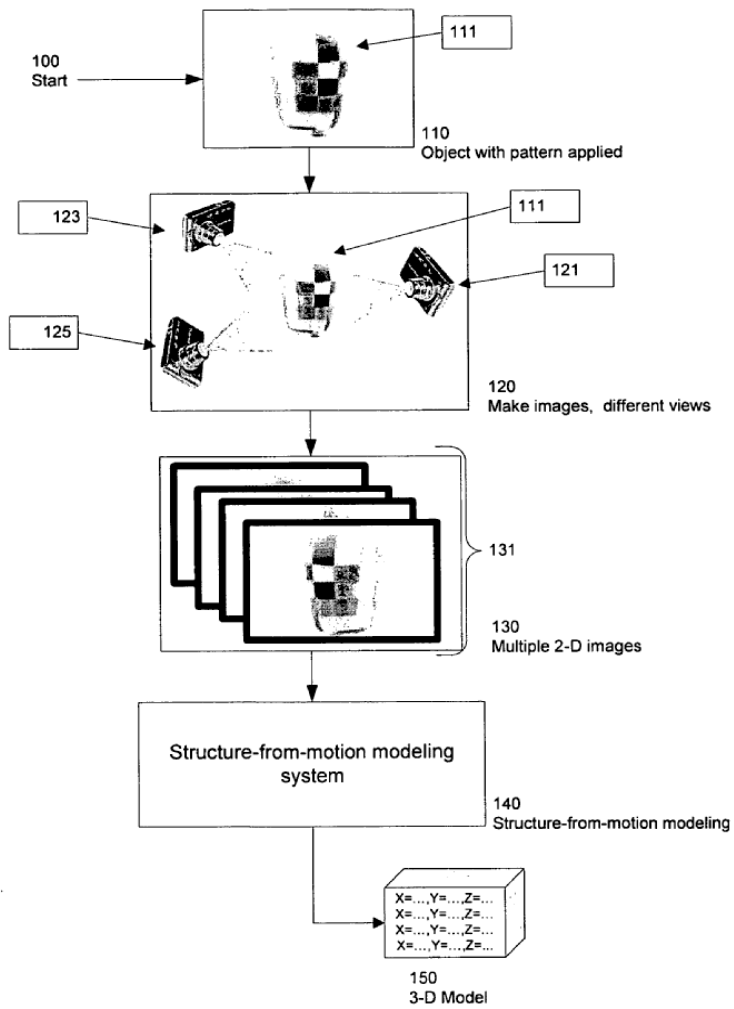


Figure 2. Shape from motion reconstruction

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Determining position or orientation of objects or cameras	G06T 7/70
---	---------------------------

Special rules of classification

For Camera pose, Indexing Code [G06T 2207/30244](#) should be added.

G06T 7/586

from multiple light sources, e.g. photometric stereo

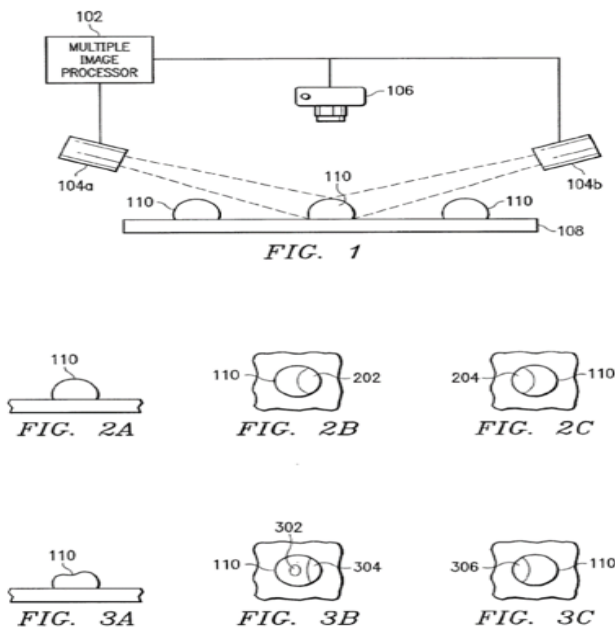
Definition statement

This place covers:

Algorithms for the determination of scene depth parameters from multiple images for which more than one source of illumination has been used. Typically, different illumination sources are used when capturing each of the multiple images to produce different images of the same scene under the different lighting conditions. The different images are used to determine depth and shape parameters in the scene.

- Different illumination intensities, e.g. ambient and flash
- Different directions of illumination

Illustrative example:



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

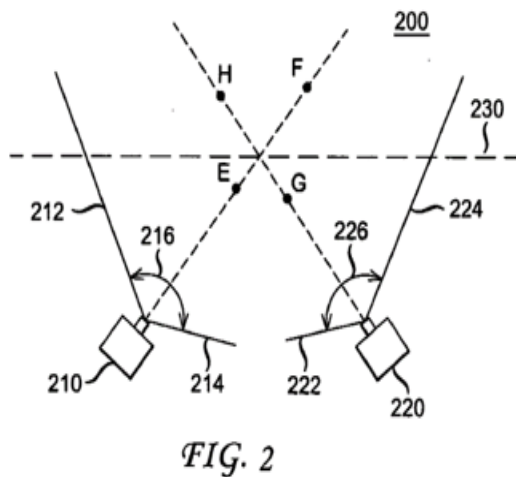
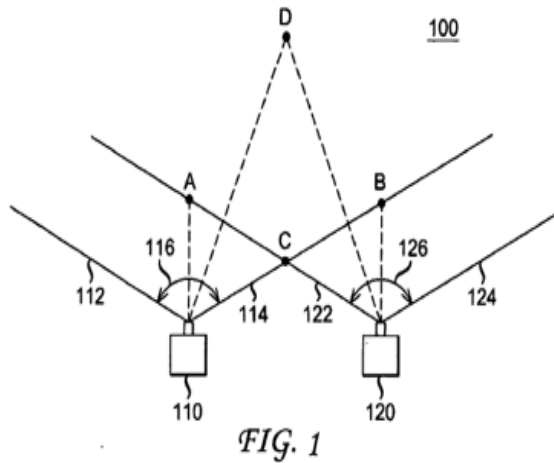
Photometric stereo	a technique for estimating the normal vectors at different points on an object's surface by observing the object under different lighting conditions.
--------------------	---

G06T 7/593**from stereo images****Definition statement**

This place covers:

Shape from stereo images or sequences of stereo images

Illustrative example:

**References****Application-oriented references**

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Stereoscopic or multiview image generation wherein the generated image signals comprise depth maps or disparity maps
--

H04N 13/271

Informative references

Attention is drawn to the following places, which may be of interest for search:

Depth or shape recovery from multiple images using trilinear computations / the trifocal tensor	G06T 7/55 and G06T 2207/20088
Depth or shape recovery from multiple images using the quadrifocal tensor	G06T 7/55

G06T 7/596

{from three or more stereo images}

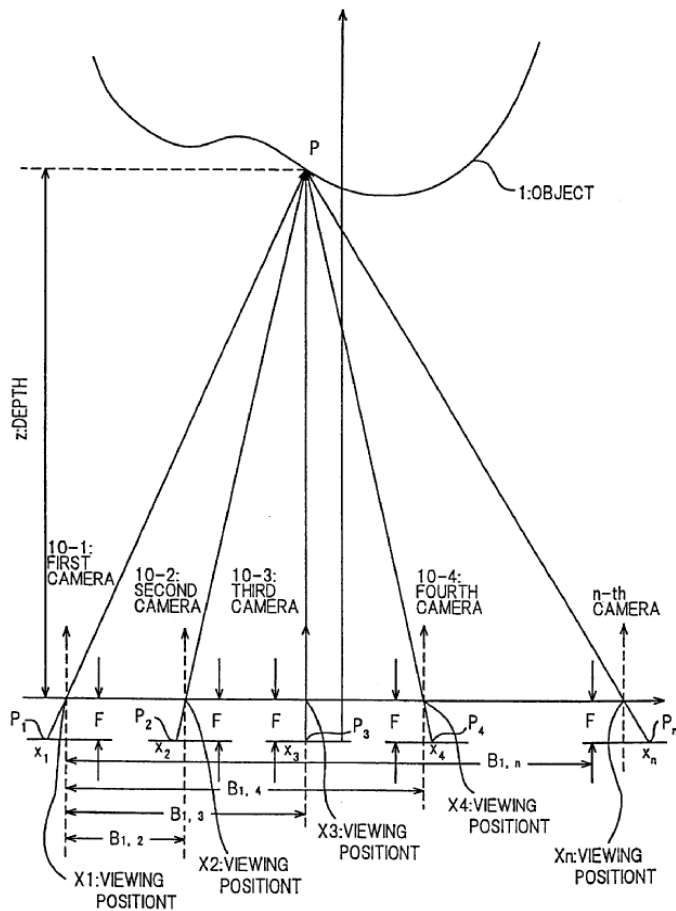
Definition statement

This place covers:

Multi-baseline stereo (special case only where

- each view is always treated together with the same reference view and
- the lengths of the respective baselines differ from each other)

Illustrative example:



G06T 7/60

Analysis of geometric attributes

Definition statement

This place covers:

- Analysis of image subjects to determine geometric attributes thereof, e.g. area, centre of mass, perimeter, diameter or volume.
- Ellipse detection

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Extraction of image features for pattern recognition by deriving geometrical properties of the whole image	G06V 10/42
--	----------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring characterised arrangements by the use of optical means	G01B 11/00
--	----------------------------

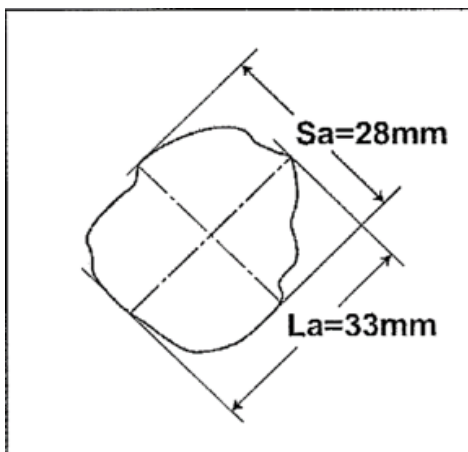
G06T 7/62

of area, perimeter, diameter or volume

Definition statement

This place covers:

Illustrative example:



G06T 7/64

of convexity or concavity

Definition statement

This place covers:

Convexity, concavity, curvature, circularity, sphericity, roundness

Illustrative examples:

Figure 1

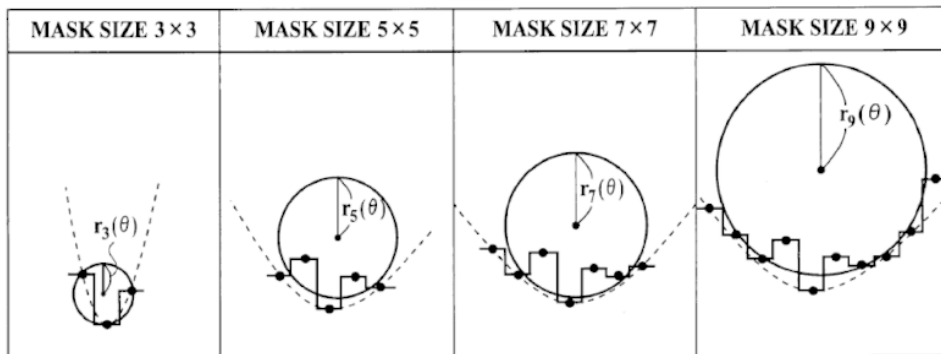
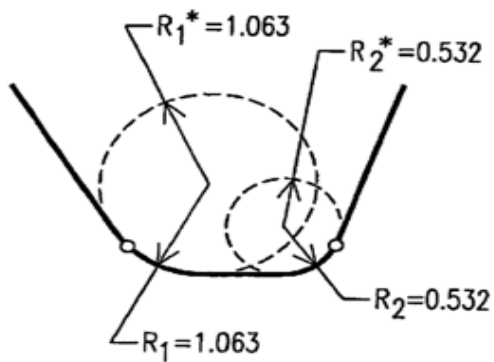


Figure 2



G06T 7/66

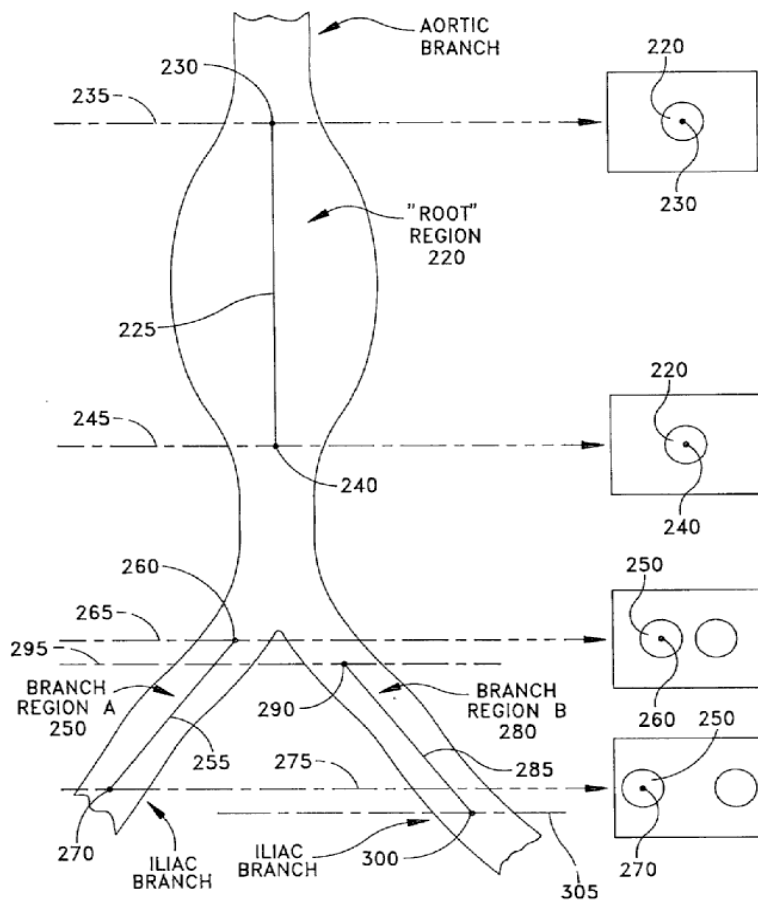
of image moments or centre of gravity

Definition statement

This place covers:

Following centers of gravity of sections along elongated or tubular structure

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Computation of moments, for pattern recognition	G06V 10/435
---	-----------------------------

G06T 7/68

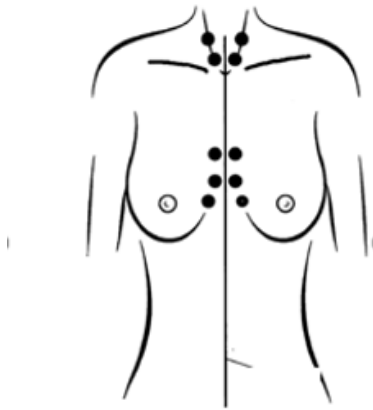
of symmetry

Definition statement

This place covers:

- Determination of lines of symmetry, midlines
- Measurement of symmetry and asymmetry

Illustrative example:



G06T 7/70

Determining position or orientation of objects or cameras (camera calibration [G06T 7/80](#))

Definition statement

This place covers:

- Image processing algorithms for determining the position or orientation of an image subject, or of the camera having acquired the image
- Position or orientation of the camera
- Estimation of position, pose, posture, attitude in 2D and 3D
- Gaze direction, head pose
- Bin picking

References

Limiting references

This place does not cover:

Camera calibration	G06T 7/80
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Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Orientation detection before recognition	G06V 10/242
Acquiring or recognising human faces, facial parts, facial sketches, facial expressions, eyes	G06V 40/16 , G06V 40/18

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image feed-back for automatic industrial control	G06T 1/0014
Analysis of motion	G06T 7/20

Measuring position in terms of linear or angular dimensions	G01B
Locating or presence-detecting by the use of the reflection or reradiation of radio or other waves	G01S
Pattern matching criteria, e.g. proximity measures	G06F 18/22
Image or video pattern matching	G06V 10/74
Mask, wafer positioning, alignment	H01L 21/681
Studio circuitry, e.g. for position determination of a camera in a television studio	H04N 5/222
Aligning or positioning of tools relative to the circuit board for manufacturing printed circuits	H05K 3/0008

Special rules of classification

For camera pose, Indexing Code [G06T 2207/30244](#) should be added. For workpiece; machine component, Indexing Code [G06T 2207/30164](#) should be added.

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Repérage" (in French documents), "location", and "locating"

G06T 7/73

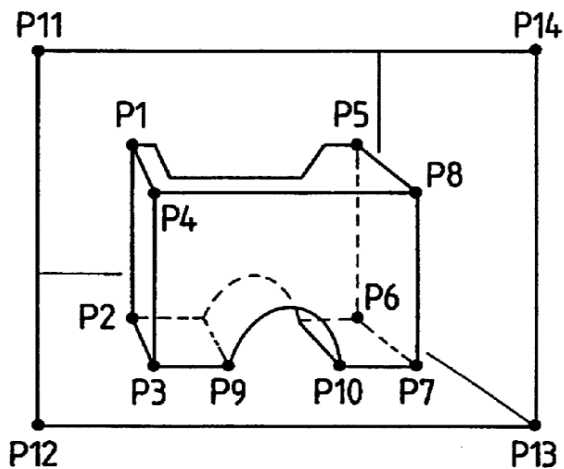
using feature-based methods

Definition statement

This place covers:

- Feature points, e.g. determined by image operators; also point descriptors, feature vectors; significant segments, blobs
- Feature, landmark, marker, fiducial, edge, corner, etc.

Illustrative example:



Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Feature	significant image region or pixel with certain characteristics.
---------	---

G06T 7/74

{involving reference images or patches}

Definition statement

This place covers:

Involving correlation with "true to reality" reference images, templates of various poses; for "directly" determining pose; correlation with "true to reality" templates of landmarks, markers, fiducials; for finding features in the image.

Illustrative examples:

Figure 1

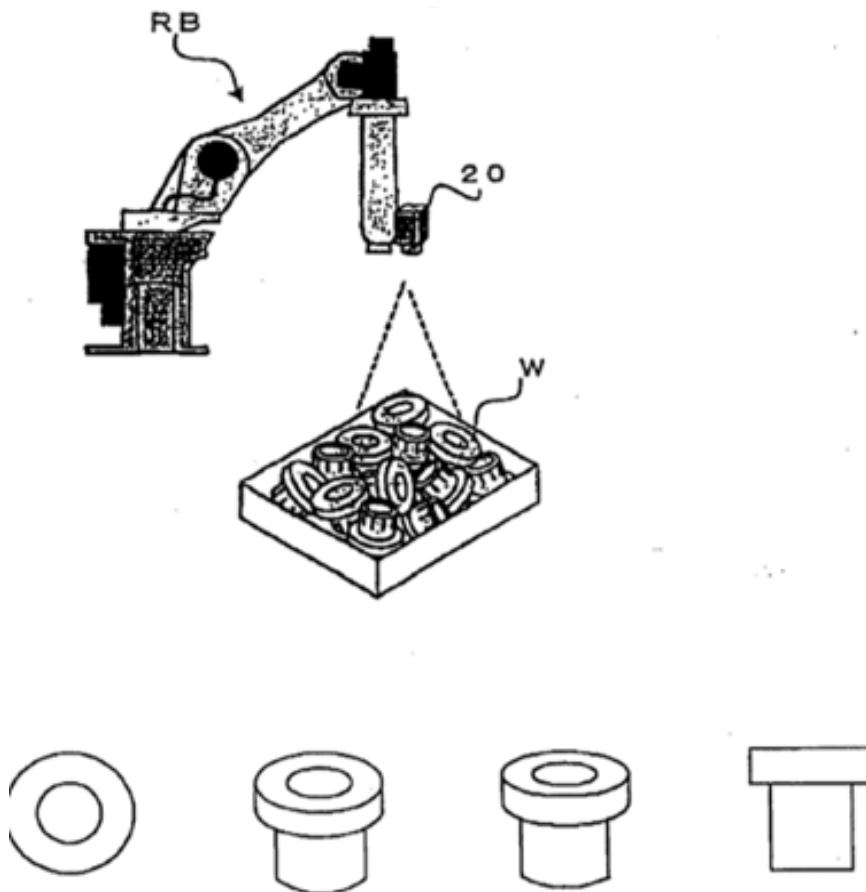
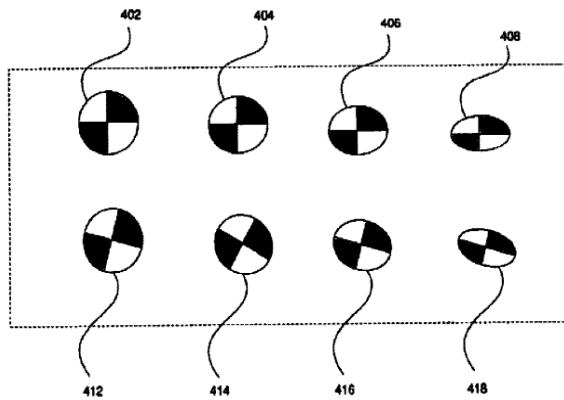


Figure 2



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Pattern matching criteria, e.g. proximity measures	G06F 18/22
Image or video pattern matching	G06V 10/74

G06T 7/75

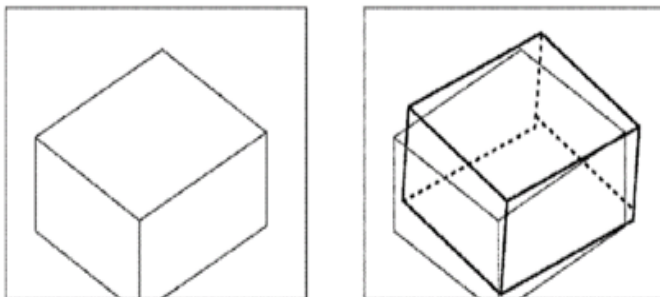
{involving models}

Definition statement

This place covers:

- Involving matching to a 2D or 3D model, e.g. geometric models of all kinds, polygon models, active appearance and shape models, also abstract models of landmarks, markers, fiducials with spatial extent, as opposed to reference images or patches
- Matching of a graphical, e.g. polygon model, may involve intermediate rendering of the model
- Model matching used for 1) finding features in each image, or for 2) "directly" determining pose of structure of interest

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation involving deformable models	G06T 7/149
Analysis of motion involving models	G06T 7/251
Matching of contours	G06V 10/752
Syntactic or structural pattern recognition, e.g. symbolic string recognition	G06V 30/1983

G06T 7/77

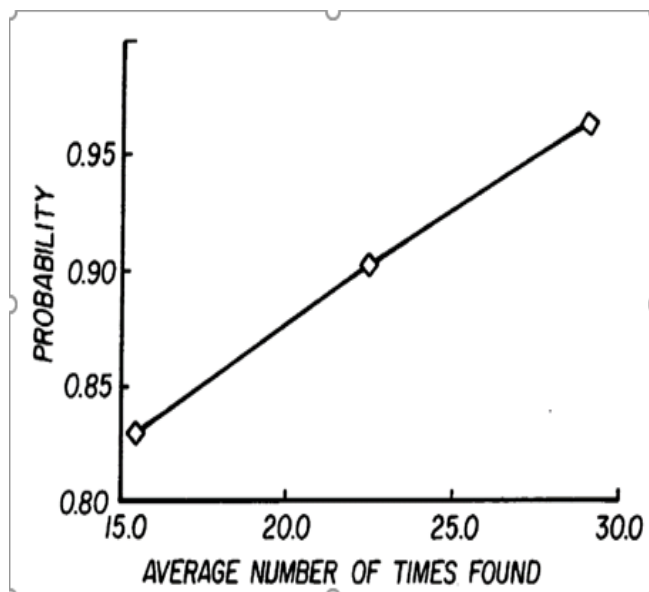
using statistical methods

Definition statement

This place covers:

- Involving probabilistic feature points, statistical models, statistics of positions
- Features, reference images, patches or method itself can be statistical
- RANSAC

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation or edge detection involving probabilistic approaches	G06T 7/143
Analysis of motion involving a stochastic approach	G06T 7/277
Image matching by comparing statistics of regions for pattern recognition	G06V 10/758

Special rules of classification

Whenever possible, documents classified herein should also be classified in one of the other subgroups of [G06T 7/70](#).

G06T 7/80

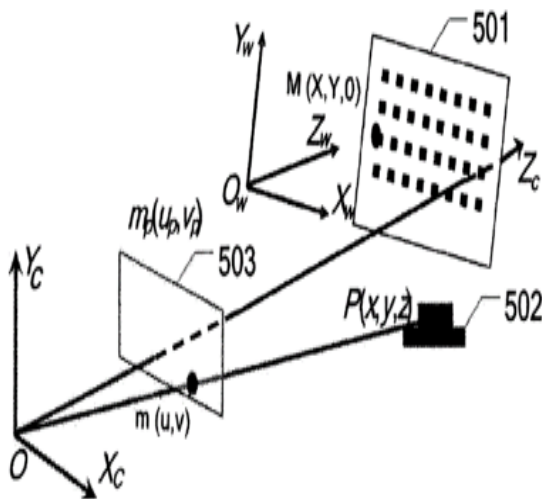
Analysis of captured images to determine intrinsic or extrinsic camera parameters, i.e. camera calibration

Definition statement

This place covers:

The use of methods/algorithms to analyse camera images for the determination of intrinsic parameters defining the camera's properties, or for the determination of extrinsic parameters defining the camera's position and orientation. Camera calibration enables pixel positions in a captured 2D image to be mapped to real-world 3D coordinates of the subject represented in the image.

Illustrative example:



References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric correction, e.g. of lens distortion	G06T 5/80
Determining position or orientation of objects, e.g. of the camera, without calibration context	G06T 7/70 , G06T 2207/30244
Calibration patterns	G01B 21/042 , G01C 15/02
Systems for automatic generation of focusing signals	G02B 7/28
Focusing aids for cameras; Autofocus systems for cameras	G03B 13/00
Colour balance, e.g. colour cast correction	H04N 1/6077
Calibration of stereoscopic cameras	H04N 13/246
Picture signal generators using solid state devices, e.g. correction of chromatic aberrations	H04N 23/10

Suppressing or minimising disturbance in picture signal generation	H04N 23/81
--	----------------------------

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Intrinsic parameters	The geometric and optical characteristics of a camera, including effective focal length, a scale factor and the image centre or "principal point".
Extrinsic parameters	The three-dimensional position and orientation of the camera in real-world coordinates.

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Camera calibration", "Geometric camera calibration", and "Camera re-sectioning".

G06T 7/85

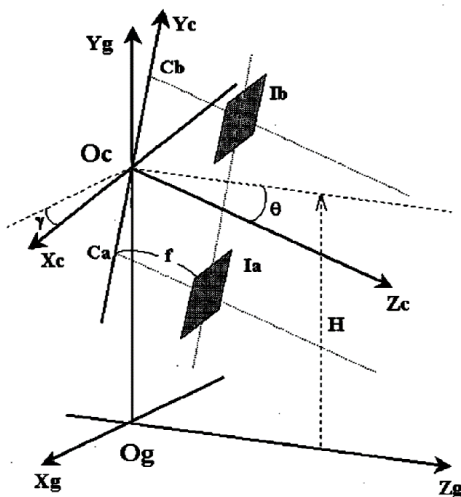
{Stereo camera calibration}

Definition statement

This place covers:

Camera calibration for stereoscopic cameras, e.g. for determining the transformation between left camera coordinate system and right camera coordinate system

Illustrative example:



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Calibration aspects relating to the control of a stereoscopic camera	H04N 13/246
--	-----------------------------

G06T 7/90

Determination of colour characteristics

Definition statement

This place covers:

- Determining colour characteristics by image analysis
- Redeye detection

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Colour image segmentation	G06T 7/10
Acquiring or recognising eyes, e.g. iris verification	G06V 40/18
Retouching, i.e. modification of isolated colours only or in isolated picture areas only	H04N 1/62

Informative references

Attention is drawn to the following places, which may be of interest for search:

Correcting redeye defects by retouching or inpainting	G06T 5/77
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Special rules of classification

For redeye defect, Indexing Code [G06T 2207/30216](#) should be added.

G06T 7/97

{Determining parameters from multiple pictures (depth or shape recovery from multiple images [G06T 7/55](#); stereo camera calibration [G06T 7/85](#))}

Definition statement

This place covers:

- Disparity, correspondence, stereopsis, if not provided for elsewhere
- Disparity calculation for the production of 3D images from 2D images without intermediate modelling

References

Limiting references

This place does not cover:

Depth or shape recovery from multiple images	G06T 7/55
Stereo camera calibration	G06T 7/85

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Industrial image inspection using an image reference approach	G06T 7/001
Biomedical image inspection using an image reference approach	G06T 7/0014
Segmentation involving the use of two or more images	G06T 7/174
Computing motion using a sequence of stereo image pairs	G06T 7/285
Determination of transform parameters for the alignment of images, i.e. image registration	G06T 7/30

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image-based rendering	G06T 15/205
3D from 2D images with intermediate modelling	G06T 17/20

Special rules of classification

For Disparity calculation for image-based rendering, Indexing Code [G06T 2207/20228](#) should be added.

G06T 9/00

Image coding (bandwidth or redundancy reduction for static pictures [H04N 1/41](#); coding or decoding of static colour picture signals [H04N 1/64](#); methods or arrangements for coding, decoding, compressing or decompressing digital video signals [H04N 19/00](#))

Definition statement

This place covers:

Coding/compression and decoding/decompression of computer graphics(CG) data and computer graphics compression methods applied on natural image/video.

Apparatus/devices of coding/compressing and/or decoding/decompressing of computer graphics data.

Computer graphics data mentioned including:

- object geometry models
- scene models
- 2D/3D vector graphics
- 3D/4D volumetric models
- CAD models
- contour shape data
- elevation data
- CG related metadata/parameters including depth, colour, texture, motion vectors, scene graph, position, connectivity information and similar.

Relationships with other classification places

This group covers compression/coding/decompression/decoding of CG related data and CG related methods applied on natural image or video. Other compression techniques specific to the natural image/video without using CG related methods are covered by [H04N 19/00](#).

Compression in general is covered by [H03M 1/00](#).

References

Limiting references

This place does not cover:

Bandwidth or redundancy reduction for static pictures	H04N 1/41
Coding or decoding of static colour picture signals	H04N 1/64
Methods or arrangements for coding, decoding, compressing or decompressing digital video signals	H04N 19/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Animation	G06T 13/00
Model based coding	G06T 15/00 , G06T 17/00
Model based coding using a 3D model	G06T 15/00 , G06T 17/00
Rendering of computer graphics data	G06T 15/00
Modeling of computer graphics data	G06T 17/00
Re-meshing for manipulation, editing purpose	G06T 17/205
Manipulation 3D objects	G06T 19/00
Pattern recognition	G06F 18/00
Computer aided design	G06F 30/00
Image or video recognition or understanding	G06V
Pattern recognition by contour coding	G06V 10/46
Coding or decoding, in general	H03M
Compression in general	H03M 1/00
Transmission of TV signals	H04N 7/24
Selective content distribution	H04N 21/00

Special rules of classification

In general, consult the gérant before using any sub-groups. This is a provisional document which will be replaced in January , 2012, after completing reorganization in [G06T 9/00](#).

- for classification, the main group [G06T 9/00](#) is assigned always before completing the reorganization.
- The Indexing Code series of symbols is reserved for the use of documents classified in [G06T 9/00](#) and subgroups. They should be allocated to documents in [G06T 9/00](#) and subgroups whenever relevant.
- the sub-groups [G06T 9/004](#), [G06T 9/005](#), [G06T 9/005](#), [G06T 9/008](#) are not used anymore, the content, which is not related with computer graphics data compression/coding, will be transferred to the corresponding classes defined in the group definition statements below.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

4D volumetric models	Sequences of volumetric images over time
MPEG	Moving Picture Experts Group
SNHC	Synthetic/Natural Hybrid Coding
BIFS	Binary Format for Scene
VRML	Virtual Reality Modeling Language
SVG	Scalable Vector Graphics
NN	Neural Networks
TV	Television

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

CG	Computer graphics
3D	Three dimensional
4D	Four dimensional
CAD	Computer aided design

In patent documents, the following words/expressions are often used as synonyms:

- "Compression" and "Coding"
- "Decompression" and "Decoding"
- "Scene graph" and "Scene model"
- "Scene description graph" and "Scene graph"
- "Metadata" and "Parameter"
- "Contour coding" and "Shape coding"
- "Elevation data" and "Height data"
- "Object geometry models" and "Object models"
- "Natural image" and "Raster/Bitmap image"
- "Vector graphics" and "Scalable Vector Graphics"

G06T 9/001

{Model-based coding, e.g. wire frame}

Definition statement

This place covers:

Means or steps for the compression/coding of wire frame models, e.g. polygon meshes.

Documents concerning mesh compression/coding by

- face merging
- incremental decimation
- simplification by remeshing for data reduction purpose are classified here.

References

Limiting references

This place does not cover:

Animation	G06T 13/00
Rendering of computer graphics data	G06T 15/00
Re-meshing for manipulation, editing	G06T 17/205
Manipulation 3D objects	G06T 19/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Model based coding	G06T 9/001 , H04N 19/20
Model based coding using a 3D model	G06T 9/001 , G06T 15/00 , G06T 17/00 , H04N 19/20

Special rules of classification

Documents classified in [G06T 9/001](#), [H04N 19/20](#) and [G06T 9/001](#), [G06T 15/00](#), [G06T 17/00](#), [H04N 19/20](#) are transferred to [G06T 9/001](#).

Documents concerning re-meshing for manipulation, editing and similar, i.e. all means not having data reduction purpose are classified in [G06T 17/205](#).

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "wireframe" and "polygon mesh"

G06T 9/002

{using neural networks}

Definition statement

This place covers:

Means or steps for the compression/coding of computer graphics data and natural image/video data using neural networks (NN).

Special rules of classification

The compression/coding data concerning in this group includes:

- computer graphics data
- natural image/video data.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

NN	Neural Networks
----	-----------------

G06T 9/004

{Predictors, e.g. intraframe, interframe coding}

Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, are transferred to [H04N 19/105](#), [H04N 19/103](#) or [H04N 19/107](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Coding or prediction mode selection	H04N 19/103
Predictor	H04N 19/105
Intracode mode selection	H04N 19/107

G06T 9/005

{Statistical coding, e.g. Huffman, run length coding}

Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/13](#), [H04N 19/91](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Variable length coding (VLC) or entropy coding	H04N 19/13 , H04N 19/91
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

VLC	Variable length coding
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G06T 9/007

{Transform coding, e.g. discrete cosine transform}

Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/60](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Transform coding	H04N 19/60
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

DCT	Discrete cosine transform
-----	---------------------------

G06T 9/008

{Vector quantisation}

Definition statement

This place covers:

This group is not used anymore, its content, which is not related with computer graphics data compression/coding, will be transferred to [H04N 19/94](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Vector coding	H04N 19/94
---------------	----------------------------

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "vector coding" and "vector quantization"

G06T 9/20

Contour coding, e.g. using detection of edges

Definition statement

This place covers:

Means or steps for the compression/coding of computer graphics data using contour/shape coding method, e.g. by detection of edges.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Shape coding for video objects	G06T 9/20 , H04N 19/20
--------------------------------	--

Special rules of classification

Documents classified in [G06T 9/20](#), [H04N 19/20](#) are transferred to [G06T 9/20](#).

The compression/coding data concerning in this sub-group includes:

- computer graphics data, e.g. vector graphics data
- natural image/video data.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

SVG	Scalable Vector Graphics
-----	--------------------------

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "contour coding" and "shape coding"
- "vector graphics" and "scalable vector graphics"

G06T 9/40

Tree coding, e.g. quadtree, octree

Definition statement

This place covers:

Means or steps for the compression/coding of computer graphics data by using a tree hierarchy, e.g. quadtree, octree, and similar.

The documents concerning compression/coding of:

- computer graphics object models, scene models and related metadata, e.g. depth data,

are classified here.

References

Limiting references

This place does not cover:

Modelling by tree structure	G06T 17/005
Natural image/video tree coding	H04N 19/96

Informative references

Attention is drawn to the following places, which may be of interest for search:

Tree description	G06T 17/005
Tree coding	H04N 19/96

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Bintree or binary tree	tree structure in which each node has at most two child nodes
Quadtree or quad tree	tree structure in which each node has at most four child nodes
K-tree	tree structure in which each node has at most K child nodes
Hextree	tree structure in which each node has at most six child nodes

Volume octree	tree structure in which each voxel is subdivided into at most 8 subvoxels
Surface octree	Volume octree with incorporated surface information
Multi tree	directed acyclic graph in which the set of nodes reachable from any node forms a tree

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "scene graph", "scene description graph" and "scene model"

G06T 11/00

2D [Two Dimensional] image generation

Definition statement

This place covers:

- Documents dealing with generating a 2D image or texture in general. To a large extent, but not exclusively, [G06T 11/00](#) covers image generation "from a description to a bit-mapped image" in general.
- Software packages, systems
- Caricaturing, Identikit
- Fusion of images with different objects, e.g. fusion of real and virtual images, labelling of 2D images
- Clipping of 2D images
- 2D and 3D reconstruction from projections, e.g. for computed tomography.
- Device independent techniques, i.e. it is not for documents which are specially adapted for I/O devices such as printers, scanners or displays.
- Note:

General idea for [G06T 11/00](#):

- For generating an image,
- first select a colour ([G06T 11/001](#)),
- then draw a line ([G06T 11/203](#)),
- fill a rectangle, circle or any other closed shape ([G06T 11/40](#)),
- edit your work ([G06T 11/60](#)).

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Image processing specially adapted for radiation diagnosis	A61B 6/52
Map generation for navigation systems	G01C 21/00
Producing output data for printers	G06K 15/02
Controller for display circuits, e.g. for LCDs, Plasma, OLEDs	G09G 5/00
Image generation for scanner, fax-machines, copy machines	H04N 1/00
Studio circuits for video generation, mixing, special effects, blue/green screens	H04N 5/262

Informative references

Attention is drawn to the following places, which may be of interest for search:

Generating of panoramic or mosaic images	G06T 3/4038
Generating high dynamic range images (HDR)	G06T 5/92
Non-photorealistic rendering in 3D	G06T 15/02
Input arrangements or combined input and output interaction between user and computer (user interfaces)	G06F 3/01
Video editing	G11B 27/00

G06T 11/001

{Texturing; Colouring; Generation of texture or colour (inpainting [G06T 5/77](#))}

Definition statement

This place covers:

Texture generation

- Textures; endless, periodic pattern
- Texture synthesis, procedural textures
- Neural style transfers
- Brush strokes
- Fractals; Julia sets; Koch curves

Colour generation, changing of selected colours

- Colour palettes, schemes; colour LUT; CLUT
- False colours
- Simulation of watercolour, oil paint, airbrush

Illustrative examples:

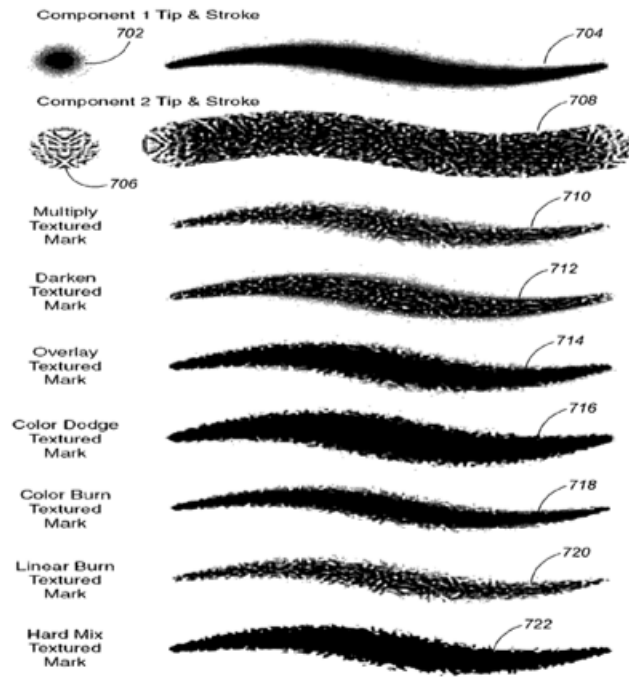
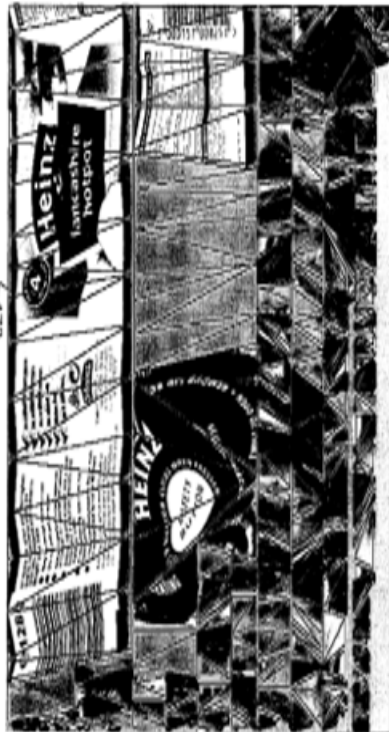


FIG._7



References

Limiting references

This place does not cover:

Inpainting	G06T 5/77
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Texture mapping	G06T 15/04
Colour palettes, CLUTs for displays	G09G 5/00
Colour space manipulation	H04N 1/60

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

LUT	look-up table
CLUT	colour look-up table

G06T 11/003

{Reconstruction from projections, e.g. tomography}

Definition statement

This place covers:

- Reconstruction from tomographic projections, i.e. measurements of an unknown object function (e.g. density of matter, activity distribution) using penetrating radiation or electromagnetic waves, described by radiation transport equations, e. g. integration along lines (= Radon transform), for e. g. refraction tomography, CT, SPECT, PET, Tomosynthesis, Optical Tomography.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Impedance measuring for diagnostic purposes	A61B 5/053
Apparatus for radiation diagnosis	A61B 6/00
Radiation diagnosis devices using data or image processing specially adapted for radiation diagnosis	A61B 6/52
Diagnostic device using ultrasound	A61B 8/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image enhancement in general	G06T 5/00
Image analysis, incl. biomedical image inspection, image registration, segmentation, analysis of motion, analysis of geometric attributes	G06T 7/00

Depth or Shape recovery, from multiple images	G06T 7/55
Analysis of materials using tomography, e.g. CT	G01N 23/046
NMR	G01R 33/4824
Measuring and detection of X-radiation	G01T 1/00
ICT specially adapted for processing medical images, e.g. editing	G16H 30/40

Special rules of classification

In this group, it is desirable to add the indexing codes of groups [G06T 2211/404](#) - [G06T 2211/464](#).

The following list of symbols from the series [G06T 2211/404](#) - [G06T 2211/464](#) should be allocated to documents in [G06T 11/003](#) whenever relevant:

- [G06T 2211/404](#) Angiography - Angiographic reconstruction includes all the reconstruction methods concerning vessels, tree structures etc.
- [G06T 2211/408](#) Dual energy - Reconstruction from dual or multi energy acquisition, polychromatic X-rays, photon-counting CT
- [G06T 2211/412](#) Dynamic - Dynamic reconstruction, i.e. moving objects are involved or motion compensation is required (e. g.: heart, lung movement, etc...)
- [G06T 2211/416](#) Exact reconstruction - Exact or quasi-exact reconstruction algorithms (in contrast to approximate algorithms)
- [G06T 2211/421](#) Filtered Back Projection based methods (the projection data can be handled sequentially, view-by-view)
- [G06T 2211/424](#) Iterative - Iterative methods including all the methods using iterations independent of the reconstruction method per-se (e.g. maximum likelihood (ML) or maximum a posteriori (MAP) estimation, regularisation, compressed sensing)
- [G06T 2211/428](#) Real-time - Real time reconstruction, e.g. fluoroscopy, intra-operative CT
- [G06T 2211/432](#) Truncation - All or part of the data from the detectors are spatially truncated, or incomplete projection data is used.
- [G06T 2211/436](#) Limited angle - limited-angle or few view acquisition, tomosynthesis
- [G06T 2211/441](#) AI-based methods, e.g. deep learning or convolutional artificial neural networks
- [G06T 2211/444](#) Low dose acquisition, reduction of radiation dose
- [G06T 2211/448](#) Involving metal artefacts, streaking artefacts, beam hardening, photon starvation
- [G06T 2211/452](#) Involving suppression of scattered radiation or scatter correction
- [G06T 2211/456](#) Optical coherence tomography [OCT]
- [G06T 2211/461](#) Phase contrast imaging or dark field imaging
- [G06T 2211/464](#) Dual or multimodal imaging, i.e. combining two or more imaging modalities, e.g. PET-CT, PET-MRI

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

CT	Computed Tomography
NMR	Nuclear Magnetic Resonance
MRI	Magnetic Resonance Imaging
SPECT	Single-Photon-Emission Computed Tomography
PET	Positron Emission Tomography

G06T 11/005

{Specific pre-processing for tomographic reconstruction, e.g. calibration, source positioning, rebinning, scatter correction, retrospective gating}

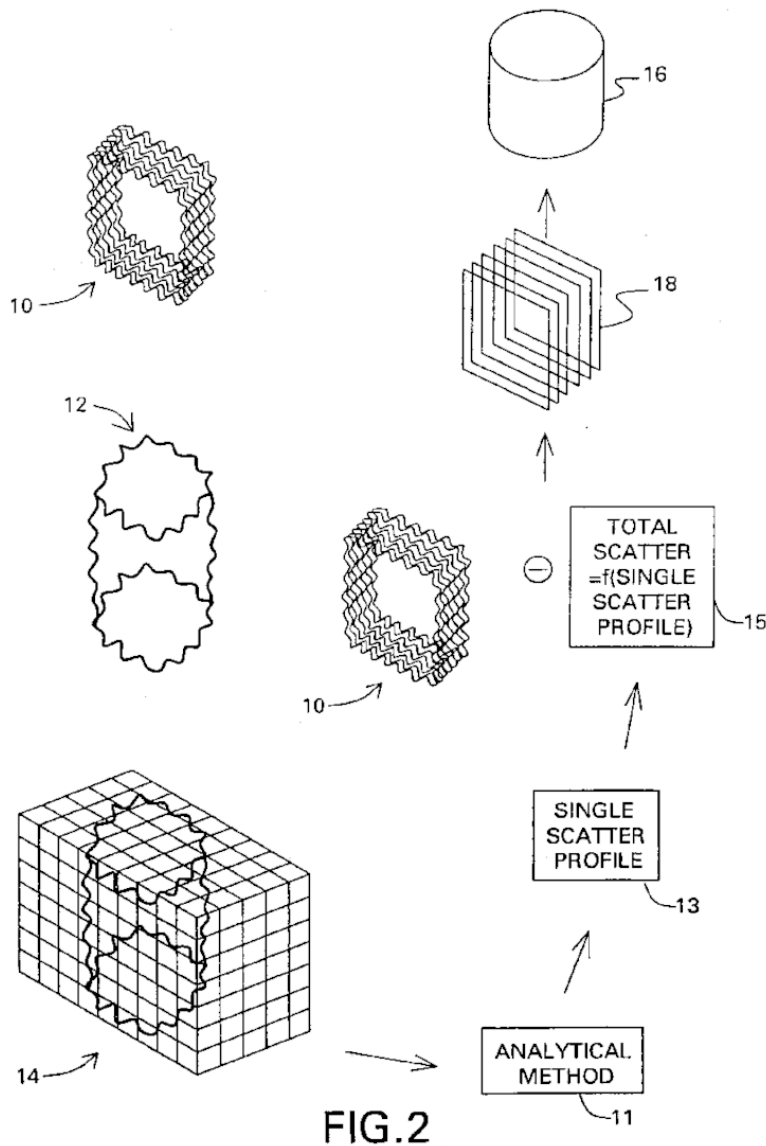
Definition statement

This place covers:

Specific pre-processing for tomographic reconstruction

- Calibration
- Source positioning
- Synchronisation
- Scouts
- Rebinning
- Scatter correction
- Attenuation correction
- Metal artefact reduction (MAR)

Example: Scatter and beam hardening correction in CT applications



G06T 11/006

{Inverse problem, transformation from projection-space into object-space, e.g. transform methods, back-projection, algebraic methods}

Definition statement

This place covers:

- Inverse problem, transformation from projection-space into object-space
- Fourier methods
- Algebraic methods
- Back-projection
- Statistical Methods, e.g. maximum likelihood
- Compressed sensing, sparsity
- AI-based methods, e. g. neural networks

Example: Reconstruction method for cone-beam CT

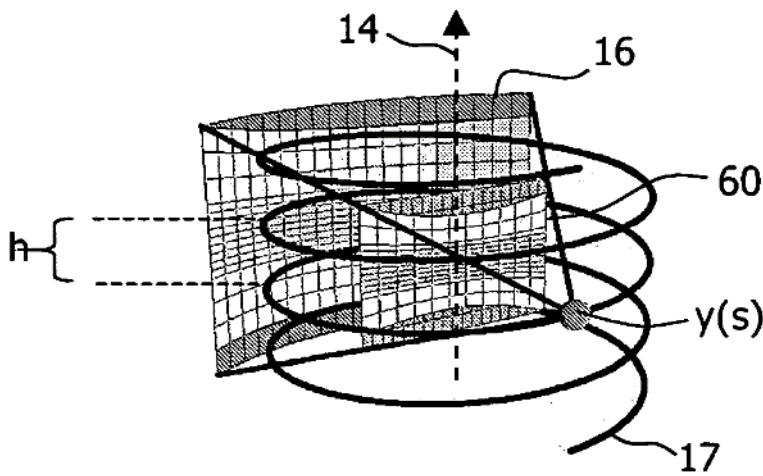


FIG. 4

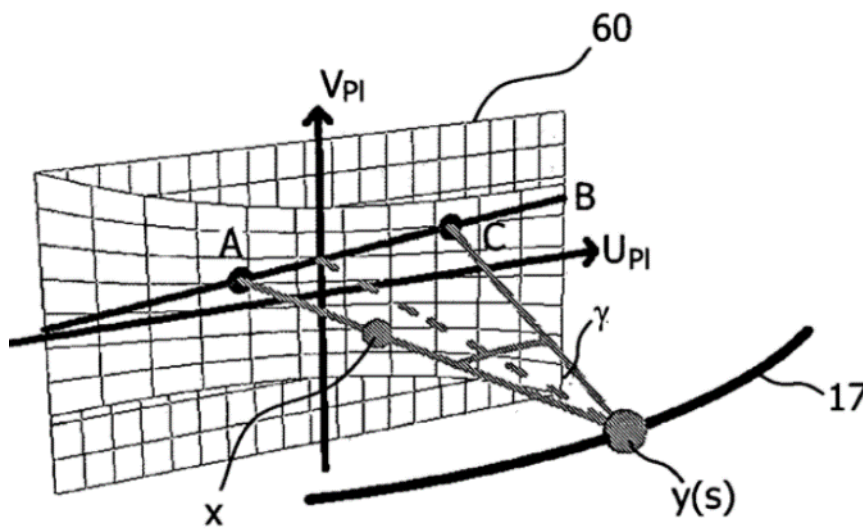


FIG. 5

G06T 11/008

{Specific post-processing after tomographic reconstruction, e.g. voxelisation, metal artifact correction}

Definition statement

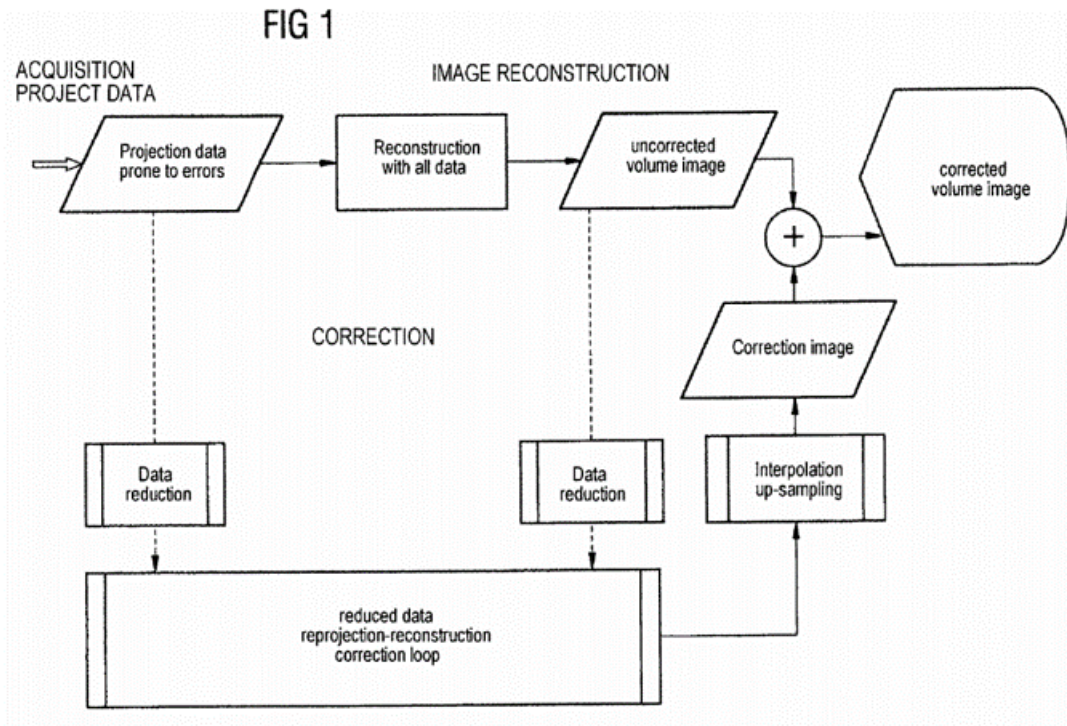
This place covers:

- Specific post-processing after tomographic reconstruction

Definition statement

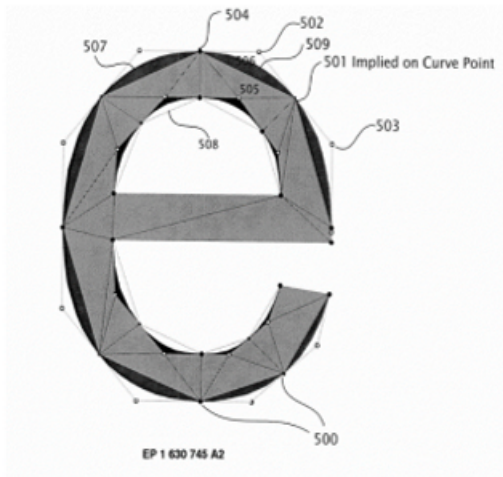
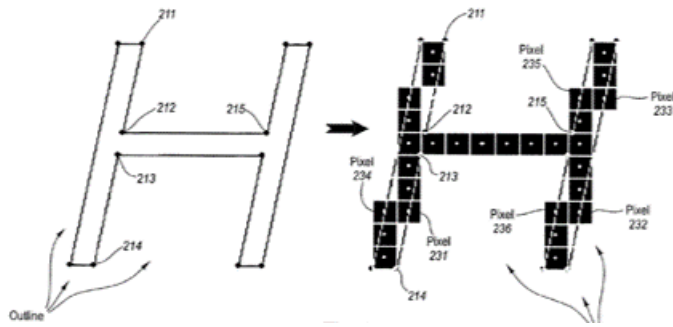
- Processing which relies essentially on unique properties of tomographic images, e.g. projection geometry or interactions of radiation with matter
- Voxelisation
- Artefact correction (e.g. scatter, metal, cone-beam)

Example: Method for post-reconstructive correction of images of a computer tomograph

**G06T 11/203****{Drawing of straight lines or curves}****Definition statement**

This place covers:

- Rendering, scan conversion of vectors, lines, ellipses, circles
- Offset curves, contour curves
- Wide, thick lines or strokes
- Splines, B-splines, NURBS; Bézier, algebraic, parametric, polynomial, cubic curves
- Approximation of curves or polygons
- Antialiasing of lines and curves; e. g. using supersampling; subpixel or area weighting
- Font rendering, e.g. scalable, outline, contour, edge fonts
- Sketching; freehand curve drawing



References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Vehicle instruments	B60K 35/00
Printer fonts	G06K 15/02

Informative references

Attention is drawn to the following places, which may be of interest for search:

Vector coding	G06T 9/20
Filling a planar surface by adding surface attributes	G06T 11/40
Entering handwritten data	G06F 3/04883
Font handling; Temporal or kinetic typography	G06F 40/109
Feature extraction by contour coding	G06V 10/469
Display character generators	G09G 5/24

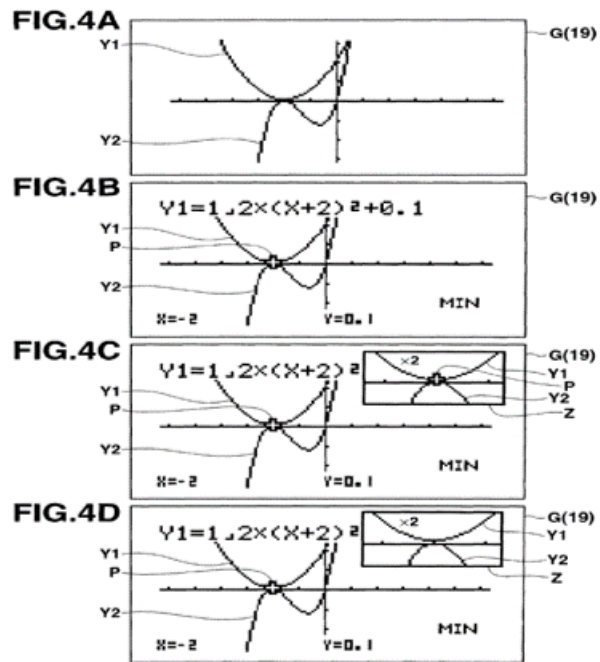
G06T 11/206

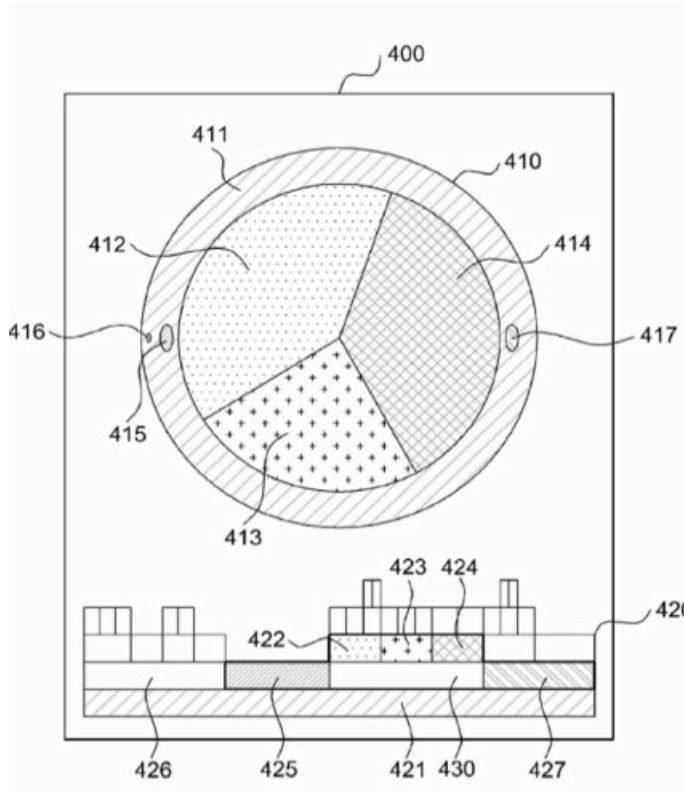
{Drawing of charts or graphs}

Definition statement

This place covers:

Illustrative examples:





- Diagram, graph layout; directed graph; flow graph; flowchart
- Venn diagram; nested tree-map
- Pie, tile, column, bar, business charts
- 2D and 3D Visualization of data; fluid flows; vector fields; scattered data
- Sketched diagrams or graphs

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Navigational instruments, e.g. for aircrafts	G01C 21/00 , G01C 23/00
ICT specially adapted for bioinformatics-related data visualisation, e.g. displaying of maps or networks	G16B 45/00
ICT specially adapted for medical reports, e.g. generation or transmission thereof	G16H 15/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Animation of fluid flows, 2D character animation	G06T 13/60 , G06T 13/80
Input devices, GUIs	G06F 3/048
GUI programs, e.g. file browsers	G06F 9/451
Menu systems, graphical querying	G06F 16/54 , G06F 16/532

Administration, e.g. office automation or reservations; resource or project management	G06Q 10/00
Finance, e.g. banking, investment or tax processing; Insurance, e.g. risk analysis or pensions	G06Q 40/00
Network visualisation or monitoring	H04L 41/06

G06T 11/40

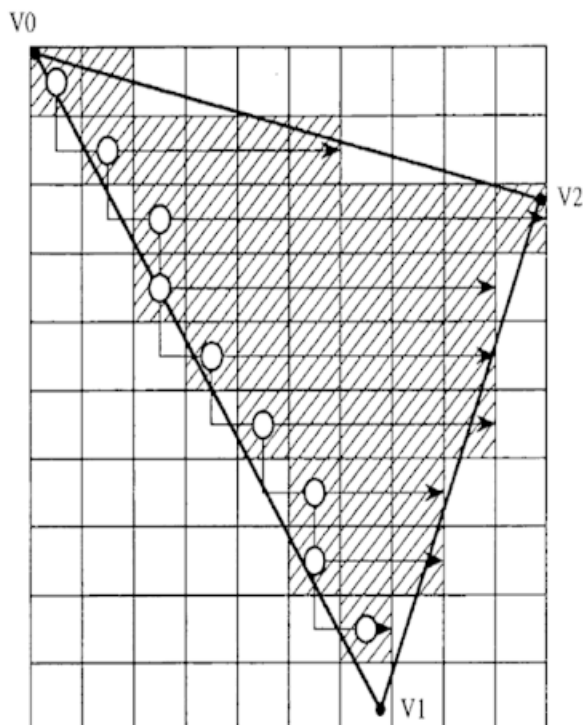
Filling a planar surface by adding surface attributes, e.g. colour or texture

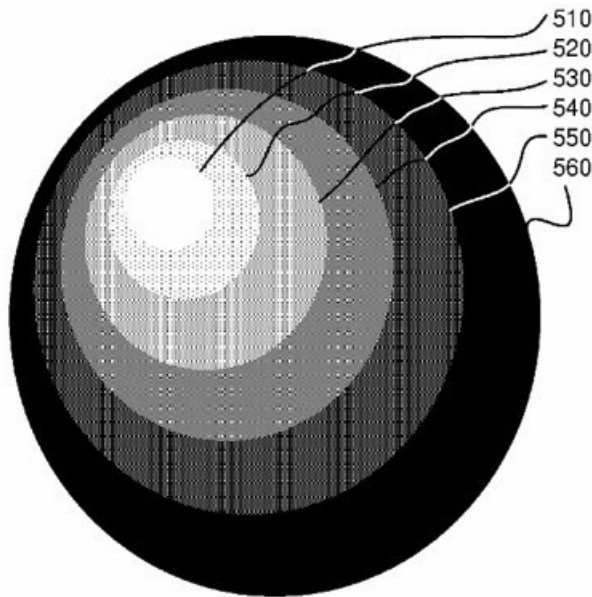
Definition statement

This place covers:

- Polygon scan conversion; rasterisation
- Scan-line algorithms, fragment processing
- Antialiasing, supersampling, subpixel or coverage masks
- Tile-based rendering
- Filling of a 2D shape, e.g. polygon, circle, ellipse, region, area
- Interior/exterior determination; edge lists or edge flags
- Colour blends, gradient fills, seed filling, e.g. for vector graphics

Illustrative example:





(gradient) fills for vector graphics

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Drawing or scan conversion of lines and fonts	G06T 11/203
3D image rendering (architectures)	G06T 15/00 (G06T 15/005)
Control of the frame buffer(s)	G09G 5/39

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- In patent documents the terms "rasterising", "scan conversion" and "rendering" are often used as synonyms.

G06T 11/60

Editing figures and text; Combining figures or text

Definition statement

This place covers:

- Editing of bitmaps or vector graphics
- Page layout, page composition, e.g. photo-album, collages, business or greeting cards
- Combining small images by editing in order to generate a new (big) one
- Graphical simulations, e. g. for 2D cosmetic or hairstyle
- Electronic or desktop publishing (DTP), Page Description Language (PDL), PostScript, TeX

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Face sketching with eye witnesses	A61B 5/117
PDL specifically for printers	G06K 15/02
ICT specially adapted for processing medical images, e.g. editing	G16H 30/40

Informative references

Attention is drawn to the following places, which may be of interest for search:

Mosaic or panoramic images	G06T 3/40
Image registration	G06T 7/30
Annotating 3D objects with text	G06T 19/00
Input devices, GUIs	G06F 3/048
Formatting, i.e. changing of presentation of documents	G06F 40/103
Form filling or merging of text	G06F 40/174
Document analysis	G06V 30/41
Composing, repositioning or geometrically modifying originals, from scanning	H04N 1/387

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

DTP	Desktop Publishing
PDL	Page Description Language

G06T 11/80

Creating or modifying a manually drawn or painted image using a manual input device, e.g. mouse, light pen, direction keys on keyboard

Special rules of classification

This group is not used for classification. Its subject-matter is covered by [G06F 3/00](#) and subgroups

G06T 13/00

Animation

Definition statement

This place covers:

Generating and displaying a sequence of images of artwork or model positions in order to create the effect of movement in a scene.

Animation of data representing a 3D or 2D image model or object.

Definition statement

Time related computation of 2D or 3D images, generation of a sequence of 2D or 3D images is classified in this group.

This group is also given as classification to indicate that animation aspects are present but the invention lies in another group than [G06T 13/00](#).

Documents only dealing with related subject-matter like for example motion capture for animation or navigation in virtual worlds and merely mentioning animation in passing are not classified in [G06T 13/00](#) i.e. the generation of an animation has to be a substantive part of the document to be classified here.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transformations for image warping	G06T 3/18
Motion capture (for animation)	G06T 7/20
3D modelling for computer graphics	G06T 17/00
Manipulation of 3D models for computer graphics	G06T 19/00
Navigation in virtual worlds	G06T 19/003
Video games	A63F 13/00
Computer aided design using simulation	G06F 30/3308
Processing, recording or transmission of stereoscopic or multi-view image signals	H04N 13/10
Model based coding of video objects	H04N 19/20

Special rules of classification

Deforming meshes for animation purposes get both classifications: [G06T 13/00](#) or one of its subgroups and [G06T 17/20](#).

The series [G06T 2213/00](#) of Indexing Codes is reserved for the use of documents classified in [G06T 13/00](#) and subgroups. They should be allocated to documents in [G06T 13/00](#) and subgroups whenever relevant:

G06T 2213/00	Head group of indexing scheme for animation. This symbol should not be allocated to any documents because the group only serves as an internal node in the group hierarchy.
G06T 2213/04	Animation description languages: computer languages for the description of an animation.
G06T 2213/08	Animation software package: also includes hardware packages for animation.
G06T 2213/12	Rule based animation: e.g. rules for behaviour, script, personality.

Furthermore, Indexing Codes from the series [G06T 2200/00](#) and [G06T 2210/00](#) should be allocated to documents whenever relevant. Specific symbols from these series that are especially relevant for the documents in a certain subgroup are mentioned under the "Specific rules for classification" of the respective subgroups.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Animation system	traditional animation systems are based on key-frames, which are a succession of individual states (the position, orientation, and current shape of objects) specified by an animator or user
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Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "simulation (of motion)" and "animation"

G06T 13/20

3D [Three Dimensional] animation

Definition statement

This place covers:

Subject matter wherein the animated image data presents a three-dimensional image model or object.

Means or steps for the generation of a sequence of 3D images.

Documents in this group concern the generation of an animation of 3D objects in general and articulated 3D objects not representing characters.

Simulations with 3D objects (e.g. bouncing balls) or 2D surfaces in 3D space (e.g. cloth) are classified here.

References

Limiting references

This place does not cover:

Nominally claimed subject-matter directed to animation with significant user interaction or manipulation	G06T 19/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Coding of wireframe meshes for animation	G06T 9/00
Simulating properties, behaviour or motion of objects in video games	A63F 2300/64

Special rules of classification

For documents concerning both 2D and 3D animation of objects the first place priority rule is applied, i.e. they are classified only in [G06T 13/20](#) or its subgroups.

Documents where cloth moves according to wind effects are classified in both subgroups [G06T 13/20](#) and [G06T 13/60](#).

For specific aspects of documents in this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated to documents in [G06T 13/20](#) and subgroups whenever relevant:

For animation of cloth: [G06T 2210/16](#)

For collision of 3D objects: [G06T 2210/21](#)

For fluid flows: [G06T 2210/24](#)

For animation using particles: [G06T 2210/56](#)

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

CFD	Computational fluid dynamics
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G06T 13/205

{driven by audio data}

Definition statement

This place covers:

Means or steps for the generation of an animation sequence based on audio data.

The input is audio data, e.g. music, speech data, i.e. no written text.

Changes e.g. in motion, colour, shape or position of objects in the animation are generated based on time events in the audio data, e.g. the beat in the music or the change of instrumentation.

References

Limiting references

This place does not cover:

Electroponic musical instruments	G10H
Emotion analysis from speech for face animation or talking heads	G10L 17/26
Lip-synchronization or synthesis of lip shapes (visemes) from speech for face animation or talking heads	G10L 21/10

Informative references

Attention is drawn to the following places, which may be of interest for search:

Animation based on written text	G06F 40/00
Video editing or indexing or timing	G11B 27/00

Special rules of classification

Documents where the audio input animates a 2D object are classified in both subgroups [G06T 13/205](#) and [G06T 13/80](#).

G06T 13/40

of characters, e.g. humans, animals or virtual beings

Definition statement

This place covers:

Subject matter wherein the animated object exhibits lifelike motions or behaviours.

Definition statement

Means or steps for the generation of an animation sequence of articulated objects representing virtual characters or for the generation of an animation sequence of "body" parts.

The animated characters herein include, e.g. humans, animals or virtual beings.

Animation of a character normally consists of an articulated skeleton surrounded by an implicitly defined volume or a wireframe surface mesh.

Lifelike motions include walking, running, waving or talking. Lifelike behaviours include showing emotions or reactions to events.

Animation of e.g. faces, lips, eyes, gestures, hair or feathers on a character.

Documents concerning only the synthesizing aspect of character animations for Tele- or Videoconferencing (no image capturing, no data transmission)

References

Limiting references

This place does not cover:

Interaction of avatars in virtual worlds	A63F 13/00
Interaction of avatars in virtual worlds for business	G06Q 30/00
Tele- or Video-conferencing	H04N 7/14

Informative references

Attention is drawn to the following places, which may be of interest for search:

Animation of articulated objects in general, i.e. not exclusively or not with the main application for character animation	G06T 13/20
Garment try-on simulators	G06T 19/00 , G06T 2210/16
Computing the motion of game characters with respect to other game characters, virtual objects or elements of a game scene	A63F 2300/6607
Head tracking input arrangements for interaction between user and computer	G06F 3/012
Eye tracking input arrangements for interaction between user and computer	G06F 3/013
Emotion analysis from speech for face animation or talking heads	G10L 17/26
Lip-synchronization or synthesis of lip shapes (visemes) from speech for face animation or talking heads	G10L 21/10

Special rules of classification

- Documents where the characters are only 2D are classified in both subgroups [G06T 13/40](#) and [G06T 13/80](#).
- Documents where the hair on a character is moved by wind effects are classified in both subgroups [G06T 13/40](#) and [G06T 13/60](#).
- Documents where the animation data for the character results from motion capture of real characters are classified in both subgroups [G06T 7/00](#) and [G06T 13/40](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Avatar	graphical representation of the user or the user's character
(inverse) kinematics	calculates the motions necessary to achieve a desired position of the character
Mocap	motion capture
Motion retargeting	transferring the motion from one character to another, different one
Skeleton	tree structure composed of several joints to facilitate modelling the motion of the character
Skinning	technique to deform the skin from the deformation of the skeleton

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Avatar" and "character"

G06T 13/60

of natural phenomena, e.g. rain, snow, water or plants

Definition statement

This place covers:

Subject-matter wherein the animated images are associated with natural phenomena.

Means or steps for the generation of a simulation of natural elements or phenomena.

Documents concerning:

- the simulation of rain, water, foam, water waves, clouds, fog, snow, fireworks, explosions or
- wind effects on grass, plants, flags or hair or
- growing processes of plants or beings or
- destruction processes

are classified here.

References

Limiting references

This place does not cover:

Physical forces (other than wind) acting on 3D objects, e.g. simulation of a flying bullet or bouncing of a ball	G06T 13/20
The simulation of behavioural effects of characters, e.g. the flee behaviour of sea anemons	G06T 13/40

Informative references

Attention is drawn to the following places, which may be of interest for search:

Simulation of fluid flows in general (3D flows)	G06T 13/20
Simulation of fluid flows in general (2D flows)	G06T 13/80

Computer aided design using simulation	G06F 30/3308
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Special rules of classification

Documents where the hair on a character is moved by wind effects are classified in both subgroups [G06T 13/40](#) and [G06T 13/60](#).

Documents where cloth moves according to wind effects are classified in both subgroups [G06T 13/20](#) and [G06T 13/60](#).

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For fluid flows: [G06T 2210/24](#)

For animation using particles, e.g. fireworks, dust: [G06T 2210/56](#)

For weathering effects like e.g. aging, corrosion: [G06T 2210/64](#)

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Weathering	aging process of material by exposure to weather, e.g. wind, water, certain temperatures
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G06T 13/80

2D [Two Dimensional] animation, e.g. using sprites

Definition statement

This place covers:

- Subject matter wherein the animated image data is a 2D image object.
- Means or steps for time related computation of a sequence of 2D images, e.g. a small moveable 2D graphic pattern on a display, often used in video game animation.
- Generation of 2D animated cartoons.
- Animation of 2D text, 2D letters.
- Change over in slide shows, leafing through digital photo albums.
- General aspects of 2D morphing or keyframe interpolation.
- All documents exclusively dealing with the animation of 2D images, i.e. no 3D animation.
- Generation of 2D motion blur.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transformations for image warping	G06T 3/18
Video editing or indexing or timing	G11B 27/00

Special rules of classification

- Documents where the animated 2D object is a character, i.e. 2D character animation, are classified in both subgroups [G06T 13/40](#) and [G06T 13/80](#).

- Documents where the motion blur concerns only the background image are classified in both subgroups [G06T 13/20](#) and [G06T 13/80](#).
- Documents where the audio input animates a 2D object are classified in both subgroups [G06T 13/205](#) and [G06T 13/80](#).
- For documents concerning both 2D and 3D animation of objects with similar algorithms the first place priority rule is applied, i.e. they are classified only in [G06T 13/20](#) or its subgroups, not in [G06T 13/80](#).
- Documents concerning morphing or warping are additionally classified with the Indexing Code [G06T 2210/44](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Keyframe interpolation	generation of a smooth transition between a starting and an ending keyframe
Morphing	continuous transformation between images (shape and colour)
Sprite	2D image or animation that is integrated into a larger 2D scene
Warping	geometric transformation of the 2D object shape

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Keyframe interpolation" and "inbetweening"
- "Morphing" and "warping"

G06T 15/00

3D [Three Dimensional] image rendering

Definition statement

This place covers:

Means or steps for generating a displayable monoscopic image from a 3D model or 3D data set.

The 3D model is a description of three-dimensional objects in a strictly defined language or data structure.

A 3D data set may include voxel data.

Included in this group are input data sets of 3D coordinates or higher.

This group covers the geometry subsystem of the graphics rendering pipeline, i.e. modeling transformation, lighting, viewing transformation, clipping, mapping to viewport.

References

Limiting references

This place does not cover:

Rasterization	G06T 11/40
Visualization of models without surface characteristics or attributes	G06T 17/00
Manipulation and visualization of 3D models for computer graphics	G06T 19/00
Image signal generator	H04N 13/20

Informative references

Attention is drawn to the following places, which may be of interest for search:

Video games	A63F 13/00
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Special rules of classification

The boundaries between [G06T 15/00](#) (in particular [G06T 15/08](#) and [G06T 15/10](#)) on the one hand, and [G06T 3/06](#) and subgroups on the other hand is not yet completely determined. Thus double classification should be considered.

Architectural elements are in general classified in [G06T 15/005](#). However, if the architectural element is only related to a certain part or function within the graphics pipeline (e.g. texture mapping or ray tracing) the document is classified in the respective subgroup (e.g. [G06T 15/04](#) for texture mapping) and additionally the Indexing Code [G06T 2200/28](#) is assigned.

The series [G06T 2215/00](#) of Indexing Codes is reserved for the use of documents classified in [G06T 15/00](#) and subgroups. They should be allocated to documents in [G06T 15/00](#) and subgroups whenever relevant:

G06T 2215/00	Indexing scheme for image rendering: SHOULD BE EMPTY!
G06T 2215/06	curved planar reformation of 3D line structures: CPR of tubular structures (e.g. bronchia, arteries, colon, vertebrae), deployment of line structures in 3D to a 2D plane
G06T 2215/08	gnomonic or central projection: projection from a center of an object, e.g. a ball, to the surrounding surface, related to VTV (virtual television)
G06T 2215/12	shadow map, environment map: generation and use of shadow maps, soft shadows, environment maps
G06T 2215/16	using real world measurements to influence rendering: e.g. shadow based on actual light, viewport based on viewer's pose, texturing with real-time output from camera

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

OpenGL	Open Graphics Library: standard specification defining an application programming interface (API) for writing applications that produce 2D and 3D computer-graphics
Direct3D	standard specification defining an API for writing graphic applications; is part of DirectX
Graphics pipeline	rendering pipeline

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "rasterization" and "rendering"

G06T 15/005

{General purpose rendering architectures}

Definition statement

This place covers:

Functional or operational structure of an image rendering computer system.

Documents in this group focus largely on the way by which the central processing unit (CPU) performs internally with the different units (e.g. the GPU) and accesses memories.

Information relevant is the selection and interconnection of hardware components or functional units in 3D rendering systems.

Hardware and software shader units.

This subgroup is given as classification if the document covers elements of the whole pipeline architecture or if the architectural element covers multiple functions of the graphics pipeline.

References

Limiting references

This place does not cover:

Architectures for general purpose image data processing	G06T 1/20
Memory management for general purpose image data processing	G06T 1/60
Program control in graphics processors	G06F 9/44
Use of graphics processors for other purposes than rendering	G06F 9/44
Graphics controllers, e.g. control of visual indicators or display of a graphic pattern	G09G 5/363

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

GPU	graphics processing unit
Shader unit	instruction sets (in software or hardware) to calculate rendering effects on the graphics hardware

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "shader unit" and "hardware shader"

G06T 15/02

Non-photorealistic rendering

Definition statement

This place covers:

Means or steps for rendering a scene in a style intended to look like a painting or drawing.

Definition statement

Illustrative examples of non-photorealistic rendering may include, e.g. cartoons, sketches, paintings or drawings.

References

Limiting references

This place does not cover:

Generation of texture or colour, e.g. brush strokes	G06T 11/001
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Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Cartoon-style rendering", "Freehand-style rendering", "Handmade-style rendering", "Ink rendering", "Painterly rendering", "Pen rendering", "Pencil rendering", "Silhouette rendering", "Sketchy rendering", "Toon-Style rendering" and "non-photorealistic rendering"

G06T 15/04

Texture mapping

Definition statement

This place covers:

Means or steps for applying or mapping surface detail or colour pattern to a computer-generated graphic, geometry or 3D-model.

Texture mapping used for the generation of a surface image in final format or form is classified herein.

MIP maps, bump mapping, displacement mapping, environment mapping, shadow maps.

References

Limiting references

This place does not cover:

Generation of texture	G06T 11/001
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Special rules of classification

Documents dealing with shadow maps are classified in both subgroups [G06T 15/04](#) and [G06T 15/60](#).

Documents dealing with environment mapping are classified in both subgroups [G06T 15/04](#) and [G06T 15/506](#).

Documents concerning environment maps or shadow maps are additionally classified with the Indexing Code [G06T 2215/12](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Texel	texture element or texture pixel
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G06T 15/06

Ray-tracing

Definition statement

This place covers:

Means or steps for creating an image by tracing rays from a viewpoint through each pixel to a visible point on an object.

Special rules of classification

Ray casting for hidden part removal is classified in both subgroups [G06T 15/06](#) and [G06T 15/40](#).

Generation of a photon map via photon tracing is classified in both subgroups [G06T 15/06](#) and [G06T 15/506](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Ray casting	non-recursive variant of ray tracing
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Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "ray tracing" and "ray casting (especially in early patent documents)"

G06T 15/08

Volume rendering

Definition statement

This place covers:

Means or steps for displaying a two-dimensional representation of three-dimensional volume data sets.

Volume data sets are typically voxels or 3D data sets consisting of groups of 2D slice images acquired by e.g. CT, MRT.

Illustrative examples of volume rendering techniques are Direct Volume Rendering Techniques (e.g. splatting, shear warp), Maximum Intensity Projection (MIP), Minimum Intensity Projection, Curved Planar Reformation (CPR), Multiplanar Reformatting (MPR), Curved Multiplanar Reformatting (CMPR).

Technical details of the projection or mapping technique used for volume rendering.

References

Limiting references

This place does not cover:

Definition of the position of the projection plane, surface or curve for volume rendering	G06T 19/00 , G06T 2219/008
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Volumetric displays for the representation of 3D data sets	H04N 13/388
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Special rules of classification

Documents concerning curved planar reformation of tubular structures are additionally classified with the symbol [G06T 2215/06](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

CMPR	Curved Multi-Planar Reformatting
CPR	Curved Planar Reformation
MIP	Maximum (or Minimum) Intensity Projection
MPR	Multi-Planar Reformatting

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "curved Planar Reformatting", "curved Multiplanar Reformatting", "curved Multiplanar Reformation", "deployment" and "Curved Planar Reformation"

G06T 15/10

Geometric effects

Definition statement

This place covers:

Means or steps for changing the visualization of a graphical object due to view transformations.

Generation of views, multiple views.

Visualization of a graphical object through projection, e.g. parallel projections, oblique projections, gnomonic projections

Mapping of the 3D graphical object on a subspace for visualization, e.g. on (a part of) a plane or on a surface in 3D space (e.g. a bend virtual screen)

References

Limiting references

This place does not cover:

Visualization of volume data sets	G06T 15/08
Perspective projections	G06T 15/20
Changes in the visualization related to lighting effects	G06T 15/50
Changes in the visualization due to geometric transformations of the object (rotation, translation etc.)	G06T 19/00
Stereoscopic imaging or 3D displays	H04N 13/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric transformations in the plane of the image, i.e. from 2D to 2D	G06T 3/00
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Special rules of classification

The boundaries between [G06T 15/10](#) on the one hand, and [G06T 3/08](#) on the other hand is not yet completely determined. Thus double classification should be considered.

Documents concerning gnomonic or central projections are additionally classified with the Indexing Code [G06T 2215/08](#).

G06T 15/20**Perspective computation****Definition statement**

This place covers:

Means or steps for presenting a 3D-object on a screen such that objects closer to the viewpoint appear larger than if farther from the viewpoint.

Perspective projections of graphical objects.

Subject matter related to details of viewpoint determination or computation with claimed or disclosed rendering aspects.

References**Limiting references**

This place does not cover:

View determination or computation without rendering	G06T 19/00
Changing the viewpoint for navigation without details of view generation	G06T 19/003
Transformation of image signals corresponding to virtual viewpoints	H04N 13/111

Informative references

Attention is drawn to the following places, which may be of interest for search:

Changing parameters of virtual cameras in video games	A63F 2300/66
Navigational Instruments, e.g. visual route guidance with on-board computers using 3D or perspective road maps	G01C 21/3635
Interaction techniques, e.g. control of the viewpoint to navigate in a 3D environment	G06F 3/04815
TV systems, e.g. alteration of picture orientation, perspective, position etc.	H04N 5/2628
Stereoscopic images	H04N 13/00

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Multiple views	rendering a graphical object seen from different viewpoints
View generation	visual rendering of geometric properties of a graphical object seen from a certain viewpoint
Viewpoint alteration	change of a viewpoint (of a virtual camera)
Virtual camera	display of a view of a 3D virtual world
Virtual Studio	technological tools for simulating a physical television or movie studio, the image of the virtual camera is rendered in real-time from the same perspective as the real camera in 3D space

G06T 15/205

{Image-based rendering}

Definition statement

This place covers:

Means or steps for rendering a 3D-object or scene using a set of two-dimensional images of it.

Generation of a new view of a graphics object exclusively from 2D images of the object without prior generation of a 3D model.

Rendering using billboards.

Pixel based rendering or point based rendering of 3D objects which are not volume data.

Depth image-based rendering.

References

Limiting references

This place does not cover:

From multiple images	G06T 7/55
Determining parameters from multiple pictures	G06T 7/97
Splatting of volume data	G06T 15/08
Rendering of a 3D model generated from 2D images of it	G06T 17/00

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

IBR	image-based rendering
Billboard	textured rectangles that are used as simplified version of 3D models for rendering

G06T 15/30

Clipping

Definition statement

This place covers:

Means or steps for eliminating those portions of graphics primitives that extend beyond a predetermined region.

The predetermined region may include a viewing volume or any subset of the view volume of any shape.

The shape of the graphics primitives that partly extend beyond the predetermined region is modified.

References

Limiting references

This place does not cover:

Cropping of 2D images	G06T 11/60
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Special rules of classification

Documents where a bounding box or shape is defined or used are additionally classified with the Indexing Code [G06T 2210/12](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Bounding box or bounding shape	minimal box or convex polygon surrounding the graphic object
Viewport	rectangular area on the screen for displaying the rendered graphical object

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "viewing volume", "view volume" and "view frustum"

G06T 15/40

Hidden part removal

Definition statement

This place covers:

Means or steps for determining which surfaces or part of surfaces of a graphic object are visible from a certain viewpoint and optionally removing them.

Hidden surface or line removal.

Culling, e.g. frustum culling, backface culling, frontface culling, occlusion culling. Culling removes graphics objects or scene graph nodes that are completely falling outside the view frustum. This is usually performed before clipping.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

VSD	visible surface determination
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G06T 15/405

{using Z-buffer}

Definition statement

This place covers:

Means or steps for determining which surfaces or parts of surfaces of a graphic object are visible from a certain viewpoint and optionally removing them using Z-Buffer information.

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Z-Buffer" and "Depth-Buffer"

G06T 15/50

Lighting effects

Definition statement

This place covers:

Means or steps for determining intensity or colour on a surface of an object based on interaction of light with the object, considering surface properties or its orientation.

G06T 15/503

{Blending, e.g. for anti-aliasing}

Definition statement

This place covers:

Means or steps for computing an image or pixel-value from several (source) images or pixel-values taking into account their weighting factors.

Weighting factors are usually opacity or transparency associated values.

Compositing.

Vertex or geometry blending.

References

Limiting references

This place does not cover:

Video editing or indexing or timing	G11B 27/00
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Alpha channel or alpha transparency channel	a portion of each pixel's data that is reserved for transparency information
Alpha compositing	combining an image with a background to create the appearance of partial or full transparency
Matte	contains the coverage information, e.g. the shape of the object to be drawn

G06T 15/506

{Illumination models}

Definition statement

This place covers:

Means or steps for computing the amount of energy absorbed, reflected, diffracted or transmitted by an object (or element) to be 3D rendered.

Illumination models usually include composition, direction or geometry of the light source, surface orientation and/or surface properties of the object.

Local illumination models only take into account light arriving straight from the light source.

Global illumination models take into account light arriving after interaction with another object in the scene.

Direct light sources, indirect light sources, multiple light sources, physically based illumination models.

Special rules of classification

Generation of a photon map via photon tracing is classified in both subgroups [G06T 15/06](#) and [G06T 15/506](#).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

BRDF	bidirectional reflectance distribution function
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G06T 15/55

Radiosity

Definition statement

This place covers:

Means or steps for rendering graphic objects through computing the balancing of substantially all light energy coming toward and going away from every point on a surface.

In radiosity, the balance of light energy is usually independent of the viewpoint.

References

Limiting references

This place does not cover:

Subject matter directed to illumination models that only consider viewpoint dependent vectors	G06T 15/506
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G06T 15/60

Shadow generation

Definition statement

This place covers:

Means or steps for determination and generation of a region of darkness on an object where light is at least partially blocked by another graphical object.

The blocking object herein might be a semitransparent object.

Shadow computation normally refers to computation of shadow caused by one object onto another object.

Concave Objects where the shadow caused by one portion of the object falls onto another portion of the concave object is classified herein, e.g. an "L" shaped object can cast a shadow from the vertical portion onto the horizontal portion.

Special rules of classification

Documents concerning the calculation of the position of the light source from the shadow are classified in both subgroups [G06T 15/50](#) and [G06T 15/60](#).

Documents concerning shadow maps are classified in both subgroups [G06T 15/04](#) and [G06T 15/60](#) and are additionally classified with the Indexing Code [G06T 2215/12](#).

G06T 15/80

Shading

Definition statement

This place covers:

Means or steps for assigning colour or intensity alterations or gradations in a particular area of a graphical object's surface based on its relationship with light.

Relationship of light herein includes vector of light which consists of angle and distance or it even may include ambient light.

Surfaces may include polygons or curved surfaces or patches.

Interpolation of colour or shade based on vertex data or other pixels on the surface is classified herein.

Shading caused by the object blocking light on the back side of the same object with respect to a light source is classified herein.

References

Limiting references

This place does not cover:

Shader units	G06T 15/005
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Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Scanline interpolation	Interpolation of values along each surface edge linearly and interpolation of values in the interior of each surface from left edge to rightrightedge, i.e. along a scanline
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G06T 15/83

Phong shading

Definition statement

This place covers:

Means or steps for interpolating surface normals from the vertices of a graphical object in rasterizing a surface thereby calculating specular reflections on a graphical object.

G06T 15/87

Gouraud shading

Definition statement

This place covers:

Means or steps for producing a smooth variation of surface intensity over a surface by bilinearly interpolating the color or intensities from the vertices of a graphical object.

G06T 17/00

Three dimensional [3D] modelling, e.g. data description of 3D objects

Definition statement

This place covers:

Means or steps for generating a description of a 3D model or scene.

The 3D model description is usually generated from point clouds, 2D images, mathematical definitions for the description of curves, surfaces or volumes or data from different sensors.

Marching Cubes, sampled distance fields.

Image data format conversions, e.g. converting polar coordinates to rectangular coordinates or IGES to combinatorial geometry descriptions.

References

Limiting references

This place does not cover:

Depth or shape recovery	G06T 7/50
Manipulating 3D models or images for computer graphics	G06T 19/00
Route guidance using 3D or perspective road maps including 3D objects and buildings	G01C 21/3635
Generation of 3D objects with NC-machines	G05B 19/4099
CAM (Computer aided manufacturing)	G05D 3/00
CAD (Computer aided design) in general	G06F 30/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Methods for drafting or marking-out cutting-out patterns for cloth	A41H 3/007
Collision detection for path planning of manipulators	B25J 9/1666
Collision detection for programme-controlled systems	G05B 19/4061
Image signal generators	H04N 13/268

Special rules of classification

Documents concerning image data format conversion are additionally classified with the Indexing Code [G06T 2210/32](#) - image data format.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

IGES	Initial Graphics Exchange Specification
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G06T 17/005

{Tree description, e.g. octree, quadtree}

Definition statement

This place covers:

Means or steps for generating a hierarchical tree-based description of a 3D model or scene.

Special rules of classification

Documents concerning scene graphs are additionally classified with the Indexing Code [G06T 2210/61](#) - scene description

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Bintree or binary tree" and "tree structure in which each node has at most two child nodes"
- "Quadtree or quad tree" and "tree structure in which each node has at most four child nodes"
- "K-tree" and "tree structure in which each node has at most K child nodes"

- "Hextree" and "tree structure in which each node has at most six child nodes"
- "Volume octree" and "tree structure in which each voxel is subdivided into at most 8 subvoxels"
- "Surface octree" and "Volume octree with incorporated surface information"
- "Multi tree" and "directed acyclic graph in which the set of nodes reachable from any node forms a tree"

G06T 17/05

Geographic models

Definition statement

This place covers:

Means or steps for generating 3D models which relate to geographic data.

The geographic data is usually obtained from different sensors, e.g. LIDAR, stereo photogrammetry from aerial surveys, radar, infrared cameras, GPS, satellite photography and maps e.g. topographic maps, road maps, development plans.

Digital Elevation Models (DEM), contour maps, digital cartography.

Superimposing or overlaying of registered geographic data from different sensors.

Editing of maps, e.g. modelling of roofs or generation of 3D models for buildings displayed on a map.

Map revision, map updating.

Calculation of visibility fields for geographic areas.

Geographical fractal modeling.

References

Limiting references

This place does not cover:

Determination of transform parameters for the alignment of images, i.e. image registration	G06T 7/30
Navigation in a road network, GPS for navigation	G01C 21/26
Navigational Instruments, e.g. visual route guidance using 3D or perspective road maps (including 3D objects and buildings)	G01C 21/3635

Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transformations for image registration	G06T 3/14
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Special rules of classification

This subgroup is an application oriented group. Therefore, whenever possible, documents classified herein should also be classified in a function oriented group.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

GIS	Geographic Information Systems
AMS	Automated Mapping System

Synonyms and Keywords

In patent documents the following expressions are often used as synonyms:

Chorography	description of a landscape
Choropleth map	thematic map

G06T 17/10

Constructive solid geometry [CSG] using solid primitives, e.g. cylinders, cubes

Definition statement

This place covers:

Means or steps for generating 3D models using boundary or volumetric representations of solid primitive objects.

Incremental feature generation, feature modification or modelling, feature-based design is classified here.

Solid modelling via sheet modelling or via sweeping or extrusion of contours, areas or volumes, e.g. the generation of sweep objects or generalized cylinders.

Modelling of solids using volumetric representations, an "alternating sum of volumes" process, volume or convex decomposition or boundary representations.

Generation of 3D objects from 2D line drawings.

Special rules of classification

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For convex hull for 3D objects: [G06T 2210/12](#)

For collision detection or intersection of 3D objects: [G06T 2210/21](#)

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

B-rep or BREP	boundary representation
Alternating sum of volumes (ASV) process	a convex decomposition method for volumetric objects

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "sweep object" and "generalized cylinder"

G06T 17/20

Finite element generation, e.g. wire-frame surface description, {tesselation}

Definition statement

This place covers:

Means or steps for the generation or modification of polygonal surface descriptions of 3D models or parts thereof.

Meshes, grids, tessellations, tessellated surface patches, triangulations, tilings are classified here.

Delaunay triangulation, Voronoi diagrams.

Concatenation of tessellated surface patches, T-junctions.

Meshes for finite element modelling.

References

Limiting references

This place does not cover:

Compression using wireframes	G06T 9/00
Computer-aided design using finite element methods	G06F 30/23

Informative references

Attention is drawn to the following places, which may be of interest for search:

Seismic models	G01V 1/282
Geologic models	G09B 23/40

Special rules of classification

For specific aspects of documents In this group the following additional Indexing Codes from the series [G06T 2210/00](#) should be allocated whenever relevant:

For modelling of cloth: [G06T 2210/16](#)

For collision detection or intersection of 3D objects: [G06T 2210/21](#)

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

FEM	Finite element modelling
TIN	Triangulated irregular network
T-junction	a spot where two polygons meet along the edge of another polygon

G06T 17/205

{Re-meshing}

Definition statement

This place covers:

Means or steps for modifying the structure of a mesh by inserting or deleting mesh vertices.

Generation of meshes with different level of detail from a source mesh.

Refinement or simplification of meshes, honeycomb scheme.

The refinement or coarsening may be locally or globally.

Special rules of classification

Documents concerning the generation of meshes with different levels of detail are additionally classified with the Indexing Code [G06T 2210/36](#).

G06T 17/30

Polynomial surface description

Definition statement

This place covers:

Means or steps for generating a meshfree surface description.

Polynomial surface descriptions, e.g. NURBS, Bézier surfaces, B-spline surfaces, Coons patches, Tensor product patches, without mesh generation or visualization based on tessellations.

Analytical surface descriptions.

Free-form surfaces.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

NURBS	Non-Uniform Rational B-Spline
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G06T 19/00

Manipulating 3D models or images for computer graphics

Definition statement

This place covers:

Means or steps for changing 3D models, for adding information or for changing the visualization via a user interface.

View determination or computation without rendering details, geometric transformations of the whole 3D object to change the viewpoint.

Manipulating 3D models by multiple users in a collaborative environment.

Annotating or labelling of 3D models with text, markers

Definition statement

Dimensioning and tolerancing of 3D models, e.g. display of dimension information for each part

Display of 3D models as an exploded view drawing.

Unfolding or flattening of 3D models or graphs.

Positioning or defining a cut plane or a curved surface in a 3D volume data set, e.g. for projection in volume rendering.

Manipulating 3D data while displaying or updating several views at the same time, e.g. top, front, and side view or sagittal, coronal, and axial view for medical applications.

Virtual try-on or virtual 3D design systems, e.g. virtual dressing or fitting-rooms, virtual mannequins, virtual interior or garden design, architectural design, virtual car configurators.

For documents in this group the function of manipulating 3D objects is prevailing, not the details how it is achieved. Therefore, the documents are usually general and do not contain specific technical details, e.g. documents concerning the change of the viewpoint via a GUI are classified here whereas documents with mathematical details on the change of the viewpoint and the frustum are classified in [G06T 15/20](#).

References

Limiting references

This place does not cover:

CAD-CAM (Computer Aided Design and Manufacturing)	G05B 19/4097
Generation of 3D objects with NC-machines	G05B 19/4099
Interaction techniques for graphical user interfaces	G06F 3/048

Informative references

Attention is drawn to the following places, which may be of interest for search:

2D cosmetic or hairstyle simulations	G06T 11/60
Video games	A63F 13/00
Computer-aided design	G06F 30/00
Transformation of image signals corresponding to virtual viewpoints	H04N 13/111

Special rules of classification

The boundaries between [G06T 19/00](#) on the one hand, and [G06T 3/06](#) and subgroups and [G06T 3/08](#) on the other hand is not yet completely determined. Thus double classification should be considered.

The Indexing Code series [G06T 2219/00](#) and below is reserved for documents classified in [G06T 19/00](#) and subgroups. They should be allocated to documents in [G06T 19/00](#) whenever relevant:

G06T 2219/00	Indexing scheme for manipulating 3D models or images for computer graphics: SHOULD BE EMPTY!
G06T 2219/004	annotating, labelling: annotating or labelling of 3D models or 3D images with text or markers
G06T 2219/008	cut plane or projection plane definition: positioning or defining a cut plane or a curved surface in a 3D volume data set, e.g. for projection in volume rendering

G06T 2219/012	dimensioning, tolerancing: dimensioning or tolerancing of 3D models, e.g. display of dimension information for each part of the model
G06T 2219/016	exploded view: displaying 3D models as an exploded view drawing
G06T 2219/021	flattening: unfolding or flattening of 3D models or graphs in a 2D plane
G06T 2219/024	multi-user, collaborative environment: collaborative environments, multi-user environments
G06T 2219/028	multiple view windows (top-side-front-sagittal-orthogonal): manipulating 3D data while displaying or updating several views at the same time, e.g. sagittal, axial, and coronal view or top, side, and front view

The Indexing Code series [G06T 2219/20](#) and below is reserved exclusively for documents classified in [G06T 19/20](#). To each document classified in [G06T 19/20](#) at least one of the symbols from this series should be allocated:

G06T 2219/20	Indexing scheme for editing of 3D models: SHOULD BE EMPTY!
G06T 2219/2004	aligning objects, relative positioning of parts: aligning graphical objects or relative positioning of parts of a 3D model
G06T 2219/2008	assembling, disassembling: assembling and disassembling of parts of a 3D model
G06T 2219/2012	colour coding, editing, changing, or manipulating: colour modifications, e.g. colour coding, use of pseudo-colour, highlighting object parts in a different colour
G06T 2219/2016	rotation, translation, scaling: Euclidian transformations of the object or parts thereof, i.e. rotation, translation/dragging/shifting, reflection/mirroring, or size changes of a 3D object or parts thereof
G06T 2219/2021	shape modification: shape modifications of a 3D object, e.g. adding or deleting parts of the object, shearing, free-form deformations
G06T 2219/2024	style variation: modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style (e.g. bold lines, dotted lines), displaying more details of an object or of parts thereof in a separate window

Furthermore, symbols from the Indexing Code series [G06T 2200/00](#) and below as well as [G06T 2210/00](#) and below should be allocated to documents in [G06T 19/00](#) and subgroups whenever relevant.

For the documents in the group [G06T 19/00](#) the following additional symbols from the Indexing Code series [G06T 2210/00](#) and below are especially relevant and should be allocated whenever possible:

For architectural design: [G06T 2210/04](#)

For bandwidth reduction: [G06T 2210/08](#)

Convex hull for 3D objects: [G06T 2210/12](#)

For virtual dressing rooms: [G06T 2210/16](#)

For collision detection of 3D objects: [G06T 2210/21](#)

For medical applications concerning e.g. heart, lung, brain, tumours: [G06T 2210/41](#)

G06T 19/003

{Navigation within 3D models or images}

Definition statement

This place covers:

Means or steps for generating a sequence of images of a virtual movement (e.g. flight, walk, sail) through a 3D space or scene.

Navigation path or flight path determination.

Virtual navigation within human or animal bodies or organs, e.g. virtual medical endoscopy of the colon, of the ventricular system, of the vascular system, of the bronchial tree, or within 3D objects, e.g. virtual inspection of pipeline tubes.

Walk- or flight-through a virtual museum, a virtual building, a virtual landscape etc.

References

Limiting references

This place does not cover:

Navigational instruments, e.g. visual route guidance using 3D or perspective road maps (including 3D objects and buildings)	G01C 21/3635 , G01C 21/3638
Interaction techniques for GUIs, e.g. control of the viewpoint to navigate in a 3D environment	G06F 3/04815

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

ICT specially adapted for processing medical images, e.g. editing	G16H 30/40
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Segmentation; Edge detection	G06T 7/10
Analysis of geometric attributes	G06T 7/60
3D animation	G06T 13/20
Centreline of tubular or elongated structure	G06T 2207/30172
Virtual racing games	A63F 13/803

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Virtual angioscopy	virtual endoscopy of the vascular system
Virtual bronchoscopy	virtual endoscopy of the bronchial tree
Virtual colonoscopy	virtual endoscopy of the colon

Virtual ventriculography	virtual endoscopy of the ventricular system
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Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "virtual fly through navigation", "virtual navigation", "virtual flight", "virtual fly-through" and "virtual walk-through"

G06T 19/006

{Mixed reality (object pose determination, tracking or camera calibration for mixed reality [G06T 7/00](#))}

Definition statement

This place covers:

Means or steps for generating 3D mixed reality, i.e. displaying 3D virtual model data together with 2D or 3D real-world image data or for displaying 2D virtual model data together with 3D real-world image data, e.g. real volume data.

3D mixed reality encompasses 3D augmented reality and 3D augmented virtuality.

References

Limiting references

This place does not cover:

Object pose determination, tracking or camera calibration for mixed reality	G06T 7/00
Mixed reality by combining 2D virtual models or text with 2D real image data	G06T 11/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Head-up displays, head mounted displays	G02B 27/01
With head-mounted left-right displays	H04N 13/344
Volumetric display, i.e. systems where the image distributed through a volume	H04N 13/388

G06T 19/20

Editing of 3D images, e.g. changing shapes or colours, aligning objects or positioning parts

Definition statement

This place covers:

Means or steps for changing the visual appearance of the 3D object or parts thereof or for changing the position of the 3D object or parts thereof in the visualization environment.

Shape modifications of the 3D object, e.g. adding or deleting parts of the 3D object, shearing, free-form deformations.

Definition statement

Colour modifications, e.g. colour coding, use of pseudo-colour, highlighting object parts in a different colour.

Modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style (e.g. stroke width and pattern), displaying more details of the object or of parts thereof in a separate window).

Shifting objects or parts thereof, aligning objects, rotating parts of the object or model, Euclidian transformations, size changes of the object or parts thereof.

Assembling and disassembling of object parts, connecting or mating different 3D parts.

References

Limiting references

This place does not cover:

Geometric transformations of the whole 3D object to change the viewpoint but without rendering details	G06T 19/00
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Geometric image transforms in the image plane	G06T 3/00
Colour changes in 2D images	G06T 11/001
Editing of 2D images	G06T 11/60
Time-related zooming on 3D objects	G06T 13/20
Time-related zooming on 2D images	G06T 13/80

Special rules of classification

For the documents in the group [G06T 19/00](#) the following additional symbols from the Indexing Code series [G06T 2210/00](#) and below are especially relevant. To each document classified in [G06T 19/20](#) at least one of the following symbols should be allocated:

For aligning objects, relative positioning of parts: [G06T 2219/2004](#)

For assembling, disassembling: [G06T 2219/2008](#)

For colour coding, editing, changing, or manipulating, pseudo-colours, highlighting: [G06T 2219/2012](#)

For rotation, translation, scaling: [G06T 2219/2016](#)

For shape modifications, adding or deleting parts, shearing, free form deformations: [G06T 2219/2021](#)

For modifications of the display style, e.g. changes of patterns for surfaces, change of line drawing style: [G06T 2219/2024](#)

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

DDM	Direct deformation method
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G06T 2207/00

Indexing scheme for image analysis or image enhancement

Definition statement

This place covers:

Indexing Codes that relate to

- the modality with which the processed image was acquired
- special algorithmic details, also in the sense of further breakdown of groups
- the imaged subject or the context of the image processing

Special rules of classification

Whenever classifying in [G06T 5/00](#) and [G06T 7/00](#), additional information should be classified using one or more of the Indexing Codes from the range of [G06T 2207/00](#). The use of the Indexing Codes is obligatory.

For Image acquisition modality, see Indexing Code [G06T 2207/10](#).

For Special algorithmic details, see Indexing Code [G06T 2207/20](#).

For Subject of image; Context of image processing, see Indexing Code [G06T 2207/30](#).

For example, the Indexing Codes would be used to classify that a model-based segmentation ([G06T 7/12](#) and [G06T 7/149](#)) using an active shape model ([G06T 2207/20124](#)) is done on a CT image ([G06T 2207/10081](#)) of the heart ([G06T 2207/30048](#)), or to classify that extrinsic camera parameters ([G06T 7/80](#)) are determined for an infrared camera ([G06T 2207/10048](#)) mounted on a car facing to the exterior of the car ([G06T 2207/30252](#)), wherein multiresolution image processing is used ([G06T 2207/20016](#)).

As a basic principle, the Indexing Codes from [G06T 2207/00](#) are applicable only in connection with [G06T 5/00](#) and [G06T 7/00](#).

However, not all Indexing Codes are applicable over the whole range of [G06T 5/00](#) and [G06T 7/00](#). The following restrictions apply:

- The Indexing Codes in the range [G06T 2207/20116](#) - [G06T 2207/20168](#) are applicable only together with [G06T 7/10](#) and subgroups.
- The Indexing Codes in the range [G06T 2207/20182](#) - [G06T 2207/20204](#) are applicable only together with [G06T 5/00](#) and subgroups.
- The Indexing Code [G06T 2207/20228](#) is applicable only together with [G06T 7/97](#).

The following Indexing Codes are only used as nodes to build the classification hierarchy and should not contain any documents, i.e. only their subgroups are used for classification:

- [G06T 2207/00](#)
- [G06T 2207/10](#)
- [G06T 2207/10004](#)
- [G06T 2207/10141](#)
- [G06T 2207/20](#)
- [G06T 2207/20024](#)
- [G06T 2207/20112](#)
- [G06T 2207/20172](#)
- [G06T 2207/30](#)

Moreover, the following Indexing Code is considered redundant in the context of image processing and is, thus, not used for classification:

- [G06T 2207/10004](#)

G06T 2207/10

Image acquisition modality

Definition statement

This place covers:

G06T 2207/10012	Stereo images - image acquisition by two cameras or a single camera that is displaced acquire at least one stereo image pair
G06T 2207/10024	Color image - image acquisition by color or multichannel camera; only to be used when color aspect is of some importance also in the processing
G06T 2207/10028	Range image; Depth image; 3D point clouds - range image, depth image, surface image, i.e. 2D image providing depth information; 3D point clouds
G06T 2207/10032	Satellite or aerial image; Remote sensing - satellite or aerial imaging; space-based; remote sensing; Fernerkundung (German expression)
G06T 2207/10036	Multispectral image; Hyperspectral image - multispectral or hyperspectral radiometers in satellite or aerial imaging
G06T 2207/10068	Endoscopic image - image acquisition by endoscopic instrument, e.g. ultrasound catheter, colonoscope, video endoscope, capsule/pill endoscope
G06T 2207/10084	Hybrid tomography; Concurrent acquisition with multiple different tomographic modalities - image acquisition by hybrid tomographic scanner, i.e. by system that combines different tomographic modalities
G06T 2207/10112	Digital tomosynthesis [DTS] - image from digital tomosynthesis [DTS], i.e. limited angle reconstruction based on radiographies
G06T 2207/10124	Digitally reconstructed radiograph [DRR] - DRR reconstructed from 3D tomographic data
G06T 2207/10128	Scintigraphy - image acquisition by scintigraphy or gamma camera
G06T 2207/10144	Varying exposure - acquisition of multiple images with varying exposure parameters
G06T 2207/10148	Varying focus - modification of focus during acquisition of single image or of multiple images
G06T 2207/10152	Varying illumination - acquisition of multiple images with varying illumination conditions

G06T 2207/20

Special algorithmic details

Definition statement

This place covers:

G06T 2207/20008	Globally adaptive - processing of whole image with the same parameters, e.g. the same filter weights, but parameters may vary from image to image
G06T 2207/20012	Locally adaptive - processing of image in a locally differing manner; covers also the limiting of processing to a ROI
G06T 2207/20081	Training; Learning - training or learning, e.g. of background for motion analysis or of model or atlas for segmentation
G06T 2207/20096	Interactive definition of curve of interest - involving interactive definition of non-closed curve of interest; closed curve, see G06T 2207/20104
G06T 2207/20104	Interactive definition of region of interest [ROI] - involving interactive definition of ROI; setting of closed curve or box
G06T 2207/20132	Image cropping - cutting out, cropping, i.e. defining automatically a ROI of simple shape, e.g. rectangular, circular, usually for limiting the further processing to the ROI; this place does not cover manual definition of the ROI: G06T 2207/20104
G06T 2207/20156	Automatic seed setting - automatic setting of seed, e.g. based on statistics of a region of interest, usually for subsequent region-growing or for edge-growing/following; this place does not cover manual seed-setting: G06T 2207/20101
G06T 2207/20164	Salient point detection; Corner detection - detection of salient points, e.g. corners, T-junctions, end points; this place does not cover automatic seed setting: G06T 2207/20156 ; salient points for pattern recognition: G06F 18/00
G06T 2207/20201	Motion blur correction - correcting motion blur in still image or video
G06T 2207/20208	High dynamic range [HDR] image processing; - High Dynamic Range Imaging [HDR or HDR I] from a series of conventional images of lower dynamic range
G06T 2207/20216	Image averaging - averaging of multiple images
G06T 2207/20221	Image fusion; Image merging - image fusion, i.e. merging of images of same subject
G06T 2207/20224	Image subtraction - subtraction of images of same subject, e.g. temporal subtraction, subtraction of images with varying illumination conditions or for masking out certain pre-segmented image parts

G06T 2207/30**Subject of image; Context of image processing****Definition statement***This place covers:*

G06T 2207/30021	Catheter; Guide wire - subject of image: catheter, endoscope or guide wire when imaged in biomedical image
G06T 2207/30052	Implant; Prosthesis - subject of image: implant or prosthesis; also non-synthetic transplants
G06T 2207/30068	Mammography; Breast - subject of image: mammography; breast, usage not limited to x-ray image
G06T 2207/30076	Plethysmography - measurement of possibly periodic volume/size/position changes, e.g. due to blood flow
G06T 2207/30101	Blood vessel; Artery; Vein; Vascular - subject of image: vascular structures, blood vessel, artery, vein, angiography
G06T 2207/30132	Masonry; Concrete- inspection of concrete or masonry in buildings, dams, bridges, etc.
G06T 2207/30144	Printing quality - inspection of printed product
G06T 2207/30152	Solder - inspection of solder, electrical contacts
G06T 2207/30164	Workpiece; Machine component - inspection of workpiece, e.g. machine component; Werkstück (German expression)
G06T 2207/30172	Centreline of tubular or elongated structure - determining the centreline of a tubular or elongated structure, e.g. of a lumen, vessel, colon, pipe
G06T 2207/30176	Document - enhancement or analysis of document image; this place does not cover document recognition: G06F 18/00 , G06V
G06T 2207/30181	Earth observation - earth observation with image from remote sensing
G06T 2207/30184	Infrastructure - observation of infrastructure, e.g. urban infrastructure, roads, railway, water channel, power transmission line
G06T 2207/30188	Vegetation; Agriculture - observation of vegetation areas, e.g. agriculture
G06T 2207/30192	Weather; Meteorology - weather, meteorology, climate
G06T 2207/30204	Marker - subject of image: artificial marker or symbol in image, e.g. used for calibration, registration or tracking
G06T 2207/30212	Military - military application, e.g. target tracking

Definition statement

G06T 2207/30216	Redeye defect - redeye defect detection and correction
G06T 2207/30232	Surveillance - application in video surveillance
G06T 2207/30236	Traffic on road, railway or crossing - subject of image: traffic on road, railway, crossing, square
G06T 2207/30241	Trajectory - determination of trajectory, track, trace
G06T 2207/30244	Camera pose - determination of camera pose, as opposed to the determination of the pose of image content
G06T 2207/30248	Vehicle exterior or interior - imaging with camera placed on a vehicle, car, train, plane, boat or mobile robot
G06T 2207/30252	Vehicle exterior; Vicinity of vehicle - subject of image: exterior of a vehicle; imaging from a vehicle
G06T 2207/30256	Lane; Road marking - subject of image: lane, road marking, railroad, pathway
G06T 2207/30261	Obstacle - subject of image: obstacle, e.g. pedestrian, other vehicle
G06T 2207/30264	Parking - imaging from a vehicle, e.g. for parking aid
G06T 2207/30268	Vehicle interior - subject of image: interior of a vehicle