UNIT-2

1. What is the process of breaking an image into groups?

a) Edge detection b) Smoothing c) Segmentation d) None of the above

Answer: c

2. For edge detection we observe

a.intensity transition **b.**shape transition **c.**color transition **d.**sign transition

Answer: (d).

3. For diagonal edge detection we use

a.1D mask **b.**2D mask **c.**3D mask **d.**4D mask

Ans:b

4. Intersection between zero intensity and extreme of second derivative is called

a.Discontinuity **b.**Similarity **c.**Continuity **d.**zero crossing

Ans: d

5. Edge detection has fundamental a

a.2 points **b.**3 points **c.**4 points **d.**5 points

Answer: (b)

6. Regions of the image must be

a.Joint **b.**Disjoint **c.**Connected **d.**Overlapped

Ans: b

7. The direction of angle to the gradient is

a.Orthogonal **b.**Isolated **c.**Isomorphic **d.**Isotropic

Ans:a

8. Second derivative approximation says that value at end of ramp must be

a.Nonzero **b.**Zero **c.**Positive **d.**Negative

Ans: a

9. In Canny edge detection, we will get more discontinuous edges if we make the following change to the hysteresis thresholding:

(a) increase the high threshold (b) decrease the high threshold
(c) increase the low threshold (d) decrease the low threshold

Ans: c

10. Suppose we are using a Hough transform to do line fitting, but we notice that our system is detecting two lines where there is actually one in some example image. Which of the following most likely to alleviate this problem?

(a) Increase the size of the bins in the Hough transform.
(b) Decrease the size of the bins in the Hough transform.
(c) Sharpen the image.

(d) Make the image larger

Ans: a

11. Edge detection in images is commonly accomplished by performing a spatial --- ---of the image field.

a) Smoothing Filter b) Integration c) Differentiation d) Min Filter

Ans: c

12. What is a perspective anomaly?

a) Oblique b) vanishing point c) cavalier d) none of these

Ans:b

13.. N sift descriptors are indexed using a randomized KD-tree then, What is the complexity (in terms of N) of finding an approximate nearest neighbour to a query sift descriptor?

a. N2 b. N c. log N d. log log N

Ans:c

14 Example of Edge Detection Methods is

a) Neural Networks Segmentation b) Graph Partitioning Methods

c) Watershed Transformation d) Multi-scale Segmentation

Ans: c

15. Edge based segmentation algorithm is using

a) Discontinuity and similarity b) Threshold value

c) None of the above d) Edge linking and boundary

ans:d

16. Segmentation is usually not perfect due to number of factors such as

a) Noise, Bad illumination b) Object Contain several region c) Due to boundary-filling d) Due to closed contour

Ans:a

17. A gradient operator for edge detection is

a) Roberts b) Second order derivative c) Zero crossing operator d) None

Ans:a

18. In histogram-based segmentation, we measure the

a) Color or intensity of objects b) Region of objects c) All of the above d) None of the above

Ans:a

19. A Classical edge detector uses

a) Prewitt operator b) Robert operator c) Threshold operator d) Gaussian operator

Ans: a

UNIT-3(MCQ)

1.Which is a computer-generated curve that move within images to find object boundaries.?
a.Active contours b. scissors c. shifts d.set

2.The overall internal energy of a curve is calculated using first and second derivative of the snake method,
a. The energy can be used to evolve the curve
b. The energy can't be used to evolve the curve
c. The energy can be used to evolve the sphere
d. The energy can't be used the evolve the semi-sphere

3. Condensation is the principal application of computer vision
a. **to detect and track the contour of objects moving in a cluttered environment**
b. only to detect the contour of objects moving in a cluttered environment
c. to detect and track the contour of objects moving in a systemized environment
d. only to detect the contour of objects moving in a systemized environment

4. which is the image segmentation method?
a. **normalized cut**
b. Histogram of oriented Gradients.
c. Viola-Jones algorithm
d. Image editing.

5. _____ allow objects within digital images to be extracted quickly and accurately using simple gesture motions with a mouse.
a. **scissors** b. snake c.counters d.sets

6. The 2D Alignment using least squares is
a**. x'=f(x;p)** b. x'=f(x) c.x'=f(p) d.x'=f(y)

7. Speeding up of finding a likely good set of inliers is called
a. **PROSAC** b.RANSAC c.RANSOM d. SOMRAM

8. Many computer applications require the alignment of _____
a. **3D points** b. 2D points c. 1 point d.2 points

9.The algorithm that helps in computing the single value decomposition of the 3X3 correlation matrix is
a. Orthogonal Procrustes algorithm b. absolute orientation algorithm
c.approximate algorithm d.angular algorithm

10. As the user draws a rough outline the system computes and draws a better curve that clings to high-contrast edges are _____.
a) Active Contour
b)intelligent scissors
c) Snakes
d) level sets

Q) Which is the best method for active contour or level set in segmentation images?
A) level set c) Contours d) Detectors
Ans: b

12. Involve active shape and appearance models, active contours and deformable templates is called

a) Model based Segmentation b) Semi-automatic Segmentation

c) All of the above d) None of the above

Ans: a

13 Techniques like Livewire or Intelligent Scissors are used in

a) Model based Segmentation b) Semi-automatic Segmentation

c) Threshold based Segmentation d) None of the above.

Ans:b

14. Normalized cuts is an NP-hard problem. To get around this problem, we do the following:
(a) apply k-means as an initialization
(b) allow continuous eigenvector solutions and discretize them
(c) converting from a generalized eigenvalue problem to a standard one
(d) constraining the number of cuts we make
(e) forcing the affinities to be positive
Solution b or c

16.An interesting application that is closer to computer animation and visual effects is _____ which uses the tracked contours to deform a set of hand drawn animations

Rotoscoping

17. _____ are a two dimensional generalization of the 1D energy minimizing splines

a) Snakes scissors grapcut levelset

18.which one of the following allows the association between constraints and curves points to evolve over time?

Slippery spring

19. one of the simplest applications of image alignment is a special form image stitching called ____

a) panography b) morphology c) cardiology d) none of the above

20 The pose estimation problem is also known as

Extrinsic Calibration

Intrinsic calibration

Both A ansd B

Direct linear transform

21. How can we produce the best estimate of the motion parameters P?

Use Least Squares

Sum squares

Both a and b only

None of the above

22. The energy corresponding to a segmentation problem can be written as ____

$$E(f) = \sum_{i,j} E_r(i,j) + E_b(i,j),$$

23.The Harris detector extracts interest points for a given image. Select the properties which are correct?

a. The detector is based on the auto-correlation matrix.

b. The detector selects the characteristic scale.

c. The detector finds discriminant points.

d. The detector is invariant to rotation.

24..In feature matching, which of the following is true?

a) Select matching strategy, which determines which correspondences are passed on to the next stage for further processing.

b) Devise efficient data structures and algorithms to perform this matching as quickly as possible

c) **Both a and b** d) None of the above.

25. Identify the approach used to find feature points and their correspondences

a) finding features in one image that can be accurately *tracked using a local search technique*, such as correlation or least squares.

b) independently detect features in all the images under consideration and then *match features based on their* local appearance

c) Both of the above

d) None of the above

26. What are good features to track?

a) Patches with large contrast changes (gradients) are easier to localize, although straight line segments at a single orientation suffer from the aperture problem.

b) Patches with gradients in at least two (significantly) different orientations are the easiest to localize.

c) Both of the above

d) None of the above

27. To rapidly search for features near a given feature, which of the following can be devised?

a) multi-dimensional search tree

b) a hash table

c) Either (a) or (b)

d)None of the above

28. To accelerate the neighbor finding in edge linking, what can be done?

a) Use a sorted list of edgels(sorted first by x coordinates and then by y coordinates, for example)

b) Use a *2D array*

c) *Use a long unsorted list*

d) ***Option (a) and (b)***

29. In video tracking applications, the expected amount of motion and appearance deformation between adjacent frames is expected to be

a) Small
b) Large
c) Average
d) None of the above

30.Which of the following is true?

a) The finer (smaller kernel) Gaussian is a noise-reduced version of the original image
b) The coarser (larger kernel) Gaussian is an estimate of the average intensity over a larger region.
c) Both (a) and (b) are true
d) Option (a) is true but (b) Is false

31. Multi-dimensional hashing maps descriptors into _____based on some function applied to each descriptor vector

a) fixed size buckets b) stacks c) queue d) large buckets

32.Isolated edge points can also be grouped into_____

a) longer curves or contours, as well as straight line segments
b) edges c) Corners d) straight lines only

33. Successive approximation is also known as _____

a**) Line simplification** b) circle approximation c) parabolic model d) b and c

34. A global descriptor describes_____

a**) a complete object or point cloud** b) Regions only c) edges and corners d) none of the above

35.Many computer applications require the alignment of _____

a)3D points b) 2D points c) 1 point d)2 points

36.Which is a computer-generated curve that move within images to find object boundaries.?

a)Active contours b)scissors c) shifts d)set

37.. Slippery spring allows the association between _____ and _____

a)Constraints and curve
+b) gradient and orientation
c) Splines and lines
d) none of the above

38.Active contours allow a user to roughly specify a _____

a) boundary of interest
b) edge points
c) pixel intensity
d) dimension

39. Alpert, Galun, Basri et al. (2007) develop a probabilistic merging algorithm based on two cues, namely _____

a) Color images and gray level
b) gray-level similarity and texture similarity
c) texture similarity and key points
d) none of the above

40. Mean-shift techniques try to find clusters of _____ using mode finding

a) similar pixels

b) neighbouring pixels
c) immediate pixels

41. Snakes can be very good at capturing the _____ shape in many real-world contours.

fine and irregular

42. To compute a good solution to the TSP, the slippery spring data association energy is combined with a regular _____ to define the cost of a tour.

first-order internal smoothness energy

43. A more common way to estimate a set of _____on the typical distribution of the control points $\{x_k\}$.

Shape priors

44. Active contours allow a user to roughly specify a _____

boundary of interest

1. Demonstrate the mean shift color image segmentation with an neat example.
2. Explain the normalized cut algorithm and its improvements to determine the shape of the objects.
3. How we can quantify the performance of a matching algorithm?
4. Discuss about the Vanishing point,
5. Illustrate the expectation maximization algorithm in K-means and mixture of Gaussians.
6. How the image features are evolved using the snakes in active contour?
7. Explain the normalized cut algorithm and its improvements to determine the shape of the objects.
8. How we can quantify the performance of a matching algorithm?
9. What are the challenges of CONDENSATION? How it is addressed using level sets?
10. Explain graph-based segmentation in splitting and merging
11. Write short note on Pose estimation.
12. Explain Harris corner Detection algorithm
13. Briefly explain how feature matcher works.
14. Explain how confusion matrix is used to quantify the performance of feature matching.
15. Discuss some of the approaches for efficient feature matching.
16. What kinds of features need to be detected and then matched in order to establish an alignment or set of correspondences? Compare those features.
17. Explain briefly the stages involved in keypoint detection and feature matching.
18. Difference between divisive and agglomerative algorithms in cluster analysis.
19. What are the techniques used to minimize the energy in contour detection?

UNIT-2

MCQS, Fill in the blanks, and Descriptive questions

Subject: 18CS390T Computer Vision

MCQS

Identify the approach used to find feature points and their correspondences

a. finding features in one image that can be accurately *tracked using a local search technique,* such as correlation or least squares.
b. independently detect features in all the images under consideration and then *match features based on their* local appearance
c. Both of the above
d. None of the above
Answer: c

What are good features to track?
a. Patches with large contrast changes (gradients) are easier to localize, although straight line segments at a single orientation suffer from the aperture problem.
b. Patches with gradients in at least two (significantly) different orientations are the easiest to localize.
c. Both of the above
d. None of the above
Answer: c

The feature descriptors describe elementary characteristics such as
a. the shape
b. the color
c. the texture or the motion
d. all of the above
Answer: d

In feature matching, which of the following is true?
a. Select matching strategy, which determines which correspondences are passed on to the next stage for further processing.
b. Devise efficient data structures and algorithms to perform this matching as quickly as possible
c. Both a and b
d. None of the above
Answer: c

To rapidly search for features near a given feature, which of the following can be devised?
a. multi-dimensional search tree
b. a hash table
c. Either (a) or (b)
d. None of the above
Answer: c

In video tracking applications, the expected amount of motion and appearance deformation between adjacent frames is expected to be
a. Small
b. Large
c. Average
d. None of the above
Answer: a

Examples of edge detectors are
a. Sobel Edge detector and Threshold edge detector
b. Scale-space edge detector and Sobel Edge detector

c. Sobel Edge detector, Scale-space edge detector, Threshold edge detector
d. None of the above
Answer: c

Which of the following is true?
a. The finer (smaller kernel) Gaussian is a noise-reduced version of the original image
b. The coarser (larger kernel) Gaussian is an estimate of the average intensity over a larger region.
c. Both (a) and (b) are true
d. Option (a) is true but (b) ifalse
Answer: c

To accelerate the neighbor finding in edge linking, what can be done?
a. Use a sorted list of edgels (sorted first by x coordinates and then by y coordinates, for example)
b. Use a *2D array*
c. *Use a long unsorted list*
d. *Option (a) and (b)*
Answer: d

Fill in the blanks

The key advantage of keypoints is_____

Answer: they permit matching even in the presence of clutter (occlusion) and large scale and orientation changes.

When the auto-correlation surface for the textured flower bed and the red cross in the lower right quadrant exhibits a strong minimum, it indicates _____

Answer: it can be well localized

A global descriptor describes_____

Answer: a complete object or point cloud

A local descriptor tries to resemble shape and appearance only in _____

Answer: a local neighbourhood around a point and thus are very suitable for representing it in terms of matching.

Multi-dimensional hashing maps descriptors into _____based on some function applied to each descriptor vector.

Answer: fixed size buckets

If the images are undergoing brightness change, _____ may be preferable.

Answer: explicitly compensating for variations or using normalized cross-correlation

Isolated edge points can also be grouped into_____

Answer: longer *curves or contours, as well as straight line segments*

If edges were not detected using *zero crossings*, finding the continuation of an edgel for edge linking can be tricky, so _____ and _____ can be used.

Answer: ***comparing the orientation*** (and, optionally, phase) **of adjacent edgels** can be used for disambiguation and Ideas from ***connected component computation*** can also sometimes be used to make the edge linking process even faster.

The field of **contour detection** and **linking** continues to evolve rapidly and now includes techniques for_____
Answer: global contour grouping, boundary completion,junction detection*, grouping contours into likely regions and wide-baseline correspondence*

Successive approximation is also known as _____
Answer: Line simplification

The **Hough transform** is a _____technique
Answer: feature extraction

A **vanishing point** means _____
Answer: a **point** on the **image** plane of a perspective drawing where the two-dimensional perspective projections (or drawings) of mutually parallel lines in three-dimensional space appear to converge

Big questions

1. What kinds of features need to be detected and then matched in order to establish an alignment or set of correspondences? Compare those features.
2. Explain briefly the stages involved in keypoint detection and feature matching.
3. Briefly explain how feature matcher works.
4. Explain how confusion matrix is used to quantify the performance of feature matching.
5. Discuss some of the approaches for efficient feature matching.
6. Explain various feature tracking strategies.
7. Explain briefly about vanishing points detection approach.

12 MARKS

1. What is feature detection? Explain the following feature detectors:
i)Forstner-Harris Hessian
ii) Adaptive non-maximal suppression
iii) Affine invariant detectors

2. What are feature descriptors? Explain the following feature descriptors:
i) Bias and Gain normalization
ii) SIFT
iii)GLOH

3. Explain the concept of edge detection with an example and also discuss various approaches of edge detection.

4. Explain in detail any edge linking techniques with relevant examples and diagrams.

5. Explain in about Hough transform technique with algorithm, examples, diagrams, and mention some of the applications of this technique.