بسم الله الرحمن الرحيم

Chapter 3

1. Feature detection and matching are an essential component of many computer vision applications:
    a. Automate object tracking
    b. Point matching for computing disparity
    c. Stereo calibration and Estimation of fundamental matrix
    d. Motion based segmentation
    e. Recognition
    f. 3D object reconstruction
    g. Robot navigation
    h. Image retrieval and indexing
    i. <u>All of the above</u>
2. 1st approach: Find features in one image that can be accurately tracked using a ………………… search technique.
    a. <u>Local</u>
    b. Global
3. 1st approach: Example of local search techniques:
    a. Correlation
    b. Least squares
    c. <u>All of the above</u>
4. 1st approach: We use local search techniques when images are taken from nearby viewpoints or in rapid succession (e.g., video sequences).

a. **True**

b. False

5. 2nd approach: Independently detect features in all the images under consideration and then match features based on their ……….. appearance.

a. **Local**

b. Global

6. 2nd approach: A ………. amount of motion or appearance change is expected.

a. Little

b. **Large**

7. 2nd approach: Stitching together panoramas.

a. **True**

b. false

8. 2nd approach: …………….. in wide baseline stereo.

a. **Establishing correspondences**

b. Establishing features

c. Establishing edges

9. 2nd approach: Performing ………………… .

a. **Object recognition**

b. Histogram equalization

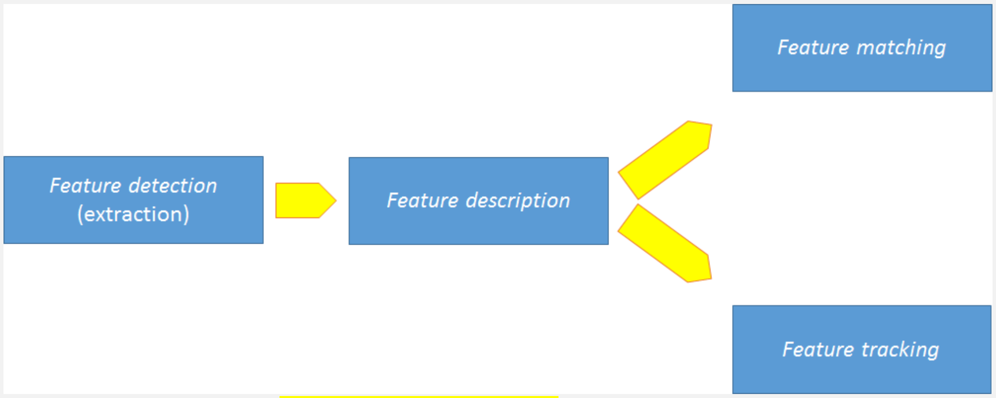
10. Steps of Keypoint detection:

a. Feature detection(extraction)

b. Feature description, then

i. Feature matching(images)

ii. Feature tracking(videos)



11. Interest point has expressive texture.

    a. **True**

    b. false

12. Interest point is the point at which the direction of the boundary of object changes ....

    a. Gradually

    b. **Abruptly (suddenly)**

    c. Smoothly

13. Interest point is the Intersection point between two or more edge segments.

    a. **True**

    b. False

14. Properties of Interest Point Detectors:

    a. Detect all (or most) true interest points.

    b. No false interest points.

    c. Well localized.

    d. Robust with respect to noise.

    e. Efficient detection.

15. Interest point detectors permit matching even in the presence of clutter (occlusion), large scale, illumination change and orientation changes.

    a. **<u>True</u>**

    b. false

16. ……………., Identify the interest points .

    a. **<u>detection</u>**

    b. description

    c. matching

17. ……………., Extract feature vector descriptor surrounding each interest point.

    a. Detection

    b. **<u>Description</u>**

    c. Matching

18. ……………., Determine correspondences between two descriptors in two views.

    a. Detection

    b. Description

    c. **<u>Matching</u>**

19. Feature descriptor must provide some invariance to geometric and photometric differences between the two views.

    a. **<u>True</u>**

    b. False

20. Texture-less patches are nearly ……………. to localize.

    a. Possible

b. **<u>Impossible</u>**

21. Patches with large ………… changes (gradients) are easier to localize.

    a. Brightness

    b. Saturation

    c. **<u>Contrast</u>**

22. Straight line segments at a single orientation suffer from the …………….

    a. Shutter speed

    b. **<u>Aperture problem</u>**

    c. Iso

23. No unique match

    a. **<u>Aperture problem</u>**

    b. Shutter speed problem

    c. Iso problem

24. ………………, Frequency with which key-point detected in one image are found within Ɛ (say, Ɛ=1.5) pixels of the corresponding location in a transformed image.

    a. **<u>Measuring repeatability</u>**

    b. Scale invariance

    c. Rotational variance and orientation estimation

    d. Affine invariance

25. ε= …………. .

    a. 1

    b. 1.25

    c. **<u>1.5</u>**

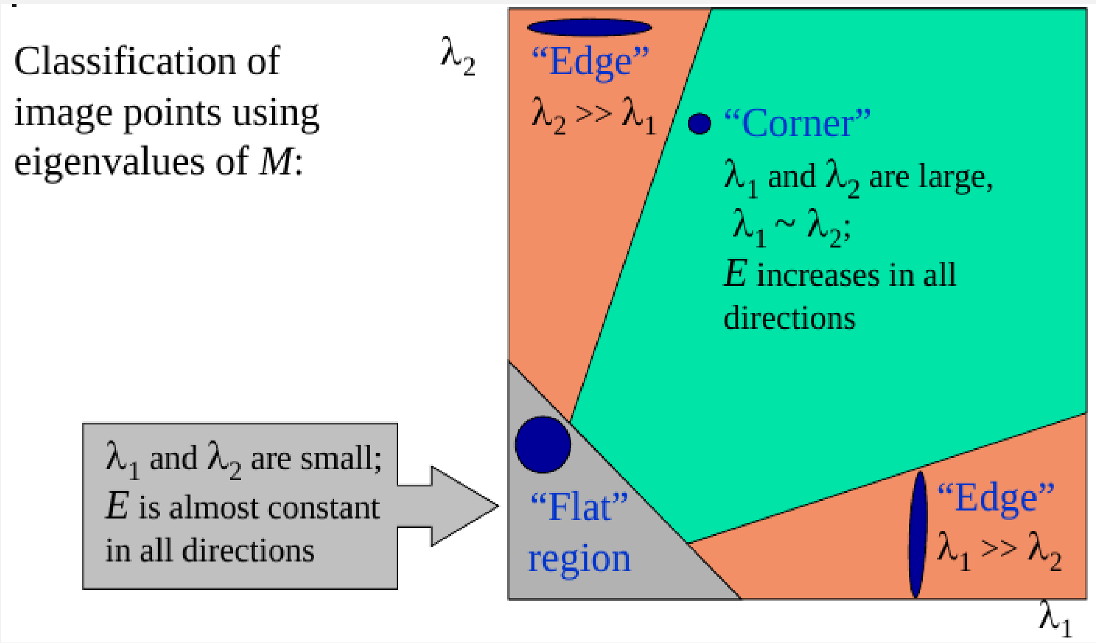
d. 2

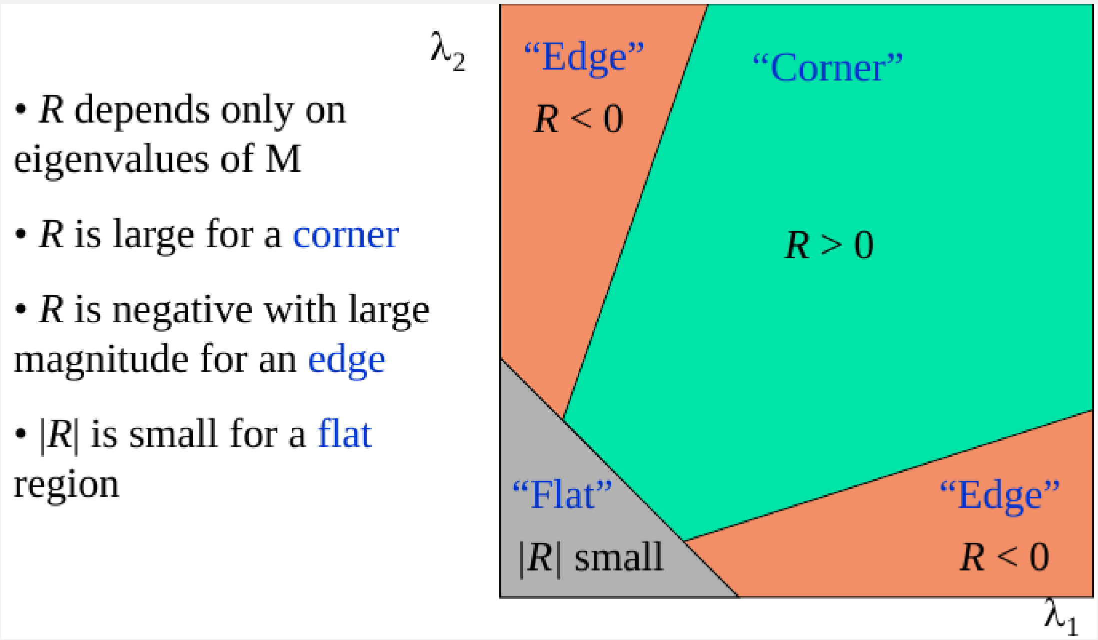
26. Performing the same operations at multiple resolutions in a pyramid and then matching features at the same level.
    a. Measuring repeatability
    b. Scale invariance
    c. Rotational variance and orientation estimation
    d. Affine invariance
27. They also respond consistently across affine deformations such as (local) perspective foreshortening.
    a. Measuring repeatability
    b. Scale invariance
    c. Rotational variance and orientation estimation
    d. Affine invariance
28. The Simplest Possible Matching Criterion
    a. Weighted summed square difference
    b. auto-correlation function or surface
    c. all of the above
29. Comparing an image patch against itself (respect to small variations), which is known as ……………
    a. Weighted summed square difference
    b. auto-correlation function or surface
30. Approaches to corner detection
    a. Based on brightness of images
        i. Usually image derivatives
    b. Based on boundary extraction

    i. First step edge detection
    ii. Curvature analysis of edges

31. Shifting a window in any direction should give a large change in intensity.
32. Significant change in all directions.
    a. Flat
    b. Edge
    c. **<u>Corner</u>**
33. No change in all directions
    a. **<u>Flat</u>**
    b. Edge
    c. Corner
34. No change along edge direction
    a. Flat
    b. **<u>Edge</u>**
    c. Corner
35. …………….. are good because they don’t have aperture problem
    a. Flat
    b. Edge
    c. **<u>Corner</u>**

36.





37.

38. Multiply & maximize

a. **<u>Correlation</u>**

b. Sum square difference(SSD)

c. Taylor's series

39. Subtract & minimize
    a. Correlation
    b. <u>Sum square difference(SSD)</u>
    c. Taylor's series
40. Can be represented at a point in terms of it's derivatives
    a. Correlation
    b. Sum square difference(SSD)
    c. <u>Taylor's series</u>
41. If pixel value is greater than its neighbors, then it is a …………
    a. local minima
    b. <u>local maxima</u>
    c. global maxima
    d. global minima
42. The local motion around each feature point may be mostly translational
    a. <u>true</u>
    b. false
43. The local appearance of features will change, if there is a change in orientation, scale, and undergo affine deformations
    a. <u>True</u>
    b. False
44. MOPS stands for
    a. Multi-frame Organic potatoes
    b. <u>Multi-scale Oriented Patches</u>

45. To compensate for slight inaccuracies in the feature point detector (location, orientation, and scale), ………. are sampled at a spacing of …………. pixels relative to the detection scale
    a. MOPS, four
    b. <u>MOPS, five</u>
    c. MOPS, six
    d. MOPS, ten
46. Using a ………. level of the image pyramid to avoid aliasing
    a. <u>Coarser</u>
    b. High
    c. Low
    d. Mid
47. To compensate for affine photometric variations, patch intensities are ………. so that their mean is ….. and variance is ……..
    a. re-scaled, one, one
    b. re-scaled, zero, two
    c. <u>re-scaled, zero, one</u>
    d. re-scaled, five, one
48. the resulting ……… non-negative values form a row version of the SIFT descriptor vector
    a. 126
    b. <u>128</u>
    c. 127
    d. 190

49. ………….. computes the x and y derivatives over a **39x39** patch and then reduces the resulting **3042-dimensional** vector to **36**

   a. SIFT Detector
   b. **PCA-SIFT Detector**

50. SURF uses ………. to approximate the derivatives and integrals used in SIFT

   a. Average filter
   b. **box filters**
   c. median filter
   d. linear filter

51. Gradient Location-orientation Histogram (GLOH) Detector is invariant on SIFT that uses a log-polar binning structure instead of the four quadrants

   a. True
   b. **False (variant)**

52. The spatial bins are of radius 6, 11, and 15, with eight angular bins (except for the central region), for a total of 17 spatial bins and 16 orientation bins

   a. **True**
   b. False

53. The 272-dimensional histogram is then projected onto a ………. -dimensional descriptor using PCA trained on a large database

   a. 123
   b. 200
   c. **128**

d. 256

54. GLOH has the over all better performance and it outperforms by a SIFT small margin

    a. <u>True</u>

    b. False

55. Steerable filters are combinations of ……………. that permit the rapid computation of even and odd (symmetric and anti-symmetric) edge-like and corner-like features at all possible orientations

    a. derivative of box filters

    b. derivative of log filters

    c. <u>derivative of Gaussian filters</u>

    d. derivative of Gaussian descriptors

56. steerable filters are somewhat insensitive to localization and orientation errors

    a. <u>True</u>

    b. False

57. Feature Matching Components

    a. Selecting a matching strategy that determines which correspondences are passed on to the next stage for further processing.

    b. Devising efficient data structures and algorithms to perform this matching as quickly as possible.

58. Determining which feature matches are reasonable to process further depends on the context in which the matching is being performed

a. **True**

b. False

59. number of correct matches.

a. **True Positive (TP)**

b. True Negative (TN)

c. False Positive (FP)

d. False Negative (FN)

60. matches that were not correctly detected.

a. True Positive (TP)

b. True Negative (TN)

c. False Positive (FP)

d. **False Negative (FN)**

61. proposed matches that are incorrect.

a. True Positive (TP)

b. True Negative (TN)

c. **False Positive (FP)**

d. False Negative (FN)

62. non-matches that were correctly rejected.

a. True Positive (TP)

b. **True Negative (TN)**

c. False Positive (FP)

d. False Negative (FN)

63. In matching strategy and error rates, given an Euclidean distance metric, the simplest strategy is to set a threshold (maximum

distance) and to return all matches from other images within this threshold.

a. **true**
b. false

64. setting the matching strategy and error rates threshold too high results ……… while setting it too low would result …………..

a. **FP, FN**
b. FN, FP
c. TN, TP
d. TP, TN

- true positive rate (TPR),

$$\mathrm{TPR} = \frac{\mathrm{TP}}{\mathrm{TP+FN}} = \frac{\mathrm{TP}}{\mathrm{P}};$$

- false positive rate (FPR),

$$\mathrm{FPR} = \frac{\mathrm{FP}}{\mathrm{FP+TN}} = \frac{\mathrm{FP}}{\mathrm{N}};$$

- positive predictive value (PPV),

$$\mathrm{PPV} = \frac{\mathrm{TP}}{\mathrm{TP+FP}} = \frac{\mathrm{TP}}{\mathrm{P'}};$$

- accuracy (ACC),

$$\mathrm{ACC} = \frac{\mathrm{TP+TN}}{\mathrm{P+N}}.$$

65. ………… is how many returned documents are relevant, it is also used instead of PPV.

a. **Precision**
b. Recall

66.………… is what fraction of relevant documents was found, it is also used instead of TPR
a. Precision
b. **Recall**

67.A better approach for reaching an efficient matching is to devise an ……………, such as a multi-dimensional search tree or a hash table, to rapidly search for features near a given feature.
a. **indexing structure**
b. indexing array

68.One of the simpler techniques to implement efficient matching is ………., which maps descriptors into ……….. sized buckets based on some function applied to each descriptor vector
a. **multi-dimensional hashing, fixed**
b. meat-dragon halal, variable

69.A simple example of hashing is the Haar wavelets
a. **True**
b. False

70.……………, Find a set of likely feature locations in a first image and to then search for their corresponding locations in subsequent images.
a. Feature detection
b. Feature descriptor
c. **Feature tracking**
d. Feature matching

71. Use ……….. in feature tracking, if images are undergoing brightness change

   a. **Normalized cross correlation**
   b. Hierarchical search strategy

72. Use ……….. in feature tracking, if the search image is large

   a. Normalized cross correlation
   b. **Hierarchical search strategy**