بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Chapter 2 – Updated Version 2021

1. The …………….. is considered as the first stage in most computer vision applications.
    a. Computer vision
    b. <u>image processing</u>
    c. see the image
    d. Taz photography
2. why image processing
    a. to preprocess the image
    b. convert it into a form suitable for further analysis
    c. <u>A&B</u>
3. Image Noise Reasons
    a. Light Variations
    b. Camera Electronics
    c. Surface Reflectance
    d. Lens
    e. Time effects
    f. <u>All Of The Above</u>

$I(x,y)$: the true pixel values
$n(x,y)$: the noise at pixel (x,y)
$$\hat{I}(x,y) = I(x,y) + n(x,y)$$

4. Noise Equation:
5. Gaussian Noise Equation:
6. **point** to point mapping to perform brightness, contrast adjustments, color correction and transformations.
    a. <u>Point Operators</u>

    $$n(x,y) = e^{\frac{-n^2}{2\sigma^2}}$$

    b. Image filters in spatial domain
    c. Image filters in the frequency domain

    d. Templates and Image Pyramids

7. **mathematical** operations of a **grid of numbers** to perform smoothing, sharpening, and measuring texture.
    a. Point Operators
    b. Image filters in spatial domain
    c. Image filters in the frequency domain
    d. Templates and Image Pyramids
8. a way to modify the **frequencies** of images to perform Denoising, sampling, and image compression.
    a. Point Operators
    b. Image filters in spatial domain
    c. Image filters in the frequency domain
    d. Templates and Image Pyramids
9. A way to match a template to the image to perform Detection and coarse-to-fine registration
    a. Point Operators
    b. Image filters in spatial domain
    c. Image filters in the frequency domain
    d. Templates and Image Pyramids
10. They are the simplest kinds of image processing transforms
    a. Point Operators
    b. Image filters in spatial domain
    c. Image filters in the frequency domain
    d. Templates and Image Pyramids
11. Each output pixel's value depends only on input pixel value.
    a. Point Operators
    b. Image filters in spatial domain
    c. Image filters in the frequency domain
    d. Templates and Image Pyramids
12. Point operators include
    a. Brightness
    b. Contrast Adjustments
    c. Color Correction

d. Transformations.

e. <u>All of the above</u>

13. A general image processing operator is a function that takes one or more input images and produces an output image

a. <u>True</u>

b. False

14. Commonly used point processes are ….. with a constant

a. multiplication

b. addition

c. subtraction

d. <u>A&B</u>

15. Multiplication (a > 0) and addition (b) are called

a. <u>Gain and Bias parameters</u>

b. Bias and Gain parameters

16. Gain and Bias parameters control contrast and brightness

a. <u>True</u>

b. False

17. Gain and Bias parameters can be spatially ……….. when simulating the ……….. used by photographers to selectively darken the sky.

a. Fixed, graded density filter

b. <u>Varying, graded density filter</u>

c. Varying, graded contrast filter

d. Varying, fixed density filter

18. The ……………………… is varying from 0 and 1, this operator can be used to perform a ……………………… between two images or videos.

a. Spatial blend operator and temporal cross-dissolve

b. linear blend operator and fixed cross-dissolve

c. frequency blend operator and fixed cross-dissolve

d. <u>linear blend operator and temporal cross-dissolve</u>

19. …………………… is used to remove the non-linear mapping between input radiance and quantized pixel values.

a. <u>Gamma correction</u>

b. Linear blend operator

c. Color balancing

d. Graded density filter

20. The …… is used by photographers to selectively darken the skys.

a. Gamma correction

b. Linear blend operator

c. Color balancing

d. Graded density filter

21. Gamma value equal …… is usually fit for most digital cameras.

a. 2.1

b. 2.2

c. 2.3

d. 2.4

22. Color images can be treated as arbitrary vector-valued functions or collections of independent bands

a. True

b. False

23. But it usually makes sense to think about color images as highly correlated signals with strong connections to the image formation process, sensor design, and human perception

a. True

b. False

24. adding the same value to each color channel increases ……………., ……………., and ……………. of each pixel

a. hue

b. saturation

c. intensity

d. all of the above

25. ……………… can be performed either by multiplying each channel with a deferent scale factor or by the more complex process of mapping to XYZ color space

a. Pixel balancing

b. Zzzzzzz!

c. Color balancing

d. Contrast balancing

26. The process of extracting the object from the original image
    a. Compositing
    b. <u>Matting</u>
    c. alpha-matted color image
    d. opacity
27. The process of inserting an image into another image.
    a. <u>Compositing</u>
    b. Matting
    c. alpha-matted color image
    d. opacity
28. The intermediate representation used for the foreground object between matting and compositing is called an ……………..
    a. Compositing
    b. Matting
    c. <u>alpha-matted color image</u>
    d. opacity
29. It contains a fourth alpha channel (or A) that describes the relative amount of opacity
    a. Compositing
    b. Matting
    c. <u>alpha-matted image</u>
    d. opacity
30. ……….. is the fractional coverage at each pixel
31. The opposite of transparency
    a. Compositing
    b. Matting
    c. alpha-matted color image
    d. <u>opacity</u>
32. Pixels within the object are fully ………… if opacity = 1, while pixels fully outside the object are fully ……….. if opacity = 0
    a. <u>Opaque, transparent</u>
    b. Transparent, opaque

33. compositing equation

- To composite a new (or foreground) image on top of an old (background) image, the over operator is used, $C = (1 - \alpha)B + \alpha F$.
- This operator attenuates the influence of the background image B by a factor $(1 - \alpha)$ and then adds in the color (and opacity) values corresponding to the foreground layer F.

34. The ……… channel describe the relative amount of opacity or fractional coverage at each pixel.

   a. Beta

   b. Sigma

   c. Alpha

   d. Gamma

35. Histogram equalization intensity mapping function f (I) makes the output histogram ………

   a. Flat

   b. Curvy

   c. Sherif Mounir

36. Locally adaptive histogram equalization an example of a ………… Or ……..

   a. Point operator

   b. Neighborhood operator

   c. Local operator

   d. B&C

37. full histogram equalization is an example of operations that can be done in …… transformations.

   a. Frequency

   b. Spatial

   c. Point

   d. Template

38. Neighborhood operator uses a collection of pixel values in the vicinity of a given pixel to determine its final output value

   a. True

   b. false

39. linear filtering filters images in order to

a. local tone adjustment

b. soft blur

c. sharpen details

d. accentuate edges

e. remove noise.

f. <u>All of the above</u>

40. Linear filtering operators involve weighted combinations of pixels in small neighborhoods

a. <u>true</u>

b. False

41. ………… compute function of local neighborhood at each position.

a. Hamada bl ganzabeel

b. point operators

c. <u>Image filtering</u>

d. Linear filtering

42. Image filtering can be used in

a. Enhance images: Denoise, resize, increase contrast, etc.

b. Extract information from images: Texture, edges, distinctive points, etc.

c. Detect patterns: Template matching.

d. <u>All of the above</u>

43. Derivative is the Rate of change

a. <u>True</u>

b. False

Derivative Functions

$$\frac{df}{dx} = f(x) - f(x-1) = f'(x)$$ Backward difference

Given function $f(x,y)$

difference

Gradient vector $$\nabla f(x,y) = \begin{bmatrix} \frac{\partial f(x,y)}{\partial x} \\ \frac{\partial f(x,y)}{\partial y} \end{bmatrix} = \begin{bmatrix} f_x \\ f_y \end{bmatrix}$$

ifference

Gradient magnitude $$|\nabla f(x,y)| = \sqrt{f_x^2 + f_y^2}$$

Gradient direction $$\theta = \tan^{-1}\frac{f_x}{f_y}$$

Derivative Masks

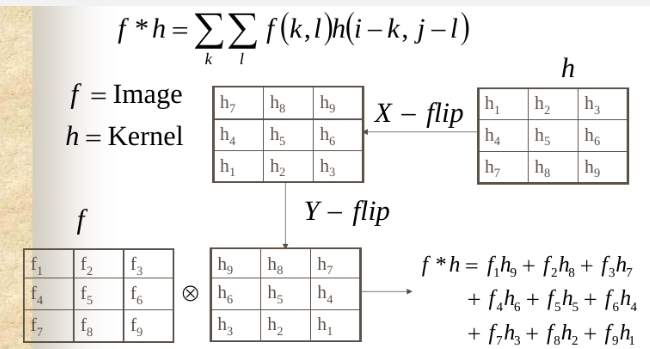
Backward difference	[-1 1]
Forward difference	[1 -1]
Central difference	[-1 0 1]

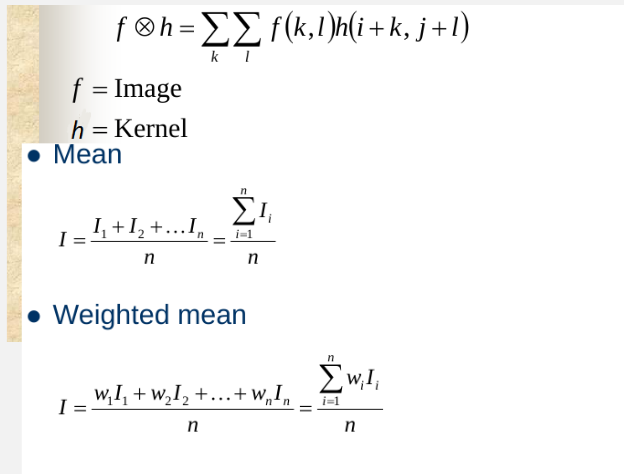
Correlation

Convolution

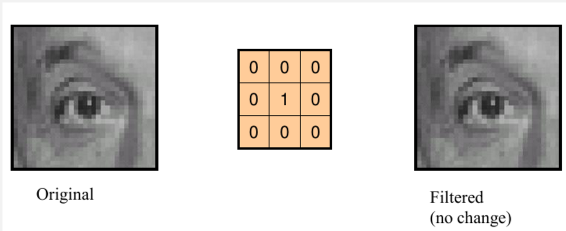
44. Replaces each pixel with an average of its neighborhood and Achieve smoothing effect
45. Makes a border around the image

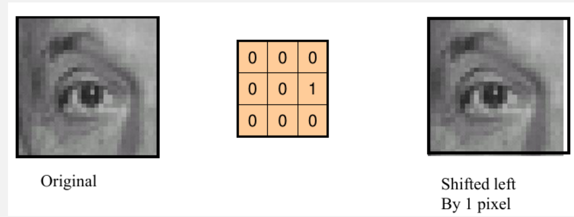
    a. **<u>Box filter</u>**

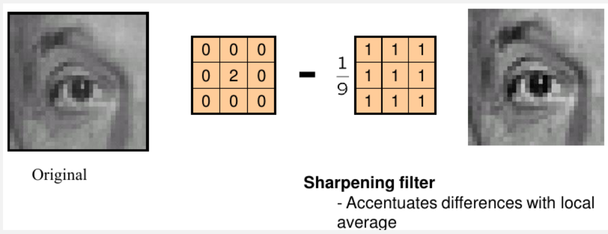


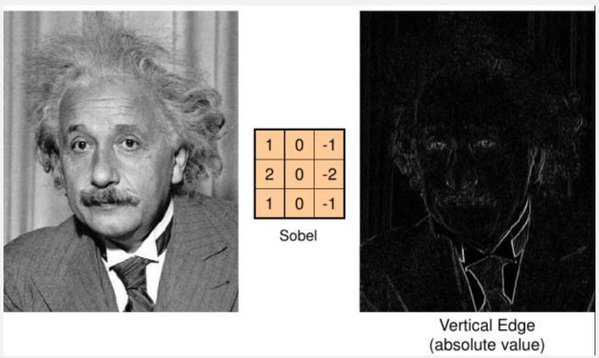


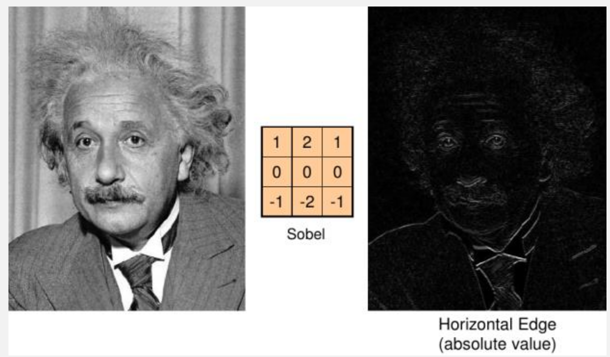
    b. Average filter
    c. Gaussian filter
    d. All of the above











46. Weight contributions of neighboring pixels by nearness

    a. Box filter

    b. Average filter

    c. <u>Gaussian filter(low-pass filter)</u>

    d. All of the above

47. Gaussian equation

$$G_\sigma = \frac{1}{2\pi\sigma^2} e^{-\frac{(x^2+y^2)}{2\sigma^2}}$$

48. Remove high-frequency components from the image (low-pass filter images become more smooth).

    a. Box filter

    b. Average filter

    c. <u>Gaussian filter</u>

    d. All of the above

49. ……….. is another gaussian.

    a. Convolution

b. Convolution with self

50. Convolving two times with Gaussian kernel of width σ is same as convolving once with kernel of width $\sigma\sqrt{2}$.
    a. True
    b. False
51. Factors into product of two 1D gaussians
    a. Kernel
    b. Separable kernel
52. Gaussian
    a. Most common natural model.
    b. Smooth function, it has infinite number of derivatives.
    c. Fourier Transform of Gaussian is Gaussian.
    d. Convolution of a Gaussian with itself is a Gaussian.
    e. There are cells in eye that perform Gaussian filtering.
    f. All of the above
53. This photo was taken by who?

    a. Taz photography
    b. Taz photography