Computer Vision Quiz

Answer all the Questions. Each carry 1 Mark

The respondent's email (**paigauresh@gmail.com**) was recorded on submission of this form.

Basic Details and Module 1   10 of 10 points

✓ Which of the following is a *non-linear* point operation often used for brightness calibration in display devices?   *1/1

○ Brightness adjustment

○ Contrast stretching

◉ Gamma correction   ✓

○ Mean Filtering

USN (Register Number) *

4JK22CS016

Name the Student *

Gauresh G Pai

✓ **What does the Bidirectional Reflectance Distribution Function (BRDF) describe?** *1/1

○ How light is absorbed by surfaces

○ The energy consumption of sensors

● How light is reflected at different angles ✓

○ The conversion of light into electrical signals

Class *

3rd year CSE

✓ **Which of the following best explains why computer vision is considered an *inverse problem*?** *1/1

○ It directly measures depth and lighting conditions.

● It infers 3D information from 2D images, often with ambiguity. ✓

○ It uses predefined logic rules to interpret visual input.

○ It only works with structured tabular data.

✓ The Sobel operator is used for: * 1/1

○ Color enhancement

◉ Edge detection using gradients ✓

○ Histogram equalization

○ Image stitching

✓ Which sensor type uses *charge transfer* across pixels to read image data, *1/1
resulting in superior uniformity but lower speed?

○ CMOS

○ BSI

◉ CCD ✓

○ Quantum dot

✓ The main distinction between *convolution* and *correlation* in linear filtering *1/1
lies in:

○ Type of output image generated

◉ Kernel flipping during the operation ✓

○ Type of sensor used

○ Support for HDR imaging

✓ Which image processing technique merges pixel values from a blurred image and the original image to enhance sharpness? *1/1

○ Gaussian Smoothing

◉ Unsharp Masking ✓

○ White Balance Correction

○ Laplacian Filtering

✓ In the Phong Reflection Model, which component is responsible for creating *highlights* on shiny surfaces? *1/1

○ Ambient reflection

○ Diffuse reflection

◉ Specular reflection ✓

○ Directional lighting

✓ In histogram equalization, which of the following steps directly enhances the contrast of the image? *1/1

○ Color balancing

◉ CDF-based intensity mapping ✓

○ Applying Gaussian blur

○ Demosaicing

✓ Which technique was introduced in the 2010s and revolutionized object detection and segmentation in computer vision? *1/1

○ Eigenfaces

○ Normalized Cuts

◉ CNNs (e.g., AlexNet) ✓

○ HOG descriptors

✓ Which of the following filters is best suited for removing salt-and-pepper noise while preserving edges? *1/1

○ Gaussian Filter

◉ Median Filter ✓

○ Low-Pass Filter

○ Bilateral Filter

✓ In the 2D Discrete Fourier Transform, what do high-frequency components represent in an image? *1/1

○ Smooth backgrounds

○ Overall brightness

◉ Noise and fine details ✓

○ Shadows and gradients

✓ What does the Convolution Theorem state regarding the Fourier domain? *1/1

○ Fourier transform of a sum is the sum of transforms

○ Differentiation corresponds to multiplication

◉ Convolution in time equals multiplication in frequency ✓

○ Scaling compresses frequency

✓ The α-trimmed mean filter combines which two filtering techniques? * 1/1

○ Gaussian and Laplacian

○ Dilation and Erosion

◉ Mean and Median ✓

○ Fourier and Wavelet

✓ In binary image morphology, the operation "Opening" is useful for: * 1/1

○ Filling small holes

○ Highlighting boundaries

◉ Removing small objects/noise ✓

○ Connecting object parts

✓ In bilateral filtering, pixels are weighted based on: * 1/1

○ Only spatial distance

○ Only intensity difference

◉ Both spatial closeness and intensity similarity ✓

○ Frequency response

✓ Which of the following is a key advantage of **Wavelet Transform** over Fourier Transform for image analysis? *1/1

○ Better phase detection

◉ Localization in both time and frequency domains ✓

○ Requires fewer filters

○ Option 4

✓ Which of the following transformations preserves straight lines but not parallelism in images? *1/1

○ Affine Transformation

◉ Projective Transformation ✓

○ Non-linear Warping

○ Bilinear Interpolation

✓ **Bicubic interpolation** in geometric transformations considers how many *1/1
surrounding pixels to calculate a new pixel value?

○ 4

○ 8

○ 9

◉ 16 ✓

✓ In image pyramids, which type focuses on retaining only high-frequency *1/1
details across levels?

○ Gaussian Pyramid

◉ Laplacian Pyramid ✓

○ Wavelet Decomposition

○ Bilateral Grid

✓ Which noise model is characterized by two impulses at the minimum and *1/1
maximum intensity values?

○ Gaussian noise

○ Rayleigh noise

○ Exponential noise

◉ Salt-and-pepper noise ✓

✓ In image segmentation, which method divides the image into regions by *1/1
similarity of intensity or texture?

○ Edge detection

○ Thresholding

◉ Region growing and merging ✓

○ Hough Transform

✓ In the image degradation model g(x,y)=h(x,y)*f(x,y)+η(x,y), what does the *1/1
function h(x,y) represent?

○ Additive noise

○ Original image

◉ Degradation function ✓

○ Edge enhancement filter

✓ What is a defining property of the adaptive median filter? *   1/1

○ Only works with 3x3 window

○ Uses frequency domain statistics

◉ Changes window size based on impulse detection ✓

○ Requires Gaussian assumption

✓ Which type of edge model represents a gradual intensity transition over several pixels? *1/1

○ Step edge

● Ramp edge ✓

○ Roof edge

○ Spike edge

✓ The Laplacian operator is typically used for: * 1/1

○ Smoothing images

● Detecting lines and isolated points ✓

○ Histogram equalization

○ Translation invariance

✓ In frequency domain restoration, periodic noise appears as: * 1/1

○ Gaussian blur

○ Local threshold peaks

● High-frequency spikes in the Fourier spectrum ✓

○ Low-frequency basebands

✓ Which noise reduction filter performs **poorly with impulse noise** but works well with **Gaussian noise**? *1/1

○ Median filter

○ Contraharmonic mean filter

◉ Geometric mean filter ✓

○ Max/min filters

✓ Which spatial filter uses product of all pixel values raised to the power 1/mn in its neighborhood? *1/1

○ Arithmetic mean filter

○ Harmonic mean filter

◉ Geometric mean filter ✓

○ Median filter

✓ The contraharmonic mean filter with a positive order (Q > 0) is best suited *1/1 for removing:

○ Salt noise

◉ Pepper noise ✓

○ Gaussian noise

○ Periodic noise

✓ The **CIE chromaticity diagram** helps visualize which of the following color *1/1 attributes?

○ Intensity and brightness

◉ Chromaticity using x and y coordinates ✓

○ Grayscale gradients

○ Gamma correction

✓ In color sharpening using the **Laplacian**, the operation is applied: * 1/1

○ On combined RGB vectors only

○ Only on the intensity channel of HSI

◉ Independently on each RGB component ✓

○ Only on CMY channels

✓ In **pseudocolor image processing**, intensity slicing is used primarily to: * 1/1

○ Convert RGB to grayscale

○ Identify edges in an image

◉ Assign color to ranges of gray levels ✓

○ Detect image noise

✓ Which color model is **device-independent** and widely used for color consistency across systems? *1/1

○ RGB

○ HSI

○ CMYK

◉ CIE L*a*b* ✓

✓ Which of the following correctly describes the **Hue** component in HSI? * 1/1

○ It represents how bright the color appears.

○ It is a measure of color saturation.

◉ It determines the dominant wavelength. ✓

○ It is derived from white light reflectance.

✓ Why is the **HSI color model** preferred for image editing tasks over RGB? * 1/1

○ It requires less memory

○ It supports faster rendering

◉ It separates intensity from color components ✓

○ It directly maps to printer hardware

○ Other: ....

✓ In the **RGB color model**, which of the following combinations results in the color **cyan**? *1/1

- ○ Red + Green
- ● Green + Blue ✓
- ○ Red + Blue
- ○ Red + Green + Blue

✓ Which component in the HSI color model is most directly associated with the **gray-scale intensity**? *1/1

- ○ Hue
- ○ Saturation
- ● Intensity ✓
- ○ Brightness

✓ Which transformation is most suitable for **highlighting a specific color range** in an image? *1/1

- ○ Histogram equalization
- ● Color slicing ✓
- ○ Bilateral filtering
- ○ Median filtering

✓ In color image smoothing using the RGB model, each component image is: *1/1

○ Processed using histogram equalization

○ Enhanced using Fourier domain only

⦿ Smoothed independently using neighborhood operations ✓

○ Converted into binary format

✓ In pattern classification, the **minimum distance classifier** operates by: * 1/1

○ Comparing shapes using eigenvalues

⦿ Computing the closest match in feature space to known prototypes ✓

○ Matching against histogram bins

○ Thresholding based on area

✓ The **Moore Boundary Tracing Algorithm** is used to: * 1/1

○ Fill holes in binary images

○ Detect edges based on gradients

⦿ Generate an ordered sequence of boundary pixels ✓

○ Apply region growing

Thickening is usually performed by: *   1/1

- ( ) Applying dilation followed by opening
- (•) Complementing, thinning, and then re-complementing ✓
- ( ) Subtracting erosion from dilation
- ( ) Using Fourier transform

In morphological image processing, the **convex hull** of a set refers to: *   1/1

- ( ) The maximum number of disjoint components
- (•) The smallest convex set containing all object pixels ✓
- ( ) The minimum bounding rectangle
- ( ) The boundary detected using chain codes

The **Freeman Chain Code** is a representation used to: *   1/1

- ( ) Approximate a region's area using histograms
- (•) Encode boundary directions in 4 or 8-connectivity ✓
- ( ) Perform convolution
- ( ) Identify objects based on color features

✓ Which of the following is **true about skeletonization** in morphology? * 1/1

○ It replaces the object with its background

○ It creates a thick boundary layer

● It reduces objects to a minimal centerline without breaking connectivity ✓

○ It removes all structuring elements

✓ The **erosion** of an image using a structuring element results in: * 1/1

○ Filling gaps between objects

○ Thickening of object boundaries

● Shrinking objects by removing boundary pixels ✓

○ No effect on binary images

✓ The **Hit-or-Miss Transform (HMT)** is used primarily for: * 1/1

○ Color enhancement

● Shape detection using two structuring elements ✓

○ Histogram matching

○ Gradient computation

✓ What is the primary role of a **structuring element** in morphological operations? *1/1

○ To normalize image intensity

○ To apply frequency filtering

◉ To probe and transform the shape of an image region ✓

○ To model the histogram of a region

✓ Which operation is performed by applying **erosion followed by dilation** using the same structuring element? *1/1

○ Skeletonization

○ Closing

○ Thinning

◉ Opening ✓

Quilgo Test ID *

This question is filled automatically ✋ DO NOT EDIT OR REMOVE

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