University of Mumbai

Examinations summer 2022

Time: 2 hour 30 minutes Max. Marks: 80

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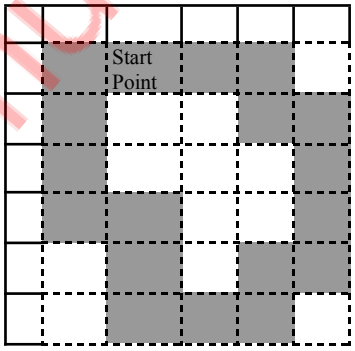
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	_____ is not a lossless compression algorithm
Option A:	Huffman coding
Option B:	Arithmetic coding
Option C:	Dictionary based coding
Option D:	Vector quantization
2.	Operations on single pixels of a digital image are known as _____.
Option A:	Point Operation
Option B:	Diagonal Pixel Operation
Option C:	Value Transformation
Option D:	Neighbours pixel Operation
3.	_____ filter works best to remove salt and pepper noise.
Option A:	Low pass
Option B:	High pass
Option C:	Median
Option D:	Max
4.	In _____ technique an entire sequence of source symbol is assigned a single code.
Option A:	Arithmetic Coding
Option B:	LZW Coding
Option C:	Huffman Coding
Option D:	Run-length Coding
5.	Three basic types of discontinuities are _____
Option A:	Lines, Edges, Planes
Option B:	Points, Lines, Planes
Option C:	Edges, Lines, Points

Option D:	Point, Planes, Edges
6.	The starting pixel of region growing process is called
Option A:	base pixel
Option B:	seed pixel
Option C:	original pixel
Option D:	image pixel
7.	_____ is the foremost step in Image Processing.
Option A:	Morphological Processing
Option B:	Image acquisition
Option C:	Segmentation
Option D:	Compression
8.	_____ is not a property of 2D Discrete Fourier Transform.
Option A:	Separability
Option B:	Real
Option C:	Periodicity
Option D:	Conjugate
9.	_____ is not a region based segmentation technique.
Option A:	Region growing
Option B:	Split and merge
Option C:	Region thinning
Option D:	Region splitting
10.	_____ is a horizontal line detection mask.
Option A:	[2 -1 -1; -1 2 -1; -1 -1 2]
Option B:	[1 2 -1; -1 2 -1; 1 2 -1]
Option C:	[-1 -1 2; -1 2 -1; 2 -1 -1]
Option D:	[-1 -1 -1; 2 2 2; -1 -1 -1]

<table>
<tr><td>Q.2</td><td colspan="2">Solve any Four out of Six. [5 Marks Each]</td><td>Marks</td></tr>
<tr><td></td><td>A</td><td>List and define types of distance measures.</td><td>5</td></tr>
<tr><td></td><td>B</td><td>Draw the different steps in digital image processing.</td><td>5</td></tr>
<tr><td></td><td>C</td><td>Show transform matrix for N=4 and Give three properties each:
(i) Discrete Walsh Transform (ii) Discrete Cosine Transform</td><td>5</td></tr>
<tr><td></td><td>D</td><td>Draw a block diagram showing processing of Homomorphic Filtering and explain the method.</td><td>5</td></tr>
<tr><td></td><td>E</td><td>Explain in brief Hough Transform.</td><td>5</td></tr>
<tr><td></td><td>F</td><td>Give a DFT Transform matrix and Apply it to find transformed coefficients for f(x) = {2, 1, 3, 1}.</td><td>5</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Q.3</td><td colspan="2">Solve any Two Questions out of Three. [10 Marks Each]</td><td></td></tr>
<tr><td></td><td>A</td><td>Perform histogram equalization for the following pixel distribution:
<table>
<tr><td>Gray Level</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Frequency</td><td>10</td><td>0</td><td>4</td><td>15</td><td>25</td><td>6</td><td>0</td><td>4</td></tr>
</table>
Draw original histogram and equalized histogram.</td><td>10</td></tr>
<tr><td></td><td>B</td><td>Explain following morphological methods with example:
(i) Erosion (ii) Dilation</td><td>10</td></tr>
<tr><td></td><td>C</td><td>Illustrate Arithmetic Coding and Decoding.</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>Q.4</td><td colspan="2">Solve any Two Questions out of Three. [10 Marks Each]</td><td></td></tr>
<tr><td></td><td>A</td><td>List all Point Processing Techniques and explain any two with examples.</td><td>10</td></tr>
<tr><td></td><td>B</td><td>Obtain the four directional Chain Code and Shape number representation using 4-directional with the given starting point as shown in the image with dark filled cell as pixel is the boundary of the object.

</td><td>10</td></tr>
</table>

	C	List all region based segmentation techniques. Apply region based segmentation on a 3-bit image of size 4x4. Assume Threshold = 3, a pixel value 7 as starting point, and use 4-way connectivity. 1 0 2 0 0 0 6 6 5 5 5 5 7 6 6 0	**10**

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