UG 6th Semester Examination 2022

COMPUTER SCIENCE (Honours)

Paper Code : DSE-3 (A+B+C)

[CBCS]

Full Marks: 32 **Time: 2 hours**

The figure in the margin indicate full marks

DSE – 3A

(Digital Image Processing)

Group - A

Answer any six questions. 2×6 =12

1. a) What is a digital image?

   b) Define quantization.

   c) What do you mean by image negative?

   d) Write any four applications of DIP.

   e) Explain city block distance matrix.

   f) What is an image histogram?

   g) What do you mean by grey level?

   h) Explain thresholding in point processing.

Group - B

Answer any two questions. 10×2=20

2. a) Write an algorithm of Otsu Thresholding.

   b) What are the differences between convolution and correlation?

   c) What is kernel?

3. a) What is image enhancement technique?

   b) Briefly describe Bit-plane slicing.

   c) What is sampling?

4. Suppose you have two histograms A and B which is given below:-

Grey Level	0	1	2	3	4	5	6	7
No. of Pixels	790	1023	850	656	329	245	122	81

Histogram-B

Grey Level	0	1	2	3	4	5	6	7
No. of Pixels	0	0	0	614	819	1230	819	614

Modify Histogram A as given Histogram B. 10

Paper Code : DSE-3B
(Introduction to Data Science)

Time: 2 hrs **Full Marks: 32**

Group- A

Answer any *six* questions from question no.1. 2×6=10

1. a) What is MSE?
   b) "Gini impurity is better than information gain while constructing decision tree"- Justify.
   c) Briefly explain data normalization using example.
   d) What is Recall?
   e) Differentiate between supervised and unsupervised learning.
   f) "A correlation of -0.92 is considered a good correlation." – Justify.
   g) How do you remove duplicate data elements from a dataset?

Group- B

Answer any *two* questions 10×2=20

2. a) Given the following data of transactions at a shop, calculate the support and confidence values of milk → bananas, bananas → milk and chocolate → milk.

Transactions	**Items in basket**
T1	milk, bananas, chocolate
T2	milk, chocolate
T3	milk, bananas
T4	chocolate
T5	chocolate
T6	milk, chocolate

b) What is meant by dimensionality reduction? Differentiate between feature selection and feature extraction. 3+(3+4)=10

3. a) Fit a Simple Linear Regression model for the following dataset.

Internal Marks	15	23	18	23	24	22	22	19	16	19	24	11	24	16	23
Final Marks	49	63	58	60	58	61	60	63	52	60	62	30	59	49	68

b) Explain the disadvantages of decision tree. 7+3=10

4. a) Explain K-means clustering with suitable example.
   b) How to set the optimal number of clusters (K) in K-means clustering? 7+3=10

Paper Code : DSE-3C
(Soft Computing)

Time: 2 hrs **Full Marks: 32**

The figure in the margin indicate full marks

Group- A

1. Answer any six: 2× 6=12

(a) Differentiate between fuzzy set and crisp set.
(b) When de-fuzzification is required?
(c) What is a Fuzzy Inference System (FIS)?
(d) Draw a figure of a Multilayer Perceptron.
(e) How to measure cardinality of a fuzzy set?
(f) What is Mamdani Fuzzy Model?
(g) What is the role of activation function in ANN?

Group – B

Answer any *two* questions 10×2=20

2. (a). Differentiate between Artificial Intelligence and Soft Computing.
(b). Explain the role of Backpropagation Algorithm.
(c). State whether the following statement is true or false with proper justification
"De Morgan's law does not apply to fuzzy sets." 4+3+3

3. (a) Solve XOR gate using Multilayer Perceptron.
(b) Differentiate between Adaline and Madaline networks. 7+3=10

4. Write short notes on any two: 5×2 =10
(a) Regularization technique in ANN.
(b) Fuzzy Rule based system .
(c) Fuzzy Controller.
(d) Boltzmann Machine.