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TCS–509

B. TECH. (CSE)

(FIFTH SEMESTER)

END SEMESTER

EXAMINATION, Jan., 2023

MACHINE LEARNING

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Explain the concept of Learning Systems in detail. How the usage of Machine

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Learning methodology helps in the development of various learning systems ? Explain with the help of an example. (CO1)

(b) "Machine Learning is an integral part of Artificial Intelligence." Comment on the above statement. Explain various applications of Machine Learning. (CO1)

(c) How can we identify outliers in a dataset using SVM ? Explain the following figures.

Figure A : Define the best fit in line Figure A, and justify the reason.

Figure B : Define, why we cannot choose Line A and Line B as the best fit line in figure B.

Figure C : Define the best fit line in Figure C, and justify the reason.

Figure D : Draw and define the best fit line in Figure D, and justify the reason.

Figure E : Draw and define the best fit line in Figure E, and justify the reason.

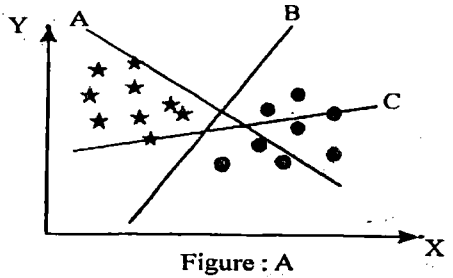

Figure : A

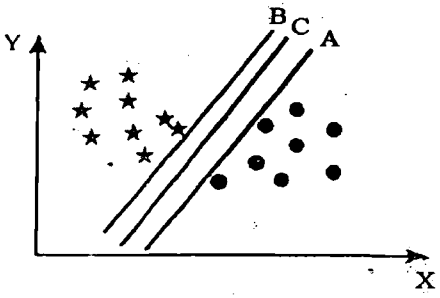

Figure : B

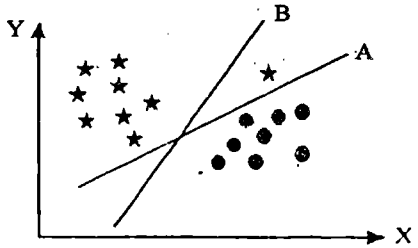

Figure : C

Figure : D

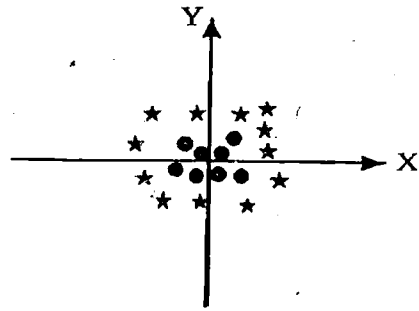

Figure : E

2. (a) With respect to splitting of data explain Information Gain and Entropy by giving the formula to calculate them. Using Entropy find out the attribute according to which the data can be divided in the below example : (CO2)

Day	Company_perf	Exchange_rate	Gold_price	Action
1	High	Increase	Stable	Sale
2	Medium	Increase	Unstable	Purchase
3	High	Increase	Unstable	Purchase
4	Medium	Decrease	Stable	Purchase
5	Low	Decrease	Unstable	Purchase
6	Medium	Increase	Stable	Sale
7	High	Decrease	Stable	Purchase
8	Medium	Increase	Stable	Sale
9	High	Increase	Stable	Sale

10	Medium	Decrease	Unstable	Purchase
11	High	Decrease	Stable	Purchase
12	Medium	Increase	Stable	Sale
13	Medium	Decrease	Unstable	Purchase
14	Low	Increase	Stable	Purchase
15	Low	Increase	Stable	Purchase

(b) Explain the following : (CO2)

(i) Information gain and Gini Index with help of mathematical equations and examples.

(ii) Concept of K-fold cross validation with the figure.

(c) Explain the term Decision Tree in Machine Learning. How is it different from Random Forest ? Explain the challenges that occur in the implementation of Decision Trees, and also give the solution to overcome these challenges. (CO2)

3. (a) Explain RELU, Sigmoid and Softmax activation functions with help of their working suitability and equations. (CO3)

(b) Write short note on the following : (CO3)

(i) Naïve Bayes with example and mathematical equation.

(ii) Backpropagation

(c) Explain the working of K-Nearest Neighbor in Machine Learning. Explain with the help of an algorithm and example. (CO3)

4. (a) Define the working methodology for the program "Social distancing using YOLO V3". Explain the different python libraries involved in its implementation with the help of its mathematical suitability. (CO4)

(b) Difference between YOLO, ALEXNET, VGG-16, VGG-19 and MOBILE NET in terms of CNN layers and working criteria. (CO4)

(c) Define the working methodology (mathematical representation) for the program "face detection using python libraries" with help of pseudo code. (CO4)

5. (a) Assume A.png and B.png are two images. Write python code for pattern matching on these images with the help of Open CV. (CO5)

(b) What do you mean by CNN ? Explain all the layers of CNN architecture with its working suitability. (CO5)

(c) Explain the significance of Tensor flow and Keras in Deep Learning with examples. (CO5)