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Code No : ACS014



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - II

B.Tech VIII Semester End Examinations (Regular), May – 2020

Regulation: IARE – R16

MACHINE LEARNING

COMPUTER SCIENCE AND ENGINEERING

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each

Unit All Questions Carry Equal

Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) How is candidate elimination algorithm different from Find-S algorithm? [7M]

(b) The following Table 1 containing student exam performance data [7M]

Table 1

No.	Student	First last year?	Male?	Works hard?	Drinks?	First this year?
1	Richard	yes	yes	no	yes	yes
2	Alan	yes	yes	yes	no	yes
3	Alison	no	no	yes	no	yes
4	Jeff	no	yes	no	yes	no
5	Gail	yes	no	yes	yes	yes
6	Simon	no	yes	yes	yes	no

Calculate the entropy and construct a decision tree based on the minimal entropy.

2. (a) Identify the suitable problems and their characteristics for decision tree learning. [7M]

(b). Analyze the use of entropy and information gain for constructing the decision tree and tabulate the ID3 algorithm. [7M]

UNIT – II

3. (a) What is linearly inseparable problem? How to solve XOR function by using SVM. [7M]

(b) What is a Perceptron? Design a two layer network of Perceptron to implement A XOR B. [7M]

4. (a) Compare and contrast the following [7M]
- i. Sequential and batch training
 - ii. Mini-batches and Stochastic Gradient Descent.
- (b) Suppose that the following are a set of points in two classes: class 1 : 11
- 21
- class 2 : 00
- 10
- 01
- Plot them and find the optimal separating line. [7M]

UNIT – III

5. (a) Explain the concept of Bayes theorem with an example. Describe Bayesian networks in detail. [7M]
- (b) Describe maximum likelihood hypothesis for predicting probabilities. [7M]
6. (a) Describe variance. Explain the concept of Bias-Variance tradeoff. [7M]
- (b) Differentiate variance and bias variance trade off. Discuss in detail about the Bayes optimal classifier. [7M]

UNIT – IV

7. (a) What is genetic algorithm? Describe the evolutionary learning genetic algorithm. [7M]
- (b) Elaborate the Boosting with a suitable example. Discuss in detail about Ensemble learning [7M]
8. (a) What is the general principle of an ensemble method and what is bagging and boosting in ensemble method? [7M]
- (b) Differentiate LDA and PCA. Write a short note on linear discriminant analysis (LDA). [7M]

UNIT – V

9. (a) A major problem with the single link algorithm is that clusters consisting of long chains may be created. Describe and illustrate this concept. [7M]
- (b) Write the algorithm for k means clustering and compute 2 clusters when given a dataset point as {2, 4, 10, 12, 3, 20, 30, 11, 25}. [7M]
10. (a) Discuss in detail about partitional algorithms and minimum spanning tree. [7M]
- (b) The squared error clustering algorithm minimizes the squared error. Justify? [7M]



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COURSE OBJECTIVES:

I.	Apply knowledge of computing and mathematics appropriate to the discipline
II.	Illustrate the concepts of machine learning and related algorithms
III.	Understand the dimensionality problems using linear discriminates
IV.	Study various statistical models for analyzing the data
V.	Learn clustering algorithms for unlabeled data.

COURSE OUTCOMES:

CO 1	Understand the concept of learning and candidate elimination algorithms.
CO 2	Understand the concept of perception and explore on forward and backward practices.
CO 3	Explore on basic statistics like variance, covariance and averages.
CO 4	Explore on Evolutionary learning techniques used in genetic algorithms.
CO 5	Explore on similarity concept and different distance measures.

COURSE LEARNING OUTCOMES:

Sl. No.	Description
ACS011.01	Understand the concept of learning and candidate elimination algorithms
ACS011.02	Explore on different types of learning and explore On tree based learning.
ACS011.03	Understand the construction process of decision trees used for classification problem.
ACS011.04	Understand the concept of perception and explore on forward and backward practices.
ACS011.05	Illustrate on kernel concept and optimal separation used in support vector machines
ACS011.06	Explore on basic statistics like variance, covariance and averages
ACS011.07	Understand the concepts of Gaussian and bias-variance tradeoff
ACS011.08	Understand the concepts of Bayes theorem and Bayes optimal classifiers
ACS011.09	Explore on Bayesian networks and approximate inference on markov models
ACS011.10	Explore on Evolutionary learning techniques used in genetic algorithms
ACS011.11	Illustrate the ensemble learning approaches used in bagging and boosting
ACS011.12	Explain the importance of principal component analysis and its applications
ACS011.13	Explore on similarity concept and different distance measures
ACS011.14	Understand the outlier concept and explain about data objects
ACS011.15	Understand the hierarchical algorithms and explain CART
ACS011.16	Understand the partitioned algorithms and explain segmentation

ACS011.17	Explore on clustering large database and explain K-means clustering algorithm
ACS011.18	Understand the clustering with categorical Attributes and comparison with other data types.
ACS011.19	Understand the clustering large databases and explain clustering methods
ACS011.20	Describe clustering with categorical attributes and explain KNN

MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE QUESTION No		COURSE LEARNING OUTCOME		Course Outcomes	Blooms Taxonomy Level
1	a	ACS014.01	Understand the concept of learning and candidate elimination algorithms	CO 1	Understand
	b	ACS014.02	Explore on different types of learning and explore On tree based learning.	CO 1	Remember
2	a	ACS014.03	Understand the construction process of decision trees used for classification problem.	CO 1	Remember
	b	ACS014.04	Understand the concept of perception and explore on forward and backward practices.	CO 1	Understand
3	a	ACS014.08	Understand the concepts of Bayes theorem and Bayes optimal classifiers	CO 2	Remember
	b	ACS014.07	Understand the concepts of Gaussian and bias-variance tradeoff	CO 2	Remember
4	a	ACS014.08	Understand the concepts of Bayes theorem and Bayes optimal classifiers	CO 2	Understand
	b	ACS014.10	Explore on Evolutionary learning techniques used in genetic algorithms	CO 2	Remember
5	a	ACS014.11	Illustrate the ensemble learning approaches used in bagging and boosting	CO 3	Remember
	b	ACS014.14	Understand the outlier concept and explain about data objects	CO 3	Understand
6	a	ACS014.15	Understand the hierarchical algorithms and explain CART	CO 3	Remember
	b	ACS014.13	Explore on similarity concept and different distance measures	CO 3	Understand
7	a	ACS014.16	Understand the partitioned algorithms and explain segmentation	CO 4	Remember
	b	ACS0114.17	Explore on clustering large database and explain K-means clustering algorithm	CO 4	Remember
8	a	ACS0114.17	Explore on clustering large database and explain K-means clustering algorithm	CO 4	Understand
	b	ACS014.18	Understand the clustering with categorical Attributes and comparison with other data types.	CO 4	Understand
9	a	ACS014.19	Understand the clustering large databases and explain clustering methods	CO 5	Understand
	b	ACS014.20	Describe clustering with categorical attributes and explain KNN	CO 5	Remember
10	a	ACS014.19	Understand the clustering large databases and explain clustering methods	CO 5	Understand
	b	ACS014.20	Describe clustering with categorical attributes and explain KNN	CO 5	Remember