

# CBBCS SCHEME

18EC745

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Seventh Semester B.E. Degree Examination, June/July 2023

## Machine Learning with Python

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

### Module-1

- Explain the designing of a learning system in detail. (10 Marks)
  - Define machine learning. Mention five applications of machine learning. (06 Marks)
  - Explain the issues in machine learning. (04 Marks)

OR

- Apply Candidate elimination algorithm to obtain final version space for the training set shown in Table Q2 (a) to infer which books or articles the user reads based on keywords supplied in the article.

Table Q2 (a)

Article	Crime	Academics	Local	Music	Reads
a <sub>1</sub>	True	False	False	True	True
a <sub>2</sub>	True	False	False	False	True
a <sub>3</sub>	False	True	False	False	False
a <sub>4</sub>	False	False	True	False	False
a <sub>5</sub>	True	True	False	False	True

- Write Find-S algorithm. Apply the Find-S for Table Q2 (b) to find maximally specific hypothesis. (10 Marks)

Table Q2 (b)

Eyes	Nose	Head	Fcolor	Hair?	Smile?(TC)
Round	Triangle	Round	Purple	Yes	Yes
Square	Square	Square	Green	Yes	No
Square	Triangle	Round	Yellow	Yes	Yes
Round	Triangle	Round	Green	No	No
Square	Square	Round	Yellow	Yes	Yes

(10 Marks)

### Module-2

- Explain the concept of decision tree learning. Discuss the necessary measures required to select the attributed for building a decision tree using IBS algorithm. (10 Marks)
  - Define the following term with an example for each :
    - Decision tree
    - Entropy
    - Information gain.
    - Restriction Bias
    - Preference Bias.(10 Marks)

OR

- Construct decision tree using ID3 considering the following training examples in Table Q4 (a). (12 Marks)

Weekend	Weather	Parental availability	Wealthy	Decision Class
H <sub>1</sub>	Sunny	Yes	Rich	Cinema
H <sub>2</sub>	Sunny	No	Rich	Tennis
H <sub>3</sub>	Windy	Yes	Rich	Cinema
H <sub>4</sub>	Rainy	Yes	Poor	Cinema
H <sub>5</sub>	Rainy	No	Rich	Home
H <sub>6</sub>	Rainy	Yes	Poor	Cinema
H <sub>7</sub>	Windy	No	Poor	Cinema
H <sub>8</sub>	Windy	No	Rich	Shopping
H <sub>9</sub>	Windy	Yes	Rich	Cinema
H <sub>10</sub>	Sunny	No	Rich	Tennis

Table Q4 (a)

- b. Discuss the issue of avoiding the data and handling attributes with diffusing costs. (08 Marks)

### Module-3

- 5 a. Derive an expression for gradient descent rule to minimize the error, using the same write the gradient descent algorithm for training a linear unit. (10 Marks)
- b. Write back propagation algorithm that uses stochastic gradient descent method. What is the effect of adding momentum to the network? (10 Marks)

OR

- 6 a. Discuss the application of neural network which is used to steer an autonomous vehicle. (06 Marks)
- b. List the appropriate problems of neural network learning. (06 Marks)
- c. Design a perceptron to implement two input AND function. (08 Marks)

### Module-4

- 7 a. Explain Bayes theorem and mention the features of Bayesian learning. (07 Marks)
- b. Prove that a maximum likelihood hypothesis can be used to predict probabilities. (08 Marks)
- c. Explain Naïve Bayes classifier. (05 Marks)

OR

- 8 a. Describe MAP learning algorithm. (08 Marks)
- b. Write and explain EM algorithm. (06 Marks)
- c. A patient take a lab test and the result comes back positive. It is known that the test result a correct positive result only 98% of the cases and a correct negative result is 99% of the cases further more only 0.008 of the entire population has this disease.
- (i) What is the probability that this patient has cancer?
- (ii) What is the probability that he does not have cancer? (06 Marks)

### Module-5

- 9 a. Define : (i) Sample error (ii) True error (iii) Confidence intervals (06 Marks)
- b. Explain K-nearest neighbor learning algorithm. (08 Marks)
- c. Write a note on Q-learning. (06 Marks)

OR

- 10 a. Define mean value, variance, standard-deviation and estimation bias of a random variable. (04 Marks)
- b. Explain locally weighted linear regression and radial basis functions. (10 Marks)
- c. What is reinforcement learning? How it differs from other function approximation tasks? (06 Marks)

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