CBCS SCHEME

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21AI63

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Machine Learning

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define Machine Learning. Explain different types of Machine Learning. **(10 Marks)**

b. Write the Final Version Space for the below mentioned training example using candidate elimination algorithm.

Example	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

OR

2 a. List and explain main challenges of Machine Learning. **(06 Marks)**

b. State the following problem with respect to task performance and experiences:
(i) A Checkers Learning problem (ii) A Robot driving learning problem **(04 Marks)**

c. Demonstrate Find-S algorithm for finding a maximally specific hypothesis on the given dataset.

Origin	Manufacture	Color	Year	Type	Class
Japan	Honda	Blue	1980	Economy	Yes
Japan	Toyota	Green	1970	Sport	No
Japan	Toyota	Blue	1990	Economy	Yes
USA	Audi	Red	1980	Economy	No
Japan	Honda	White	1980	Economy	Yes
Japan	Toyota	Green	1980	Economy	Yes
Japan	Honda	Red	1980	Economy	No

(10 Marks)

Module-2

3 a. Explain the following :
(i) Root Mean Square-Error (RMSE) (ii) Mean Absolute Error (MAE) **(04 Marks)**

b. In context to prepare the data for machine learning algorithm. Write a short note on
(i) Data Cleaning (ii) Handling text and categorical attribute **(06 Marks)**

c. With the code snippets show how grid search and randomized search helps in fine tuning a model. **(10 Marks)**

OR

4 a. Using the code snippets, outline the concepts involved in :
(i) Measuring accuracy using cross-validation
(ii) Confusion Matrix
(iii) Precision and Recall. **(10 Marks)**

b. Explain the following :
(i) Multiclass classification
(ii) Multilabel classification
(iii) Multioutput classification
(iv) Confusion Matrix **(10 Marks)**

Module-3

5 a. What is gradient Descent Algorithm and discuss its various types. **(10 Marks)**
b. In Regularized linear models illustrate the three different methods to constrain the weights. **(10 Marks)**

OR

6 a. With respect to nonlinear SVM classification, explain polynomial kernel, Gaussian RBF kernel along with code snippet. **(10 Marks)**
b. Show that how SVM's make predictions using quadratic programming and kernelized SVM. **(10 Marks)**

Module-4

7 a. With an example dataset examine how Decision Tree are used in making predictions. **(10 Marks)**
b. Explain the CART training algorithm. **(06 Marks)**
c. Explain the features of regression and instability with respect to decision trees. **(04 Marks)**

OR

8 a. In context to Ensemble methods determine the concept of :
(i) Bagging and pasting (ii) Voting classifiers **(10 Marks)**
b. Explain the following boosting methods along with code snippets:
(i) Ada.Boost (ii) Gradient Boosting **(10 Marks)**

Module-5

9 a. Write Bayes theorem. Identify the relationship between Bayes theorem and the problem of concept learning. **(10 Marks)**
b. How maximum likelihood hypothesis is helpful for predicting probabilities. **(10 Marks)**

OR

10 a. Construct Naive Bayes classifier with an example. **(10 Marks)**
b. Derive the EM algorithm in detail. **(10 Marks)**

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