19AI410 - INTRODUCTION TO MACHINE LEARNING

Question Bank

UNIT 1

PART A

1. Explain the difference between Traditional Programming and Machine Learning.
2. Explain the process of defining the learning task (T, P, E) for email spam/non-spam classification
3. Define supervised and unsupervised learning. Explain the concept with example.
4. What is regression analysis?
5. Differentiate batch and stochastic gradient descent.

PART B & C

1. Explain univariate linear regression with an example and derive the hypothesis function, Cost function. Explain overfitting.
2. Explain about multivariate linear regression and write the steps involved in it. Explain underfitting.
3. Write a python program using appropriate libraries to train a model to predict the weight of a person using height (explanatory).
4. Write a python program using appropriate libraries to train a model to predict the rainfall (in mm) using precipitation and humidity factor (explanatory).
5. What is gradient descent? Discuss in brief about the process of minimizing the cost function using gradient descent algorithm and explain its parameters.
6. Explain the different types of learning models in machine learning each with an example. List out some algorithms of each category.
7. Explain gradient descent algorithm in detail and derive the parameters for univariate linear regression. Analyze the effect of learning rate.
8. Consider an application that takes linear regression algorithm to derive a logical prediction using its mathematical model. Explain the dataset, its representation, hypothesis function, cost function, optimizer in detail. Use python to write a snippet of the concept.

UNIT 2

PART A

1. What is cross-entropy? Write down the equation of binary cross-entropy
2. What is sigmoidal function? Give an example of logistic regression application in practice
3. Write any two applications of logistic regression with sample data.
4. Explain the difference between Linear regression and Logistic regression with an example.
5. List any three optimization algorithms and explain each in detail.

PART B & C

1. Consider a scenario where you have to decide whether a person will buy a car or not. Which of the following models should be used in this case? Regression or Classification? Justify your answer. Explain the significance of sigmoid function in logistic regression. Also derive the cost function and parameters of logistic regression using gradient descent.
2. Explain logistic regression with the hypothesis function, decision boundary. List out the advantages and disadvantages of logistic regression.
3. Explain why linear regression is not suitable for classification with an example. Explain logistic regression with the hypothesis function, decision boundary.
4. List out the difference between linear and logistic regression. Explain the cost function and derive the parameters using gradient descent of logistic regression.
5. What is logistic regression? Explain the difference between linear regression and logistic regression and derive the hypothesis representation with decision boundary and cost function.
6. Write a python program using appropriate libraries to train a model to classify the dogs and cats using logistic regression. The explanatory variables are height and weight.
7. Consider an application that takes logistic regression algorithm to derive a logical prediction using its mathematical model. Explain the dataset, its representation, hypothesis function, cost function, optimizer in detail. Use python to write a snippet of the concept.
8. Elucidate the concept of sigmoidal function in logistic regression model. Explain decision boundary and non-linear decision space with an example.