CE1.2-R4 : MACHINE LEARNING

NOTE :
1. **Answer question 1 and any FOUR from questions 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time : 3 Hours   **Total Marks : 100**

1. (a) Mention the difference between Machine Learning and Data Mining. What are the advantages of Machine Learning ?
   (b) How can you avoid Overfitting ? Give an example.
   (c) What is 'Training set' and 'Test set' ? Explain with example.
   (d) What are the different Algorithm Techniques in Machine Learning ? Explain with an example.
   (e) Explain : What is the function of 'Supervised Learning' ?
   (f) Why Ensemble Learning is used ? Justify your answer by taking an example.
   (g) What is Logistic Regression ? State an example of using Logistic Regression. **(7x4)**

2. (a) What is Bias-variance decomposition of classification error in Ensemble Method ?
   (b) What is an Incremental Learning Algorithm in Ensemble ? Give an example.
   (c) How Inductive Classification is different from Normal Classification ? Write simple steps of Candidate Elimination Algorithm. **(6+6+6)**

3. (a) What are the two classification methods that SVM (Support Vector Machine) can handle ?
   (b) How do we train SVM ?
   (c) What is a Kernel ? Explain the Kernel Trick.
   (d) What are various types of Kernels ? **(4+4+6+4)**

4. (a) Briefly explain Naïve Bayes Learning Algorithm.
   (b) What are Horn Clauses ? Discuss the rule for Converting sentences in First Order Predicate Logic.
   (c) What is the importance of Inverse Resolution in Rule Learning ?
   (d) How does Bias play an important role in Classification ? Write the importance of Inductive Bias in Classification. **(4+6+4+4)**

5. (a) Draw and explain the architecture of Multi-layer Perceptrons. Briefly mention the execution steps of Neural Network Learning.
   (b) Briefly mention the application domain where Artificial Neural Network can be used.
   (c) Why is back-propagation required in Neural Network Training ? Justify the answer.
   (d) What is the use of Learning Rate ? How does learning rate improve the Neural Network Learning ? **(6+4+4+4)**

6. (a) Differentiate between Bagging and Boosting. Why and when they are required ?
   (b) Briefly explain the rule induction in Machine Learning.
   (c) Explain the difference between Generative Training and Discriminative Training.
   (d) Differentiate between Supervised and Unsupervised Learning. Give examples of Supervised Learning. **(6+4+4+4)**

7. (a) How does Markov Net is used to represent Dependencies ? Justify the answer with example.
   (b) How to measure the accuracy of Learned Hypothesis ?
   (c) Explain the steps to translate decision trees into rules.
   (d) Explain the importance of validation of Machine Learning Algorithm. **(6+4+4+4)**

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