**Module 1**

**Introduction and Concept Learning**

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| 1 | Define Machine Learning. Enlist 4 successful applications of machine learning. | 4 Marks |
| 2 | Explain the steps in design of a learning system to play checkers, with the goal of entering in the world checkers tournament. | 6 Marks |
| 3 | What is Machine Learning? Discuss the various applications and issues of Machine Learning. | 6 Marks |
| 4 | What is the role of a function approximation algorithm? How does the learner system estimate training values and adjust weights while learning? | 6 Marks |
| 5 | Explain concept learning with a training example. Explain general-to -specific ordering of hypothesis for the training example. | 8 Marks |
| 6 | Describe find-S algorithm. Explain it working for the EnjoySport dataset given below:  **Example Sky AirTemp Humidity Wind Water Forecast EnjoySport**  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 | 8 Marks |
| 7 | Explain Version-Space and list-then-Eliminate algorithm. | 8 Marks |
| 8 | Describe find-S algorithm. Explain it working for the dataset given below:  **Size Color Shape Label**  Big red circle No  Small red triangle No  Small red circle Yes  Big blue circle No  Small blue circle Yes | 8 Marks |
| 9 | Explain candidate elimination algorithm with an illustrative example. | 8 Marks |
| 10 | Provide a hand trace of the candidate-elimination algorithm learning from the below given training examples and hypothesis language. In particular, show how the specific and general boundaries of the version space after it has processed the first two training examples. | 8 Marks |
| 11 | How many distinct hypothesis from the above given hypothesis space are consistent with the following single positive training example: | 6 Marks |
| 12 | Explain advantages and drawbacks of find-S and candidate elimination algorithm. | 4 Marks |
| 13 | Explain the inductive bias of candidate-elimination algorithm. | 8 Marks |
| 14 | Explain candidate elimination algorithm, and illustrate the working of the algorithm for the dataset given below:  **Size Color Shape Label**  Big red circle No  Small red triangle No  Small red circle Yes  Big blue circle No  Small blue circle Yes | 8 Marks |
| 15 | Consider the following set of training examples to train a robot janitor to predict whether or not an office contains a recycling bin.     1. What is the size of the set of instances for this example? 2. What is the size of the hypothesis space? 3. Give a sequence of S and G boundary sets computed by the Candidate-Elimination algorithm. | * 1. Marks |
| 16 | Describe find-S algorithm. Explain it working for the dataset given below:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **outlook** | **temperature** | **humidity** | **wind** | **answer** | | sunny | hot | high | weak | no | | sunny | hot | high | strong | no | | overcast | hot | high | weak | yes | | rain | mild | high | weak | yes | | rain | cool | normal | weak | yes | | rain | cool | normal | strong | no | | overcast | cool | normal | strong | yes | | sunny | mild | high | weak | no | | sunny | cool | normal | weak | yes | | rain | mild | normal | weak | yes | | sunny | mild | normal | strong | yes | | overcast | mild | high | strong | yes | | overcast | hot | normal | weak | yes | | rain | mild | high | strong | no | | 8 Marks |
| 17 | Describe Candidate-Elimination algorithm. Explain it working for the dataset given below:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **outlook** | **temperature** | **humidity** | **wind** | **answer** | | sunny | hot | high | weak | no | | sunny | hot | high | strong | no | | overcast | hot | high | weak | yes | | rain | mild | high | weak | yes | | rain | cool | normal | weak | yes | | rain | cool | normal | strong | no | | overcast | cool | normal | strong | yes | | sunny | mild | high | weak | no | | sunny | cool | normal | weak | yes | | rain | mild | normal | weak | yes | | sunny | mild | normal | strong | yes | | overcast | mild | high | strong | yes | | overcast | hot | normal | weak | yes | | rain | mild | high | strong | no | | 8 Marks |
| 18 | Differentiate between Find-S and Candidate-Elimination Algorithm. | 8 Marks |
| 19 | Consider the following set of training examples to train a robot janitor to predict whether or not the person enjoys sport on a particular day.  **Example Sky AirTemp Humidity Wind Water Forecast EnjoySport**  1 Sunny Warm Normal Strong Warm Same Yes   1. Sunny Warm High Strong Warm Same Yes   3 Rainy Cold High Strong Warm Change No  4 Sunny Warm High Strong Cool Change Yes   1. What is the size of the set of instances for this example? 2. What is the size of the hypothesis space? 3. Give a sequence of S and G boundary sets computed by the Candidate-Elimination algorithm. | 8 Marks |
| 20 | Enlist the advantages and drawbacks of Find-S,List-then-Eliminate, Candidate Elimination Algorithm. | 6 Marks |
| 21 | What are the important objectives of machine learning ? | 4 Marks |
| 22 | What are the basic design issues and approaches to machine learning? | 4 Marks |
| 23 | What do you mean by Well-posed learning problems? | 6 Marks |
| 24 | Explain the important features that are required to well define a learning problem. | 6 Marks |
| 25 | Explain inductive biased hypothesis space and unbiased learner. | 6 Marks |