QPC: RJ20MTECH045 AR 19 Reg. No | | | | | | | | | | |

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (First Semester – Regular) Examinations, June – 2021

MPECS1031- Machine Learning

(C.S.E)

Time: 2 hrs Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A **(2 x 10 = 20 Marks)**

Q1. Answer **ALL** questions

a. List the functions of supervised learning in the context of machine learning research area.

b. Define Reinforcement Learning.

c. Compare and contrast the heuristic for rule learning and heuristics for decision trees?

d. Define pruning in decision tree and fashion of doing the same.

e. Justify:

Ensembles will yield bad results when there is significant diversity among the models.

f. Define boosting.

g. In the Back-Propagation learning algorithm, what is the object of the learning?

h. Which of the following statements is/are true about Neural Networks?

(a) Neural Networks can model arbitrarily complex decision boundaries.

(b) Neural Networks can be used to emulate a Gaussian kernel SVM

(c) Training of a neural network is very sensitive to the initial weights.

(d) Ideal initialization for weights would be setting all of them to zeros

i. Compare and contrast Naïve- Bayes and Logistic regression.

j. What is deep learning, and how does it contrast with other machine learning algorithms?

PART – B **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions **Marks**

2. Suppose we want an RL agent to learn to play the game of golf. For training purposes, we make use of a golf simulator program. Assume that the original reward distribution gives a reward of +10 when the golf ball is hit into the hole and -1 for all other transitions. To aide the agents learning process, we propose to give an additional reward of +3 whenever the ball is within a 1 metre radius of the hole. Is this additional reward a good idea or not? Why? **6**

(a) yes, the additional reward will help speed-up learning

(b) yes, getting the ball to within a metre of the hole is like a sub-goal and hence, should be rewarded

(c) no, the additional reward may actually hinder learning

(d) no, it violates the idea that a goal must be outside the agents direct control.

3. We will use the dataset below to learn a decision tree which predicts if people pass machine learning (Yes or No), based on their previous GPA (High, Medium, or Low) **6**

and whether or not they studied.

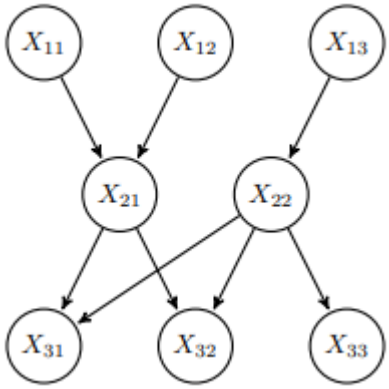
GPA	Studied	Passed
L	F	F
L	T	T
M	F	F
M	T	T
H	F	T
H	T	T

What is the entropy H(Passed | Studied)?

4. Explain about statistical hypothesis testing in comparing learning algorithms with real time example. **6**

5. Explain how to learn Multilayer Networks using Gradient Descent Algorithm. **6**

6. Consider a Bayesian network B with boolean variables. **6**



Write the joint probability P(X11, X12, X13, X21, X22, X31, X32, X33) factored according to the Bayes net. How many parameters are necessary to define the conditional probability distributions for this Bayesian network?**(4 Marks)**

Can you say the same thing when X22 = 1? In other words, can you say X13 and X33 are independent given X22 = 1? Why?**(2 Marks)**

7. Detail about unsupervised learning algorithm with real time scenario. **6**

8. Assume we have a set of data from patients who have visited MMC hospital during the year 2017. A set of features (e.g., temperature, height) have been also extracted for each patient. Our goal is to decide whether a new visiting patient has any of diabetes, heart disease, or Alzheimer (a patient can have one or more of these diseases). **6**

   We have decided to use a neural network to solve this problem. We have two choices: either to train a separate neural network for each of the diseases or to train a single neural network with one output neuron for each disease, but with a shared hidden layer. Which method do you prefer? Justify your answer.

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