

VTU B.E/B.TECH QUESTION PAPER SET

CBCS SEMESTER VIII

MACHINE LEARNING

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15EC834

Eighth Semester B.E. Degree Examination, June/July 2019
Machine Learning

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Describe the following problems with respect to tasks, performance and experience :
 i) A checkers learning problem
 ii) A handwritten recognition learning problem
 iii) A robot driving learning problem. (07 Marks)
 b. Write candidate elimination algorithm and illustrate with example. (09 Marks)

OR

- 2 a. Explain the steps in designing learning systems in detail. (06 Marks)
 b. Write FIND-S algorithm and explain by taking EnjoySport concept and training instance given below :

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)

Module-2

- 3 a. What is decision tree and discuss the use of decision tree for classification problem. (08 Marks)
 b. Describe the ID3 algorithm for decision tree learning with example. (08 Marks)

OR

- 4 a. Explain the concept of a perceptron with neat diagram. (08 Marks)
 b. How a single perceptron can be used to represent the Boolean functions such as AND, and OR. (08 Marks)

Module-3

- 5 a. Define Bayesian theorem and Maximum A Posteriori (MAP) hypothesis. (04 Marks)
 b. Derive an equation for MAP hypothesis using Bayes theorem. (05 Marks)
 c. Consider a medical diagnosis problem in which there are two alternative hypothesis :
 i) That the patient has a particular form of cancer (+) and
 ii) That the patient does not (-). A patient takes a lab test and the result comes back positive. The test returns a correct positive result in only 98% of the cases in which the disease is actually present and a correct negative result in only 97% of the cases in which the disease is not present. Furthermore, 0.008 of the entire populations have this cancer. Determine whether the patient has cancer or not using MAP hypothesis. (07 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and/or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Describe Brute – Force MAP learning algorithm. (04 Marks)
 b. Discuss the Naive Bayes classifier. (04 Marks)
 c. The following table gives data set about stolen vehicles. Using Naive Bayes classifier classify the new data (RED, SUV, Domestic).

Colour	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	Suv	Imported	No
Yellow	Suv	Imported	Yes
Yellow	Suv	Domestic	No
Red	Suv	Imported	No
Red	Sports	Imported	Yes

(08 Marks)

Module-4

- 7 a. Discuss the K-nearest neighbor learning. (04 Marks)
 b. Discuss locally weighted regression. (04 Marks)
 c. Explain the CADET system using case based reasoning. (08 Marks)

OR

- 8 a. Define the following terms with respect to K-nearest neighbor learning.
 i) regression ii) residual iii) kernel function. (03 Marks)
 b. Explain radial basis functions. (05 Marks)
 c. Explain the FOIL algorithm. (08 Marks)

Module-5

- 9 a. What is reinforcement learning and explain the reinforcement learning problem with neat diagram. (06 Marks)
 b. Briefly discuss the FOCL algorithm with example. (10 Marks)

OR

- 10 a. Write the reinforcement problem characteristics. (06 Marks)
 b. Explain the Q-function and Q-learning algorithm assuming deterministic reward and action with example. (10 Marks)

CBCS SCHEME

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15EC834

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Machine Learning

Time: 3 hrs.

Max. Marks: 80

- Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
 ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

- 1 a. Define machine learning. Describe the steps in designing learning system. (08 Marks)
 b. Write candidate-elimination algorithm and illustrate with an example. (08 Marks)
- 2 a. Describe FIND-S algorithm. Explain it by considering the training instance of Enjoy Sport given in Table.Q2(a).

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

Table.Q2(a)

(10 Marks)

- b. Describe the following problems with respect to tasks, performance and experience.
 (i) A checkers learning problem
 (ii) Hand-written recognition learning problem
 (iii) A robot driving learning problem. (06 Marks)

Module-2

- 3 a. With the help of an example, describe ID3 algorithm for decision tree learning. (08 Marks)
 b. What is decision tree? Describe its use for classification with an example. (08 Marks)
- 4 a. For the transaction shown in the Table.Q4(a), compute:
 (i) Entropy of the collection of transaction records of table with respect to classification.
 (ii) What are the information gain of a_1 and a_2 relative to the transactions of the table?

Instance	1	2	3	4	5	6	7	8	9
a_1	T	T	T	F	F	F	F	T	F
a_2	T	T	F	F	T	T	F	F	T
Target class	+	+	-	+	-	-	-	+	-

the Table.Q4(a)

(08 Marks)

- b. How a single perceptron can be used to represent the Boolean functions such as AND and OR? (08 Marks)

Module-3

- 5 a. Briefly describe the Bayes theorem and maximum a posteriori (MAP) hypothesis. (04 Marks)
 b. Derive equation for MAP hypothesis using Bayes theorem. (04 Marks)
 c. Consider a football game between two rival teams: Team0 and Team1. Suppose Team0 wins 95% of the time and Team1 wins the remaining matches. Among the games won by team0, only 30% of them come from playing on team '1's football field. On the other hand, 75% of the victories for team1 are obtained while playing at home. If team1 is to host the next match between the two teams, which team will most likely emerge as the winner? (08 Marks)

- 6 a. Explain Naïve Bayes classifier and Bayesian belief networks. (10 Marks)
b. Show that how maximum likelihood (Bayesian learning) can be used in any learning algorithms that are used to minimize the squared error between actual output hypothesis and predicted output hypothesis. (06 Marks)

Module-4

- 7 a. Explain CADET system using case based reasoning. (08 Marks)
b. Explain K-nearest neighbor algorithm. (05 Marks)
c. Define the following terms with respect to K-nearest neighbor learning:
(i) Regression
(ii) Residual
(iii) Kernel function (03 Marks)
- 8 a. Explain FOIL algorithm. (08 Marks)
b. Briefly describe locally weighted regression. (04 Marks)
c. Explain radial basis functions. (04 Marks)

Module-5

- 9 a. Explain FOCL algorithm with an example. (10 Marks)
b. Explain reinforcement learning problem with necessary diagram. (06 Marks)
- 10 a. Explain Q-learning algorithm assuming deterministic reward and action with example. (10 Marks)
b. List the reinforcement problem characteristics. (06 Marks)

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15EC834

Eighth Semester B.E. Degree Examination, November 2020
Machine Learning

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions irrespective of modules.

Module-1

- 1 a. Explain briefly the choosing a representation for the target function and a function approximation algorithm. (08 Marks)
- b. With the diagram, explain the final design of the checkers learning program. (08 Marks)
- 2 a. What is the concept Learning task, explain with as example. (08 Marks)
- b. Explain the candidate elimination learning algorithm. (08 Marks)

Module-2

- 3 a. Explain the decision tree for the concept of play tennis. (08 Marks)
- b. What is reduced error pruning and rule post pruning? (08 Marks)
- 4 a. What is the gradient descent algorithm for training a linear unit? (08 Marks)
- b. Explain the back propagation algorithm for feed forward network containing two layers of sigmoid units? (08 Marks)

Module-3

- 5 a. What is the Baye's theorem, explain briefly with an example. (08 Marks)
- b. What is the Brute-force MAP learning algorithm, explain briefly. (08 Marks)
- 6 a. Explain the minimum description length principle. (08 Marks)
- b. What is the Naïve Baye's classifier? Explain briefly. (08 Marks)

Module-4

- 7 a. What is the k-nearest neighbor learning? Explain briefly. (08 Marks)
- b. Explain briefly the locally weighted linear Regression. (08 Marks)
- 8 a. What is the general to specific Beam search? Explain briefly. (08 Marks)
- b. What is learning sets of First Order Rule (FOIL)? Explain briefly. (08 Marks)

Module-5

- 9 a. What is the explanation based learning algorithm PROLOG – EBG? Explain briefly.
- b. Explain the remarks on explanation based learning. (08 Marks)
- 10 a. Explain briefly the Hypothesis space search. (08 Marks)
- b. What is the FOCL algorithm? Explain briefly. (08 Marks)

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