

KATHMANDU UNIVERSITY
End Semester Examination
August, 2019

AUG 26 2019
Course : COMP 484
Semester : I
F. M. : 40

Level : B.Sc.
Year : IV
Time : 2 hrs. 30 mins.

SECTION "B"

[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Discuss the concept of generalization and specialization with the help of candidate elimination algorithm. [2+2]
2. Consider the table shown in Figure 1 with three inputs and one target output (**profit**). Find the optimal decision tree.

Age	Competition	Type	Profit
Old	Yes	S/W	Down
Old	No	S/W	Down
Old	No	H/W	Down
Mid	Yes	S/W	Down
Mid	Yes	H/W	Down
Mid	No	H/W	Up
Mid	No	S/W	Up
New	Yes	S/W	Up
New	No	H/W	Up
New	No	S/W	Up

Figure 1

3. Discuss the solution for non-linearly separable problem with the help of neural network based model.
4. Define the terms lazy and eager learner. Briefly discuss the working principle of RBF algorithm. [2+2]
5. Shed the lights on "Bayes theorem" and the concept of maximum a posteriori and maximum likelihood. [2+1+1]
6. Compare and contrast between supervised learning and reinforcement learning. [2+2]
7. Explain the following terms (*ANY TWO*): [2+2]
 - a. Instance Space and Hypothesis space
 - b. Over-fitting
 - c. Sample error vs. true error

SECTION "C"

[2Q. × 8 = 16 marks]

Attempt ANY TWO questions.

8. Consider the table shown in Figure 2. Assume that "Naïve Bayes" algorithm is used to train the model. Predict its label for new instance x' based on maximum a posteriori (MAP) rule.

$x' = (\text{Outlook}=\text{Sunny}, \text{Temperature}=\text{Cool}, \text{Humidity}=\text{High}, \text{Wind}=\text{Strong})$

PlayTennis: training examples

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Figure 2

- Discuss the term machine learning and its importance in automation. [5+3]
9. Discuss PAC learnability and VC dimension. [4+4]
10. Discuss genetic algorithm as a machine learning algorithm. Shed out the role of bias vs. variance trade-off in learning. [4+4]