

Computer Science and Engineering

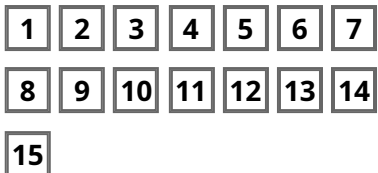
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Machine Learning

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QUIZ NAVIGATION



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Started on Thursday, 9 September 2021, 12:10 PM

State Finished

Completed on Thursday, 9 September 2021, 1:09 PM

Time taken 58 mins 39 secs


Marks 81.00/90.00

Grade 9.00 out of 10.00 (90%)

Question 1

Complete

Mark 6.00 out of
6.00

 Flag question

Which of the following statement(s) about decision trees is(are) true?


Select one or more:

- ☐ a. Given a set of an error free training examples, the version space of a decision tree may be empty
- ☒ b. A decision tree provides a rule base for making decisions.
- ☐ c. There exists a polynomial time algorithm for computing a decision tree of minimal size.
- ☒ d. Decision trees can handle both numerical and categorical variables.

Question 2

Complete

Mark 6.00 out of 6.00

 Flag question

Which of the following hypothesis(hypotheses) is (are) consistent with the training set consisting of 2 vectors: $x = \langle \text{White}, \text{Tiger}, \text{Mango} \rangle$, $y = \langle \text{White}, \text{Tiger}, \text{Banana} \rangle$, and $c(x) = \text{True}$, $c(y) = \text{True}$, where c is the target function. The representation of a hypothesis is in the Conjunctive Normal Form with the boolean literals as discussed in the lecture classes under the topic *Concept Learning*. [6]


Select one or more:

- ☐ a. $\langle ?, ?, \text{Banana} \rangle$
- ☒ b. $\langle ?, \text{Tiger}, ? \rangle$
- ☒ c. $\langle \text{White}, \text{Tiger}, ? \rangle$
- ☐ d. $\langle ?, \text{Tiger}, \text{Mango} \rangle$

Question 3

Complete

Mark 3.00 out of 6.00

 Flag question

Choose the correct option(s) for Vapnik-Chervonenkis dimension.


Select one or more:

- ☒ a. Given the VC dimension of a hypothesis space, n , there exists at least one hypothesis which is consistent to all possible dichotomies of every possible set of n instances.
- ☒ b. It is the cardinality of the largest set S that can be shattered by the Hypothesis space (H).
- ☒ c. It is infinity when arbitrarily large finite sets can be shattered by the Hypothesis space (H).
- ☐ d. The VC dimension of a hypothesis space is always smaller than the dimension of the input space.

Question 4

Complete

Mark 6.00 out of 6.00

 Flag question

Consider the following table providing training examples describing a day of shopping (Yes or No) given the conditions of Outlook, Temperature and Wind-speed. Use the convention for representation of hypothesis by conjunctive normal forms using boolean literals as discussed in the lectures on "Concept learning". Which of the following statements are true? [6]

Table 1: Training examples.

| Outlook | Temperature | Wind-speed | Shopping |
|---------|-------------|------------|----------|
| Sunny | Hot | Weak | No |
| Sunny | Warm | Weak | Yes |
| Rainy | Warm | Weak | Yes |
| Sunny | Cool | Strong | Yes |
| Rainy | Hot | Strong | No |


Select one or more:

- ☐ a. The most specific consistent hypothesis is $\langle ?, ?, ? \rangle$
- ☐ b. The most general consistent hypothesis is $\langle ?, ?, ? \rangle$.
- ☒ c. The Version Space is empty.
- ☐ d. The version space has two or more than two hypotheses.

Question 5

Complete

Mark 6.00 out of 6.00

 Flag question

Post-pruning mechanism on a full grown decision tree helps in

Select one or more:

- ☒ a. Increasing test accuracy.
- ☐ b. Avoiding underfitting.
- ☒ c. Reducing model complexity.
- ☒ d. Avoiding overfitting.

Question 6

Complete

A finite hypothesis space H has 8 hypotheses. Which of the following cannot possibly be the VC dimension of H ?

Mark 6.00 out of 6.00

Flag question

Select one:

- ☐ a. 2
- ☐ b. 1
- ☐ c. 3
- ☒ d. 4

Question 7

Complete

Mark 6.00 out of 6.00

Flag question

Consider E_1 and E_2 are *positive* and *negative* examples respectively in a training data set. Let h_1 and h_2 be two consistent hypotheses, where h_2 and h_1 are the most general and the most specific hypotheses, respectively. Which of the following statement(s) is (are) true? [6]

Select one or more:

☒ a.

All negative examples rejected by h_2 are also rejected by h_1 .

☒ b.

E_1 is accepted by both h_1 and h_2 .

☒ c.

All positive examples accepted by h_1 are also accepted by h_2 .

☐ d.

E_2 is rejected by h_1 but not by h_2 .

Question 8

Complete

Mark 6.00 out of 6.00

Flag question

Which of these best describe the decision tree?

Select one:


- ☒ a. Disjunction of conjunction of boolean literals
- ☐ b. Conjunction of boolean literals

- ☐ c. Disjunction of boolean literals
- ☐ d. Conjunction of disjunction of boolean literals

Question 9

Complete

Mark 6.00 out of 6.00

 Flag question


Let there be a 3-D hypothesis space where the attributes have 2,4 and 5 possible values respectively, in addition to ϕ and ? value. What is the total number of *distinct* hypotheses in this space. [6]

Answer:

Question 10

Complete

Mark 0.00 out of 6.00

 Flag question

Which of the following is (are) true for a Probably Approximately Correct (PAC) learning algorithm?


Select one or more:

- ☐ a. It learns all hypothesis in the version space of the training examples.
- ☒ b. It learns probability of a label of an instance .
- ☐ c. It produces a hypothesis whose generalization error is bounded with a probability at least greater than 0.5.
- ☒ d. For a consistent learner it produces a consistent hypothesis.

Question 11

Complete

Mark 6.00 out of 6.00

 Flag question

What is the minimum and maximum possible depth of a decision tree constructed from a training set having n instances, d_1 ternary valued attributes and d_2 binary valued attributes? The number of classes is y . Consider the root is at depth 1. A leaf node with a class label is not counted as a level. [6]

Select one:


- ☐ a. 0 and $\log_3(d_1) + \log_2(d_2)$

- ☒ b. 1 and $d_1 + d_2$
- ☐ c. $n(\log_3(d_1) + \log_2(d_2))$ and $3d_1 \times 2d_2$
- ☐ d. 1 and $\log_3(d_1) + \log_2(d_2)$
- ☐ e. 0 and $d_1 + d_2$
- ☐ f. $\log_3(d_1) + \log_2(d_2)$ and $3d_1 + 2d_2$

Question 12

Complete

Mark 6.00 out of 6.00

 Flag question

Consider the following table providing training examples describing a day of shopping (Yes or No) given the conditions of Outlook, Temperature and Wind-speed.

Table 3: Training examples.

| Outlook | Temperature | Wind-speed | Shopping |
|---------|-------------|------------|----------|
| Sunny | Hot | Weak | No |
| Sunny | Warm | Weak | Yes |
| Rainy | Warm | Weak | Yes |
| Sunny | Cool | Strong | Yes |
| Rainy | Hot | Strong | No |


Compute the gain in Gini index on selecting attribute *Wind-speed* for splitting a node of the decision tree with above training examples. [6]

Answer:

Question 13

Complete

Mark 6.00 out of 6.00

 Flag question

Consider the following table providing training examples describing a day of shopping (Yes or No) given the conditions of Outlook, Temperature and Wind-speed.

Table 2: Training examples.


| Outlook | Temperature | Wind-speed | Shopping |
|---------|-------------|------------|----------|
| Sunny | Hot | Weak | No |
| Sunny | Warm | Weak | Yes |
| Rainy | Warm | Weak | Yes |
| Sunny | Cool | Strong | Yes |
| Rainy | Hot | Strong | No |

Compute the information gain on selecting attribute *Outlook* for splitting a node of the decision tree with above training examples. [6]

Answer: **Question 14**

Complete

Mark 6.00 out of 6.00

 Flag question

Which of the following is/are true for Find-S algorithm.


Select one or more:

- ☒ a. It moves from most specific hypothesis to the most general hypothesis.
- ☐ b. It considers best chosen negative and positive training examples.
- ☐ c. It moves from most general hypothesis to the most specific hypothesis.
- ☒ d. It neglects all negative training examples and consider positive training examples.

Question 15

Complete

Mark 6.00 out of 6.00

 Flag question

Given the training set consisting of 2 vectors: $x = \langle \text{White, Tiger, Mango} \rangle$, $y = \langle \text{White, Tiger, Banana} \rangle$, and $c(x) = \text{True}$, $c(y) = \text{True}$, where c is the target function what is the most general boundary found by Candidate Elimination Algorithm?. The representation of a hypothesis is in the Conjunctive Normal Form with the boolean literals as discussed in the lecture classes under the topic Concept Learning.

Select one:

- ☐ a. $\langle \varphi, \varphi, \varphi \rangle$
- ☐ b. $\langle \text{Blue, Tiger, Banana} \rangle, \langle \text{Blue, ?, ?} \rangle, \langle \text{?, Tiger, ?} \rangle$
- ☐ c. $\langle \text{White, ?, ?} \rangle, \langle \text{?, ?, Mango} \rangle$
- ☒ d. $\langle \text{?, ?, ?} \rangle$

Finish review

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