Started on	Saturday, 27 July 2024, 10:11 PM
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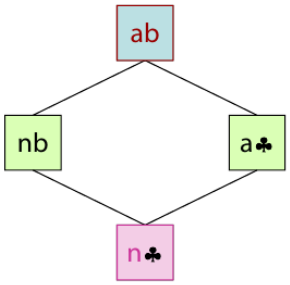
Time taken	13 mins 46 secs
Marks	21/21
Grade	**10** out of 10 (**100**%)

Question 1

Correct

Mark 5 out of 5

Let's proceed on the example from the lecture.



What would be the most specific hypothesis in the version space when updating with the positive example 2Spades, and the negative jSpades?

- (●) nb
- ( ) ab
- ( ) aClubs
- ( ) nClubs
- ( ) empty

Mark 1 out of 1

What in case we instead of the two samples above get the positive example 8Clubs?

- ( ) nb
- ( ) ab
- ( ) aClubs
- (●) nClubs
- ( ) empty

Mark 1 out of 1

What in case we instead get 8Clubs as negative example?

- ( ) nb
- ( ) ab
- ( ) aClubs
- ( ) nClubs
- (●) empty Correct: The only most specific hypothesis disagrees with this example, so no hypothesis in H agrees with all examples.

Mark 1 out of 1

And in case of the positive example jHearts?

- ( ) nb
- ( ) ab
- ( ) aClubs
- ( ) nClubs
- (●) empty Correct: The only most general hypothesis disagrees with this example, so no hypothesis in H agrees with all examples.

Mark 1 out of 1

What with the positive examples 2Spades, 4Spades?

- ( ) ab
- ( ) aClubs
- (●) nb
- ( ) nClubs
- ( ) empty

Mark 1 out of 1

Correct

Marks for this submission: 5/5.

Question 2

Correct

Mark 6 out of 6

Which of the following is true?

- [ ] a. Version space learning only learns models with categorical inputs.
- [x] b. The most general hypothesis implies the most specific one.
- [x] c. Version space learning only learns models with categorical outputs. More precisely: binary classification outputs.
- [x] d. The most general hypothesis classifies the largest subset of input samples as positive.
- [x] e. Version space learning allows incremental learning.
- [ ] f. The most general hypothesis classifies the larger subset of training samples as positive than the most specific one.

Your answer is correct.

Correct

Marks for this submission: 6/6.

Question 3

Correct

Mark 5 out of 5

To which of the following problems is version space learning (in principle) applicable?

Note that version space learning will only find purely consistent solutions. If the data is noisy, the version space may quickly collapse, due to contradicting samples.

- [x] a. Learning which molecular constellations result in a peak at a given position when applying chemical spectroscopy.

Check out Meta-DENDRAL https://www.ijcai.org/Proceedings/77-1/Papers/048.pdf

- [ ] b. linear classification of few data points
- [x] c. Narrowing down the required and non-required features of your product that a specific customer wants.
- [x] d. linear classification of separable data
- [ ] e. Fitting a curve for predicting the future revenue.

Your answer is correct.

Correct

Marks for this submission: 5/5.

Question 4

Correct

Mark 5 out of 5

A naive alternative to version space learning in case of binary classification is the Find-S algorithm (or simply S-algorithm).

It aims to build a hypothesis are of the form $[R_1, \ldots, R_n]$ where each R_i is a set of constraints that must all hold on the i-th input feature, e.g., $R_i = \{x_i \in S_i\}$ (x_i must take one of the values in S_i) or $R_i = \{\}$ (all values allowed).

Find-S starts at the hypothesis that all inputs are invalid, i.e., for all features no feature value is admissible ($R_i = \{\text{false}\}$). Going through all training samples step-by-step, for every new positive training datum it updates the constraints to some (immediately) more general one, if necessary to stay consistent.

```
1. Initialize h = (R_1={false}, ..., R_n={false})
2. FOR EACH positive training instance p
     FOR EACH input feature X_i
       IF the constraint R_i is not satisfied by p
         replace R_i by the next more general constraint that is satisfied by x
3. Output hypothesis h
```

Comparing this to the version space algorithm, which of the following is true?
Note: The card game example from the lecture might be helpful to take as an illustration here for thinking the claims through.

- [ ] a. If the training data contains a set of contradicting samples (no hypothesis can be consistent with all of them), both algorithms will yield an empty result.
- [x] b. Without prior knowledge, both algorithms start with the most specific hypothesis that maps any input to invalid.
- [ ] c. If a sample is encountered that is a false positive to the/a most specific hypothesis, it is updated only for Find-S.
- [ ] d. Only version space learning can deal with noisy data.
- [x] e. Both learning algorithms allow incremental learning.
- [x] f. In contrast to Find-S, version space learning allows more than one most specific hypothesis.
- [x] g. If a sample is encountered that is a false positive to the/a most specific hypothesis, it is updated only for version space learning.
- [x] h. In contrast to Find-S, version space learning can be applied to hypothesis spaces that allow rules relating features (e.g., $x_1 \wedge x_2$).
- [ ] i. Both algorithms aim to find the most specific consistent hypothesis.

Your answer is correct.

Correct

Marks for this submission: 5/5.

◄ 07. Quiz - Support Vector Machines

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09. Quiz - Decision Trees and Ensembling ►