

CS 4804 Homework 7

Solution Sketches

1. (30 points) Your answer will depend on the domain theory used, the nature of the predicates, and where the cutting plane is drawn. One example rule that could be learnt is:

$$\forall x \forall y \text{ Greaterthan}(\text{Score}(x), \text{Score}(y)) \wedge \text{GoodCreditRisk}(y) \Rightarrow \text{GoodCreditRisk}(x)$$

2. (30 points) This was meant to be a ‘debate’ question, to see how well you can argue for your hypothesis. There are interpretations by which the agent can be viewed as performing any one of the three types of learning!

If your answer was EBL, you should have given a domain theory and argued how the agent will find the rule by picking *one* example, explaining it, and showing where the agent drew the cutting plane. In this case, the agent didn’t learn the second rule because it just didn’t draw the cutting plane in that manner. This interpretation is slightly suspicious since the agent appears to have learnt the rule by looking at *all* the examples, taken together. This is not how EBL works.

If your answer was relevance-based learning, you should have related the ‘if P then Q’ result to learning a determination. You should have given a more general construct (e.g., ‘usually some things happen together’) and shown how the given data will help you determine that the first ‘thing’ is *P* and the second ‘thing’ is *Q*. In this case, the reason why the agent didn’t learn the second rule is because the determination did not hold in the second case.

Or, the agent could be performing inductive logic programming, since we are not given any domain theory and purely empirical observations are provided. The reason why the second rule was not learnt could be due to many factors. For instance, the agent might be ‘wired’ to prefer the most specific hypothesis possible that supports all the given data, or it might have access to ‘negative’ examples that prevent the learning of a more general rule.

If your answer was relevance-based learning because Question 1 dealt with EBL and Question 3 dealt with ILP, you will receive no points.

3. (40 points) It is clear that *C2* must contain a $\neg S$. It must also supply a *P*. In addition, we can throw in a *R* exactly similar to the one from *C1*, to get lots of possibilities. Here are thus four answers for *C2*:

- $P(x, A) \vee \neg S(z, y)$
- $P(x, A) \vee \neg S(z, C)$
- $P(x, A) \vee \neg S(z, y) \vee R(B, x)$
- $P(x, y) \vee \neg S(z, A)$

There are many more possible answers.