

Practice Exercise Solutions to STRIPS planning

1 Directed Questions

- The STRIPS representation for an action consists of what?

Answer: Preconditions - a set of assignments of values to variables that must be true for the action to occur. Effects - a set of resulting assignments of values to those variables that change as the result of the action.

- What is the STRIPS assumption?

Answer: All of the variables not mentioned in the description of an action stay unchanged when the action is carried out.

- What is the *frame problem* in planning? How does it relate to the STRIPS assumption?

Answer: The frame problem is the problem of representing all things that stay unchanged. This is important because most actions affect only a small fraction of variables, e.g. filling a cup with coffee changes the state of the cup and of the pot but not the location of the robot, the layout of the building, etc. The STRIPS assumption just says that all variables not mentioned in the description of an action remain unchanged.

- What are some key limitations of STRIPS?

Answer: States are represented simply as a conjunction of positive literals, e.g. $poor \wedge unknown$, goals are conjunctions (no disjunction allowed), no support for equality.

2 STRIPS planning

Consider a scenario where you want to get from home (off campus) to UBC during a bus strike. You can either drive (if you have a car) or bike (if you have a bike). How would you represent this in STRIPS?

- (a) What are the actions, preconditions and effects? What are the relevant variables?

Answer: The actions could be something like $goByBike$ and $goByCar$. In a very simple representation, there are variables loc , $haveBike$, and $haveCar$, indicating location, whether or not you have a bike (t/f), and whether or not you have a car (t/f). The precondition for $goByBike$ is that $haveBike = true$, and likewise the precondition for $goByCar$ is that $haveCar = true$. The effect of each action is that $loc = UBC$. Figure ?? shows this representation.

- (b) If we select the action $goByBike$, what is the value of $haveBike$ after the action has been carried out.

Answer: It will equal true, as it had to be true for the action to take place, and since it is not mentioned in the action effects its value will be unchanged.

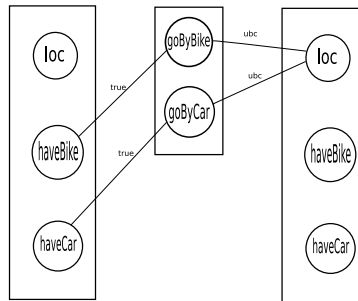


Figure 1: Simple STRIPS commuting problem

- (c) If we are at UBC and select the action *goByCar*, what will the value of *loc* be after the action has been carried out?

Answer: After the action $loc = UBC$ as this is a specified effect. Notice that there is no *loc* precondition for action, so if you begin at UBC or at home and select either action, you will wind up at UBC.

3 Learning Goals

You can:

- Represent a planning problem with the STRIPS representation.
- Explain the STRIPS assumption