CIS 700 – Homework 4: Convert WikiHow to PDDL

March 5, 2022

Question 1 What wikiHow article did you pick and why?

I picked the How To Survive A War wikiHow since it seemed applicable to SciFi and Fantasy games. It involved an enemy, conflict, collecting items, finding shelter, and first aid. The wikiHow article had multiple methods and multiple steps within each method. The steps and methods seemed concrete enough to convert PDDL, unlike other articles which, for example, asked people to learn a skill. Finally, this seemed relevant to current events.

Question 2 What portions of the article did you select to translate to PDDL?

I chose three methods: finding a shelter, collecting supplies (food and water), and first aid. Finding a shelter consists of finding a building with certain trains (i.e., a basement and not occupied). Collecting supplies can happen in multiple ways: scavenging, hunting, stealing, and bartering. First aid consists of both finding supplies (i.e., bandages) and healing yourself/others at the expense of losing supplies (i.e., clean water).

Question 3 Give some example of the actions, types, and predicates you used in your domain.

The actions in my game are: collecting rain water, boiling water, breaking into a car by smashing the windows with a rock, fishing, looting a shelter where an old man is storing food, and healing the old man in exchange for food.

To collect rainwater the player must find a post (*item*) and find an outside location (the *outdoors* predicate). This water then needs to be cleaned (the *treated* predicate). To clean the water, the player must boil the water in the pot via the *boil water* action.

In order to catch a fish (*item*), the player must find a fishing pole (*item*). The fishing pole is in the cat (*location*) but is not immediately accessible (the *gettable* predicate). To get the fishing pole, the player must find the rock (*item*) and then smash the windows of the car (the *break car window* action). One the car windows are broken, the fishing pole becomes gettable.

To clean a wound, both the *clean_others_wound* and *clean_wound* actions, the player needs water which has been treated (i.e., boiled) and bandages. The player then loses both the water and bandages but the injury is healed.

Question 4 Explain what goal you selected for your problem, and give the initial state and solution that you created.

Problem 1, fill inventory: The initial state is that the player's inventory is empty. The goal is to find treated food, water, and first aid. One can find water in two ways: (1) go to the lake, or (2) find a pot and collect rainwater. In both cases the water needs to be boiled. To find first aid, the player must search the Store location. To find food, the player must do one of three things: (1) loot the brick house where the old man is hiding, (2) barter with the old man and heal his injuries in exchange for the food, or (3) find the rock, use the rock to break the car window, loot the car for the fishing pole, use the fishing pole to fish at the lake.

Problem 2, find shelter: The initial state is that the player is in an empty parking lot (i.e., outside). The player must find a building that is unoccupied and has a basement.

Problem 3, heal old man: The initial state is that the player's inventory is empty. To heal the old man one must find water (go to the lake or find a pot and collect rainwater), treat the water (boil the water in the pot), find bandages (in the Store), and clean the old man's wounds (using the water and bandages, which are removed from the player's inventory).

Question 5 What limitations of PDDL did you encounter that makes it difficult to precisely convert a wikiHow description into PDDL?

Being forced to only used ANDs makes the conversion complicated. For example, the methods *barter_food_for_healing* method needs one player to have food and the other player to have both bandages and water. In reality, this could work with any player combination of food, water, and bandages which would require an OR.

Additionally, it is unclear how to add randomness or interactions. For example, one of the methods in the How To Survive a War article is "Defend yourself if you have to". This would involve a back and forth exchange with another player that would benefit from randomness. For example, if a player is attaching you and you defend yourself, are you always successful? For the player keep attacking or does the attack happen a fixed or random number of times? One could imagine using a series of boolean predicates (i.e, attack1, attack2, and attack3 to ensure your player is attacked three times), but this would be tedious to implement and not fun to play.

Question 6 Could your PDDL be used as an interesting challenge for a text-adventure-style game? If so, how? If not, what would needed to create an interesting challenge?

Yes, I think interesting challenges could be created this way but it is highly dependent on the wikiHow article. For example the How To Escape Quicksand article is highly sequential and,

thus, maybe not interesting and would railroad players. In my game I decided to add an item (food) which can only be obtained through (1) looting the shelter where an old man is hiding or (2) exchanging water and bandages (through healing the old man's injuries). Thus, one cannot have both food and bandages at the same time without causing harm to a fellow citizen.

Question 7 Discuss how you might use GPT-3 to automatically or semi-automatically convert a wikiHow article to PDDL?

Given the annotation task, where we supplied descriptions of each item, predicate, action, one might be able to leverage a large number of these annotations to generate the PDDL. This seems doable for common objects and actions (e.g., is an item gettable) but may be difficult for more specific world interactions (e.g., bartering food for first aid).