CIS700 HW4

[redacted]

March 3, 2022

1. **What wikiHow article did you pick and why?**

   We picked the article How to Make a Detective Kit because we found the "Kid Detectives" section to be the most interesting among the three sections. To build a detective kit, the article mentions certain items that need to go into the kit. Though the article does not mention where to get those items from, we thought that getting items from various places and building some items to put it all together in the detective kit would be a good simulation of an interactive fiction game. So, we build a scenario where the player needs to buy some items, find some items, make some items using what is available in the inventory and finally put it all together in the detective kit.

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

   The article is divided into three parts:
   - Choosing the Right Bag: This part of the article just describes what kinds of bags would be best suited for a detective kit. Since it contained only descriptions and no actions that a player could take, we defined only one action for this part, i.e., buy a bag from the market.
   - Assembling Disguises: This part is divided into four steps: choosing your regular detective gear, picking two or three aliases, finding supplies for each disguise, and keeping each disguise separated. We skipped the second and the fourth step which did not make sense to include. Based on the other two steps, the player can wear two costumes: their regular costume or a disguise. They would need to buy their regular costume from a costume store and find props for their disguise in a garage.
   - Getting Detective Gear: This part is divided into six steps out of which we selected four. The first is to make a detective badge out of some stationery items bought at the store. The second is to prepare a detective notebook out of a plain notebook bought at the store by writing something in the first few pages. The third is to get walkie-talkies from the store and the final step is to put everything in the inventory into the detective kit.

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

   Some examples of actions, types and predicates used in the domain are:
   1. Actions: `make_badge, prepare_detective_notebook, get_walkie_talkies, wear_disguise`
   2. Predicates:

```
(sells_bags ?loc - location) ; this location sells bags.
(wear ?player ?costume) ; player wears his uniform
```

3. Types: `bag - item, cardboard - item, costume - item, player, direction, location, disguise`

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

    - *Initial state*: Inventory is empty and the player is at home. We defined the connections to the markets where the player has to go buy items, and defined which stores sell which items.
    - *Goal*: Player should build a detective kit in which he stores all the collected detective gear. The kit should contain a detective badge, a detective notebook, walkie-talkies, and at least two items that the player can use to disguise themselves. All of these items should be stored in a bag and additionally, the player should be wearing their regular detective costume.
    - *Solution*: The player should visit staples for stationery items, target for a bag, electronics store for walkie-talkies and a costume store for their regular detective costume. They should also visit the garage to pick up a couple of items for their disguise. They should prepare a badge using the stationery items and write something in their detective notebook. The player should then wear their regular detective costume and put their badge, detective notebook and walkie-talkie in their bag. This will achieve the goal state defined above.

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

    1. The article has very generic human-interpretable descriptions which are really difficult to convert into PDDL. The concepts in the wikihow article are related more to implicit knowledge about the subject than the actual words in the article. e.g. step description mentions ‘getting a detective bag’ and the details about how the bag should be (it should have multiple pockets etc.) but does not describe how one can get a bag, what locations are involved etc.
    2. Preconditions for tasks are implicit. There is no description of the preconditions required to complete a task. For example, getting a notebook requires going to a store that sells notebooks. Because of lack of location descriptions, the preconditions associated are also left to the author’s understanding of the domain.
    3. Steps can be overlapping: More than one step may map to the same action and can make it difficult to precisely convert the steps to PDDL. e.g. one step requires getting a notebook and another step requires buying pens and chalks.

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

Yes, our PDDL can be used as an interesting challenge for a text adventure style game. The game can require the player to be in disguise. And in order to achieve this the player must complete multiple sub-challenges corresponding to each problem in the PDDL.
The player must get a bag, buy a detective notebook, come up with interesting costumes etc. to be able to complete the challenge.

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

We can definitely use GPT-3 to semi-automatically convert a wikiHow article to PDDL. We experimented with GPT-3 prompting by giving a couple of training examples.

1. Each training example consists of a step description from a wikihow article, and manually extracted corresponding <problem>, <location>, and <object>.
2. We prompt GPT-3 with a new step description to extract the corresponding problem name, location involved and any object information.
3. GPT-3 performs fairly well in extracting information from long step descriptions.
4. We have used the text-davinci model with a temperature setting of 0.7.