

Generating Instructions in Virtual Environments as a Planning Problem

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Abstract

This project aims to create a Natural Language Generation system for giving instructions in virtual world with different level of abstractions. We will try to incorporate hierarchical planner into the Potsdam Natural Language Generation systems which originally use forward search for planning.

1 Introduction

The Challenge on Generating Instruction in Virtual Environment (GIVE) [5] is an evaluation shared task for real-time natural language generation (NLG) systems. The system objective is to guide a human instruction follower (IF) to complete a treasure-hunting task in a 3D virtual world. We put our interests into the recent version of GIVE, namely, GIVE-2.5 [7]. GIVE-2.5 is the second second sequel of GIVE challenge which is an identical challenge to GIVE-2 [6] but was hold again for a better timing.

Users will start the 3D game from the website. First, users will download the 3D client which allows them to interact with the 3D world. Next, the client will connect to the NLG system. There are 3 evaluation worlds with different difficulties as depicted in Figure. 1. World 1 has a simple layout and buttons are easily identified. World 2 buttons are cluttered with a lot of buttons with the same colors but the user can still refer to the room by the color of the furnitures. World 3 has a maze-like layout in one room, multiple alarm tiles in another room and several doors with a lot of plants in the last room.

The task is for a user to pick up a trophy from a safe which should be preceded by pushing a sequence of buttons. There are some obstacles such as some floor tiles that can generate an alarm signal which will cause a user to lose the game if the alarms are not deactivated in advanced. In addition, there are many unrelated objects such as lamps or plants which are dummy and will be used as landmarks by the NLG systems. The demo can be found at <https://www.youtube.com/watch?v=ORSinOHChno>.

The main different between GIVE and its sequels are the ability for a user to move. In GIVE, there are discrete steps so ‘three steps’ and ‘turn left’ will be precise actions. While in GIVE-2 and GIVE-2.5, a user can move freely so the phrases like ‘three steps’ and ‘turn left’ will be more difficult to predict their effects.

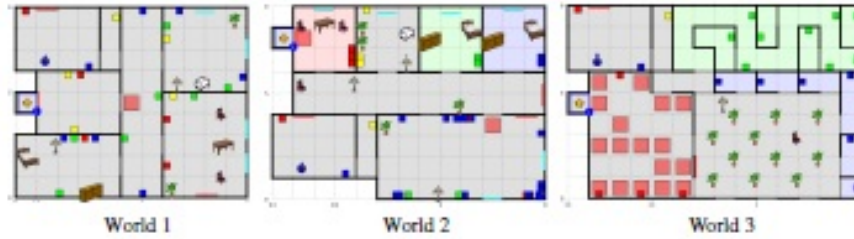


Figure 1: The layout of the 3 worlds in the GIVE-2.5 evaluation world [7].

We are interested in the Potsdam NLG systems [2] because they use AI planning technologies for NLG. However, there are still a lot of things that can be tried. For example, the Potsdam NLG systems use Forward Search (FF). Their outputs provide just one level of abstraction. So, if hierarchical planning is used, we expect the output instructions to be more structured that will lead to the better instruction understanding.

2 Technical Approach

The Potsdam NLG system [1, 2, 3] is based on the previous work, the CRISP system [4], which is an approach to generate natural language as a planning problem. the CRISP system can generate individual noun phrases.

FF

Evaluation

3 Project Management

Task to Accomplish:

- Setup the client, NLG server and the matchmaker.
- Understand their NLG system implementation.
- Make a hierarchical planner version of their NLG system.
- Compare the results.

Timeline:

March

Setup the client, NLG server and the matchmaker.

March

Understand their NLG system implementation.

April

Make a hierarchical planner version of their NLG system.

April

Compare the results.

May

Write summary paper.

4 Conclusion

We will try to rebuild the GIVE-2.5 challenge evaluation system. We also pick up the Potsdam NLG system which use AI planning techniques. We try to compare hierarchical planner with their conventional fast forward search (FF).

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