**KR & R Proposal idea**

# *Who is in your group?*

Michael Cantu, Brandon Harris, Kelly Wachtel and Souvik Bagchi.

# *What is the goal of your project?*

Our group has decided to create an autonomous maze solver. We want to create an agent that will traverse a maze and store any relevant information that it observes into a knowledge base. With that information, it will determine if the maze is tractable, find the quickest path if it is, and record those instructions. It is possible to build a maze solver that does not use any knowledge storage and operates in a perfectly deterministic algorithmic way. However, such a maze solver cannot determine if a maze is tractable nor relay the quickest path through the maze for future reference, and we plan for our solver to implement this functionality through knowledge representation.

# *What related work has already been done?*

Malmo is widely used in a number of similar small research project. There is even a maze solver that a group created; it, however, takes a very different approach than we do. Their maze solver is a reinforcement learning algorithm without any base knowledge of the mechanics of the maze and only receives feedback as it repeatedly throws itself into the lava that serves as the maze’s boundary.

# *What Sources of knowledge will you use?*

We don’t have to use additional sources of knowledge. A maze solver only needs to know information about the maze it is solving, which it will accumulate and record as it proceeds through the maze. Any information about mazes generally will be simple enough so as to be recorded in the form of an algorithm.

# *What tools will you need/use?*

We will be using Project Malmo, ActorSim Malmo Connector, and Companions. Project Malmo is an experimentation platform for artificial intelligence research on top of the game Minecraft. Malmo Connector can connect Malmo to Companions, a framework in which we can store the knowledge our solver gains as it traverses the maze. It is important to note that the current plan for the algorithm is to use a simple DFS-style maze traversal technique, treating all forks in the maze as branching points in the “tree.” Leaf nodes represent either dead ends or the maze exit. The knowledge representation comes in the form of storing our knowledge of the most efficient path through the maze.

# *What steps do you plan to take to complete your project?*

1. Malmo has a random maze generation tool already called *MazeDecorator*. We first need to figure out how to use it and possibly adjust it for our specific needs.
2. We will install all the software we plan to use. We have access to two Windows machines, which will be necessary to use Companions, as it does not run on MacOS.
3. We need to integrate our agent’s behavior algorithm.
4. We need to plan the format of the information we store in our knowledge base.
5. We need to integrate the knowledge base and insert information into it based on what the agent “sees” in the game.
6. We need to test edge cases for bugs, clean up code, and make our outputs convenient and human-readable.

## Who is responsible for each step?

Souvik will be working on how to implement the ActorSim Malmo connector with

Malmo. Kelly will be working on how to format the information that we store in our knowledge base. Brandon and Michael will be working on the maze traversal technique. All of us will be responsible for creating the knowledge base that comes from knowledge representation, as well as working on edge cases.

## What deadlines are you setting for yourself?

Installing all the software, and figuring out how to implement the maze generator we plan on having done by February 15th. The Maze traversal and completion of our information that we store on the knowledge base due by March 1st.

We would like to complete our integration of the knowledge base and testing our edge case by March 8th.

# *What obstacles do you foresee in your project?*

Irina has informed us that Malmo Connector may have some bugs. These bugs may affect our workflow.

## How will you overcome them?

Since Irina was part of the creation of the Connector software, we plan to coordinate with her should we come across any errors.

## b. What are your backup plans for if you can’t?

If Irina can’t solve the bugs we come across, we will consult with her as to our recourse. There will probably some other functionality or direct implementation in Malmo we can use to bypass any bugs in Malmo Connector.