

TJHSST Senior Research Project

Proposal: Map Navigation Using A* Search

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Abstract

I'm hoping to create a program that can interpret a map with connected intersections and places. The program will then be able to find the shortest path between different places on the map using A* search. The ultimate version of this program will be able to interpret different speed limits and traffic jams to determine the fastest path to the target rather than simply the shortest.

Keywords: A* Search, Artificial Intelligence

1 1st Quarter

Initially, I'll work with inputs of lists of intersections and paths and familiarize myself with A* Search and I'll plan how to implement traffic jams and speed limits on the map. By the end of first quarter I'm hoping to have a text-based program with a list of locations and distances that can calculate both the shortest and the fastest paths through the map (from one endpoint to another) without the added complications of traffic jams and varying speed limits.

I'm planning on using the Python programming language to simplify coding and focus on the abstract nature of the problems that I'll be dealing with. The syntax is simple, and the language provides a large amount of tools, which will prove useful in the process of writing the program. Also, because it is an interpreted language, it uses fewer resources than Java.

2 3rd Quarter

By the end of third quarter I will have implemented a UI to display the fastest and shortest paths. In addition, my program will be able to take in a variety of inputs, including (possibly) image inputs of abstract maps. Things such as speed limits and traffic jams will be implemented. The most important piece of the program will be the AI - it will be searching for good paths in a smart manner rather than recursing through all of the possible paths and finding the shortest times.

3 Background

Types of research include:

1. A* Search

- This will include research of similar pathfinding programs and searches, most of which are based on the A* search.
- Research used to answer a specific question, determine why something failed or succeeded, and solve a specific, pragmatic problem. This will be especially useful while I'm learning the concept.

2. Artificial Intelligence

- Research in this area will be very useful once i get into more complex algorithms where traffic speed will be considered.