Final Project Proposal

by

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The final project for Comp Sci 3200 is to take one of the many topics taught in the course and expand upon its scope and apply it to a more complicated domain than the one explored in the assignments. After some deliberation between the group members, we concluded that the algorithm we wish to elaborate upon is A\* path-finding. We feel that A\* is a truly powerful algorithm which has lots of potential for growth outside of what we were able to explore in the assignments. As such we plan to take the scope of A\* and expand on it to try and explore the complicated tasks A\* can handle.

When creating our plan to broaden A\* we had to consider elements that would not only broaden the scope of A\* search, but also provide us with a challenge as we try to grow the algorithm. The first thing we plan to incorporate into our assignment is a health system. On our map there will be tiles that will remove some health from the agent when they are crossed. This will force us to expand our heuristic to not only consider the shortest paths, but the ones that won’t kill the agent. Second, we plan to incorporate one way only tiles. This means that on our map, some tiles will only be able to be traversed in one direction (i.e. a bridge can only be crossed from east to west). As such, our heuristic will need to be able to read this data from the map and not attempt to traverse tiles in the opposite of their direction. Our third challenge will be to incorporate tiles with a different movement speed than normal, some tiles would be slower, others faster. This will force us to not only incorporate different weights for tiles with different speeds, but train our heuristic to not just search for the path with the least amount of tiles. As paths that have more tiles, but more fast tiles, may take less time to traverse than shorter paths if those shorter paths are all normal or slow tiles. On top of all of these other changes, we also plan to incorporate maps that are larger than those explored in the assignments. While all of the other changes will require us to create a more innovative heuristic that is able to take all of the above considerations into account, the larger maps will bring forth a completely different set of challenges. The larger maps mean our search space is vastly increased, which means that we will need to ensure that our algorithm is very efficient in its performance, as it needs to be able to complete the searches in the larger map space in a reasonable amount of time. Our project will be implemented solely in JavaScript. JavaScript’s ability to easily create a user interface, and run across multiple platforms without much work will allow our project to be tested and developed with relative ease. Furthermore, being able to write the GUI quickly will increase the amount of time we can spend working on the A\* implementation.

Our group consists of the same members that worked together to complete the course assignments 3, 4 and 5. They are: Matthew English, Taswaf Rahman and Yuchen Zhang. As we already have much experience working together, we feel the learning curve to adjust to each other’s code practices will be low. Furthermore, the low adjustment time to working together will help us get to working productively on the project sooner, which gives us more time to make optimizations and improve our code.