Assignment 02: Pathfinding

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Objectives

- Implement a pathfinding algorithm to determine the lowest cost necessary to create roads from my Martian city to every other Martian city.

Specifications

- The cost of building a road from one tile to another was one plus the change in height squared.

- The road was to start just inside my city and travel to just inside another city. It could not travel through any other cities along its path.

Approach

- Continuous application of Dijkstra's Algorithm until every city was reached.
- When new tiles were reached, they were added to the fringe ordered by lowest cost so that the minimum would not have to be searched for each time, as it would always be at the front.
- Cities were not considered unless they were touched by the road.

Problems

- The insertion into the fringe initially sorted the reverse of the intended way.

- Cities were trespassed on.

- Cities were then never entered.

- Cities were then entered wrong.

- Cities were finally fixed, except for one, whose path became invisible briefly.

Solutions

- A sign error was fixed in the sorting.
- The "do not enter" zones were fixed to align with the cities.
- A method for entering cities was created.
- The method for entering cities was fixed.
- The path drawing method was fixed.

Results

Starting City	Ending City	Road Cost
Jacksonville	OldSquirrelTown	1087
Jacksonville	PlainsOfAshford	1417
Jacksonville	CarrotCake	3985
Jacksonville	Brockville	4150
Jacksonville	MartianHub	4457
Jacksonville	Williamsberg	5635
Jacksonville	AceHill	5966
Jacksonville	Jaranohr	6961
Jacksonville	LazyTown	8915
Jacksonville	Louisville	9626
Jacksonville	GiveMeASecond	10007
Jacksonville	SquirrelTown	12243

Results, Continued

- The first city was found after about 2 minutes
- The last city was found after about 50 minutes
- The longest gap between finds was about 15 minutes, between Jaranohr and LazyTown

Results Image
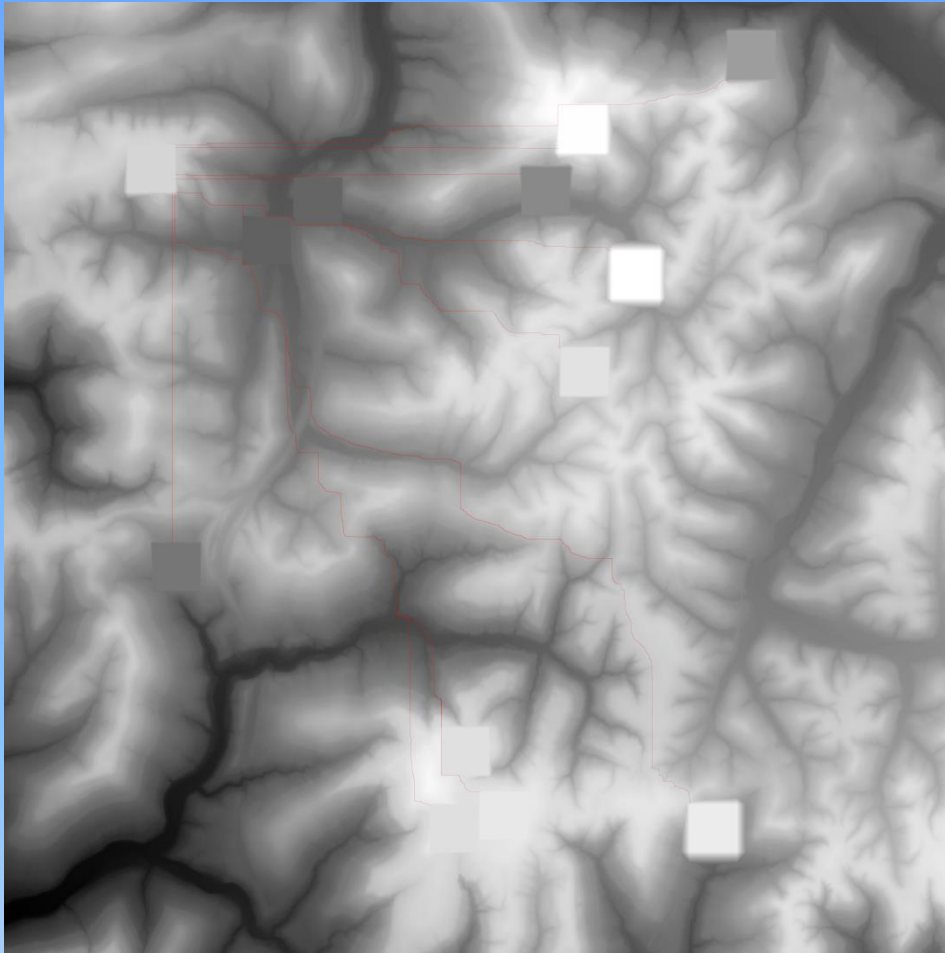
Paths are small but highlighted in bright red

Potential Improvements

- A-Star pathfinding to each city could potentially be faster, more testing is necessary.

- Optimize insertion into the fringe, possibly through binary heaps.

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