HW4 - Project Extension

Team 18
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Drone Battery

What is it?

A real life drone runs on a battery that will eventually run out and the drone will have to be recharged before it can start to deliver packages again. We added this element of realism to the simulation to increase the applicability of our simulation to a real world scenario where drones are used to deliver packages.

Using the decorator and factory patterns, we created a battery station factory class to create recharge stations around the map. We also created a battery decorator class that is wrapped around the original drone object, and adds functionalities like a charge variable and functions to path to the nearest recharge station when battery levels are low.

Why is this new feature important?

This feature adds significant business value to our simulation project because a battery indicator and recharge functionality are crucial for a drone delivery system to work in the real world, where drones do not have an infinite power source. This added functionality will allow businesses to be more confident in this system by accounting for one of the largest potential problems with drone delivery.

Drone Battery Demo

Automated Testing / Data Collection

What is it?

The automated testing was developed together with the data collection to make the process of gathering valuable data from the simulation more streamlined. The client can specify how many battery stations they would like to simulate and then run the tests accordingly. This testing operates on the front-end, utilizing the schedule page to generate randomized locations for both the robot and the package. These randomized locations will be used to schedule deliveries for each of the pathing algorithm.

For each delivery, the start and stop times will be recorded by the Singleton and written to an output csv file.
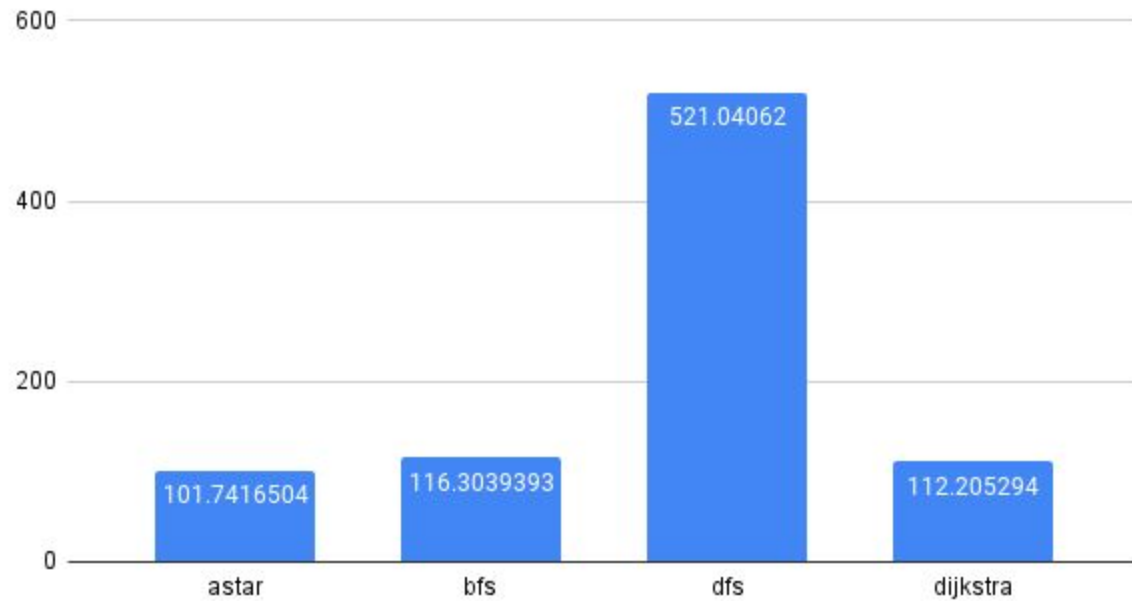
Why is this new feature important?

In a business setting, company stakeholders/clients will be able to use the singleton data to see how many battery stations and which strategies are most optimal for delivering packages. It also provides an expansive way to collect data and test deliveries within our simulation. With the usage of randomized testing a user can create a multitude of different scenarios and test the capabilities of the drones delivery process.
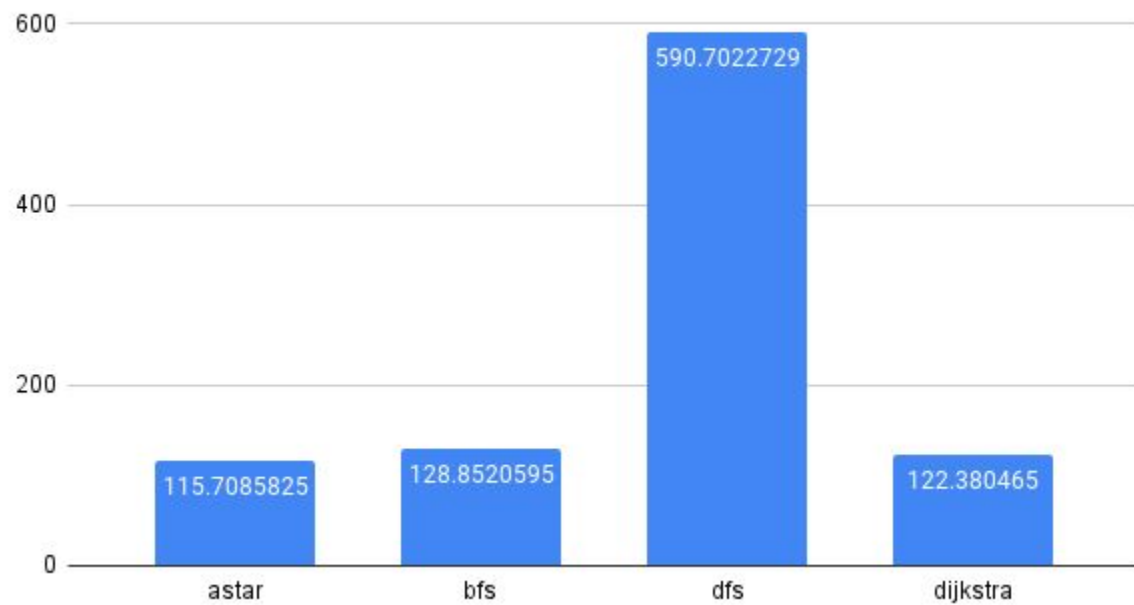
Automated Testing Demo
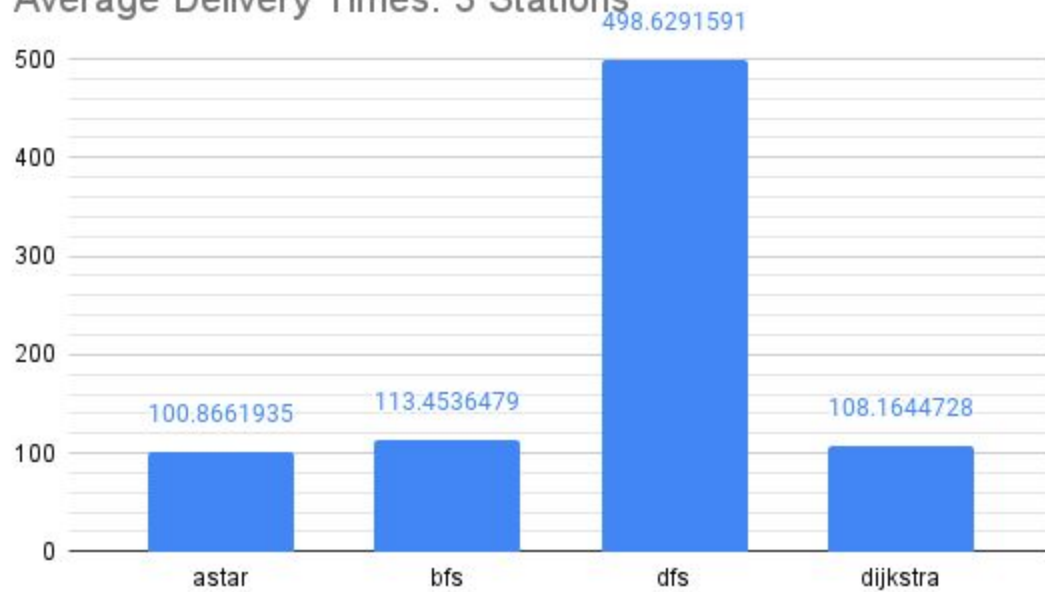
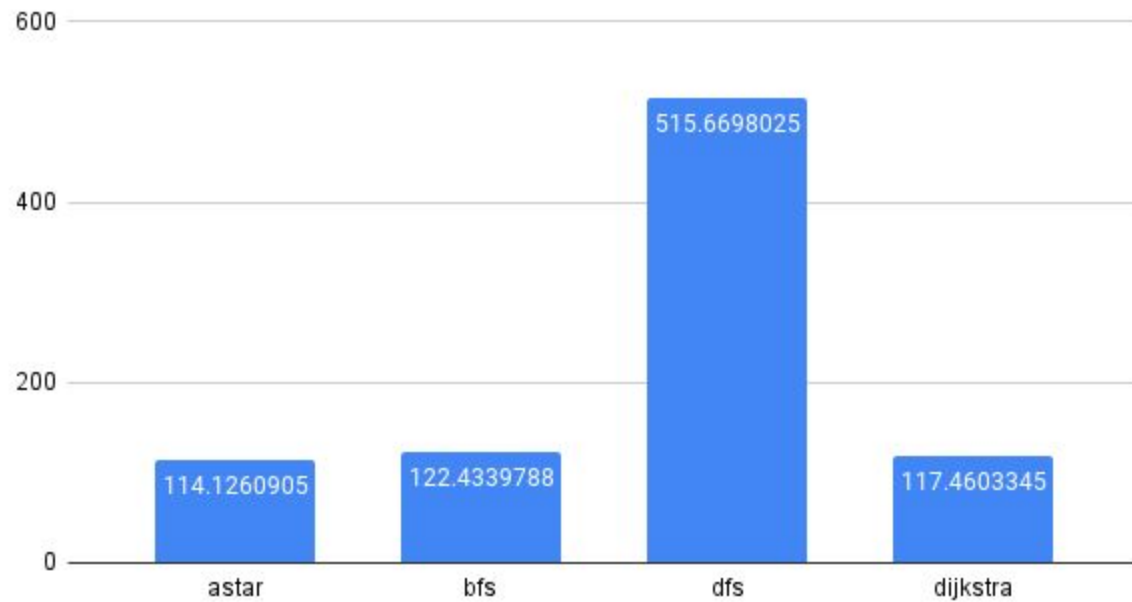# Data Collection Results

Average Delivery Times: 1 Station

astar	101.7416504
bfs	116.3039393
dfs	521.04062
dijkstra	112.205294

Average Delivery Times: 2 Stations

astar	115.7085825
bfs	128.8520595
dfs	590.7022729
dijkstra	122.380465

Average Delivery Times: 3 Stations

Average Delivery Times: 4 Stations

astar	bfs	dfs	dijkstra
114.1260905	122.4339788	515.6698025	117.4603345

Average Delivery Times: 5 Stations