Steven Law

Project 3 Report

Memory Structure

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| Retrieval | FIFO | LIFO | Random | Closest-First |
| 40% | 285.01 | 510.301 | 626.176 | 610.926 |
| 60% | 543.446 | 598.366 | 536.715 | 653.813 |
| 80% | 611.750 | 714.065 | 740.808 | 729.133 |

For this series of experiments, I ran 20 trials of the robot simulation of each memory structure and for each retrieval probability. As expected, the lower retrieval probability resulted in an overall lower average of distance traveled. The only exception was the Random memory structure. This can possibly be explained to the random nature of the memory retrieval causing anomalies among the results. However, the difference was not drastic, so it is a reasonable result.

In terms of individual memory structures, the Closest-First memory had consistently higher distances than the other memory structures. This is due to the fact that the robot sought after the closest energy source in its hungry state, which means less energy expended getting to the source. This will allow the robot to travel further because it will not lose too much energy trying to reach any particular energy source. On the other hand, the other memory structures do not utilize this method and so the robot will occasionally walk extremely long distances to reach an energy source and thus, putting it into the inactive state sooner. Between LIFO and FIFO memory, the LIFO memory had higher averaged distances because the robot would go for the most recently detected energy source, which is usually the closer energy source compared to its FIFO counterpart. The Random memory structure was truly random in that it had very good runs as well as very poor runs.

In all, the distance traveled by the robot depended a lot on how many energy sources were close to its starting point as that often determined the success of the run. However, the best overall memory structure for the robot was the Closest-First structure, followed by either Random or LIFO (I would give the edge to LIFO for consistency), and lastly FIFO.