

Cover Letter – Data Structures

There are five groups of files in my program:

- dijkstra.cpp and dijkstra.h, which store the functions to find the shortest path using Dijkstra's algorithm. They contain the findShortestDistance function, which returns an int, in addition to some helper functions to deallocate memory and to look up priorityQueue entries. It also contains the dijkstraList class, which is the list used to keep track of previously visited vertices and weights for each vertex.
- graph.cpp and graph.h, which contain the graph class which contains the graph class that contains the vertices and allows for operations on vertices.
- main.cpp and main.h, which read the files into the graph and do other driver "things."
- pQueueEntry.cpp and pQueueEntry.h, which contain the pQueueEntry class, which contains the "from" vertex, "to" vertex, and a number for weight that allows for comparison between pQueueEntry entries.
- priorityQueueDijkstra.cpp and priorityQueueDijkstra.h, which contains the binary heap-based implementation for the priority queue
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Efficiency

- I made the programs more efficient by using array-based implementations for most of the lists used, allowing for constant access time. I also used a binary heap implementation for the priority queue used in the algorithm,, which is both time and space efficient.

Report:

For the first set of test inputs, my program gives the result of 7, while for the second set of test inputs, my program gives the result of 629.

Most Rewarding: I think that the most rewarding project were projects 3a and 3b.

Most Frustrating: I think that the project I found to be most frustrating was this current project, as it requires knowledge of how to implement many different data structures: priority queue, binary heap, resizable lists, and knowledge of how to implement dijkstra's algorithm.

I Growth: I think that the thing which data structures taught me most was how to work with memory in c++ through pointers better.

Future changes: I think that one thing which would help future students would be to give them a "tool kit" or "cheat kit" to use for projects if they have already covered the given skills. For example, if one project teaches students how to build a resizable array, then students should be allowed to simply use a vector in subsequent projects – this way, less time is spent just doing work that has already been done.