SC2001/CE2101/CZ2101 ALGORITHM DESIGN AND ANALYSIS

Project 2: The Dijkstra's Algorithm

In the Dijkstra's algorithm, the choice of the input graph representation and the priority queue implementation will affect its time complexity.

(a) Suppose the input graph G = (V, E) is stored in an *adjacency matrix* and we use an *array* for the priority queue. Implement the Dijkstra's algorithm using this setting and analyze its time complexity with respect to **|V|** and **|E|** both theoretically and empirically.

(b) Suppose the input graph G = (V, E) is stored in an *array of adjacency lists* and we use a *minimizing heap* for the priority queue. Implement the Dijkstra's algorithm using this setting and analyze its time complexity with respect to **|V|** and **|E|** both theoretically and empirically.

(c) Compare the two implementations in (a) and (b). Discuss which implementation is better and in what circumstances.

1. Code
2. Input data
3. Output graphing
4. Time complexity calculations (theoretical)
5. Time complexity analysis (experimental and comapre with theoretical)