

CS 1203: Data Structures

Semester: Monsoon 2023

Assignment #5

Instructor: Subhamoy Mitra

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Time complexity

In the implemented Floyd-Warshall algorithm, in which we computed all pair shortest paths and stored parent information, the auxiliary space complexity is influenced by the following factors:

Distance Matrix: The dist matrix having size $V \times V$, where V is the number of vertices stores the shortest path distances between all pairs of vertices. As a result, its space complexity is $O(V^2)$.

Parent Matrix: The parent matrix also has a size $V \times V$. This matrix stores information about the intermediate vertices on the shortest path between any two given vertices. This matrix thereby also has a space complexity of $O(V^2)$.

Both matrices contribute to the auxiliary space complexity. Therefore, the total auxiliary space complexity of the program is $O(V^2 + V^2)$, which simplifies to $O(V^2)$ as we carry out the operation at once.