

Shortest Paths

- Definitions
- Single Source Algorithms
 - Bellman Ford
 - DAG shortest path algorithm
 - Dijkstra
- All Pairs Algorithms
 - Using Single Source Algorithms
 - Matrix multiplication
 - Floyd-Warshall
 - Both of above use adjacency matrix representation and dynamic programming
 - Johnson's algorithm
 - Uses adjacency list representation

Single Source Definition

- Input
 - Weighted, connected directed graph $G=(V,E)$
 - Weight (length) function w on each edge e in E
 - Source node s in V
- Task
 - Compute a shortest path from s to all nodes in V

All Pairs Definition

- Input
 - Weighted, connected directed graph $G=(V,E)$
 - Weight (length) function w on each edge e in E
 - We will typically assume w is represented as a matrix
- Task
 - Compute a shortest path from all nodes in V to all nodes in V