

Shortest Path: Supplemental Notes

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1 Algorithms for Shortest Path

Table 1: Algorithms for Shortest Path

Single/All	Data Structure	Algorithm	Running Time
Single-Source	unweighted graph	BFS	$O(V + E)$
Single-Source	non-negative weighted graph	Dijkstra (Fibonacci Heap)	$O(E + V \lg V)$
Single-Source	weighted graph	Bellman-Ford	$O(VE)$
Single-Source	DAG	Topological Sort + 1 round of Bellman-Ford	$O(V + E)$
All-Pairs	unweighted graph	BFS for each vertex	$O(VE)$
All-Pairs	non-negative weighted graph	Dijkstra for each vertex (Fibonacci Heap)	$O(VE + V^2 \lg V)$
All-Pairs	weighted graph	Floyd-Warshall	$\Theta(V^3)$