Algorithm Time Complexities Summary

Algorithm	Best Case	Average Case	Worst Case	Notes
Huffman	O(n)	O(n log n)	O(n log n)	Greedy heap
DFS (Adj List)	O(V + E)	O(V + E)	O(V + E)	Graph traversal
DFS (Adj Matrix)	$O(V^2)$	$O(V^2)$	$O(V^2)$	Graph traversal
BFS (Adj List)	O(V + E)	O(V + E)	O(V + E)	Level-order traversal
BFS (Adj Matrix)	$O(V^2)$	$O(V^2)$	$O(V^2)$	Level-order traversal
Cycle Detection	O(V + E)	O(V + E)	O(V + E)	DFS or Kahn’s algo
Prim (Matrix)	$O(V^2)$	$O(V^2)$	$O(V^2)$	Simple implementation
Prim (Heap)	O(E log V)	O(E log V)	O(E log V)	Binary heap version
Kruskal	O(E log V)	O(E log V)	O(E log V)	Sort edges + Union-Find
Dijkstra (PQ, List)	O(E + V log V)	O(E log V)	O(E log V)	Priority queue (binary heap)
Dijkstra (Simple)	$O(V^2)$	$O(V^2)$	$O(V^2)$	No heap version
Bellman–Ford (List)	O(E)	O(VE)	O(VE)	Edge relaxation V–1 times
Bellman–Ford (Matrix)	$O(V^2)$	$O(V^3)$	$O(V^3)$	Dense graph
Radix Sort	O(nk)	O(nk)	O(nk)	k = number of digits
Bucket Sort	O(n + k)	O(n + k)	$O(n^2)$	Depends on distribution
Counting Sort	O(n + k)	O(n + k)	O(n + k)	Range-based linear sort
Naïve String Match	O(n – m + 1)	O(nm)	O(nm)	Brute force substring search
Rabin–Karp	O(n + m)	O(n + m)	O(nm)	Hashing-based search
KMP	O(n + m)	O(n + m)	O(n + m)	Prefix table-based linear search