

# Algorithmic Analysis for the 3 Common Graph Representation Types

## Adjacency List

Graph Operation	Time Complexity	Space Complexity
add_node	$O(1)$	$O(1)$
add_edge	$O(1)$	$O(1)$
remove_node	$O(V)$	$O(1)$
remove_edge	$O(E)$	$O(1)$
check_existence	$O(1)$	$O(1)$
find_neighbours	$O(1)$ (average)	$O(V)$
visualize_graph	$O(V+E)$	$O(V+E)$

## Adjacency Matrix

Graph Operation	Time Complexity	Space Complexity
add_node	$O(n)$	$O(1)$
add_edge	$O(1)$	$O(1)$
remove_node	$O(n^2)$	$O(n^2)$
remove_edge	$O(n^2)$	$O(n^2)$
check_existence	$O(1)$	$O(1)$
find_neighbours	$O(n)$	$O(1)$
visualize_graph	$O(n^2)$	$O(n^2)$

## Edge List

Graph Operation	Time Complexity	Space Complexity
add_edge	$O(1)$	$O(1)$
remove_node	$O(n)$	$O(n)$
remove_edge	$O(n)$	$O(n)$
check_existence	$O(n)$	$O(1)$
find_neighbours	$O(n)$	$O(n)$
visualize_graph	$O(n)$	$O(n)$