Time Complexity

Adjacency Lists

Pros

- Space-efficient when a graph is sparse
- Can be modified to support many graph variants
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Complexity

Space $\Theta(V^2)$

Time $\Theta(1)$

Checking if an edge $(u, v) \in G$ takes $\Theta(1)$
Listing all neighbors of a vertex takes $\Theta(V)$
Listing all edges takes $\Theta(V^2)$

	Space	Edge Check	List all neighbors	List all edges
Adjacency List	$\Theta(E+V)$	$O(degree(u))$	$\Theta(degree(u))$	$\Theta(E+V)$
Adjacency Matrix	$\Theta(V^2)$	$\Theta(1)$	$\Theta(V)$	$\Theta(V^2)$

Adjancy list representation is suited to spares graphs ($E << V^2$)
Adjacency matrix representation is suited to dense graphs $E \approx V^2$