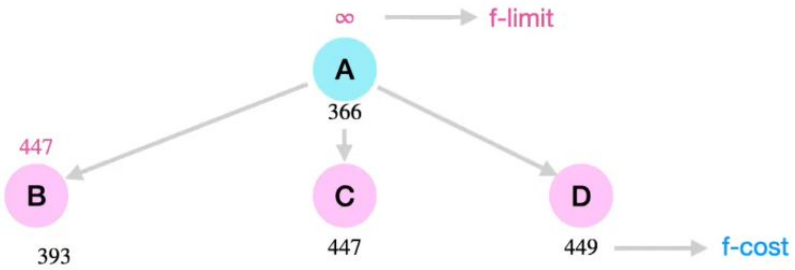
IDA* and RBS-A*

AI by Anupam Purwar

Recursive Best First Search



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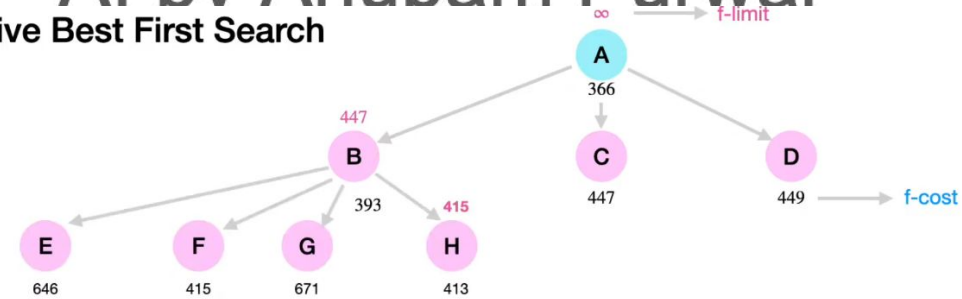
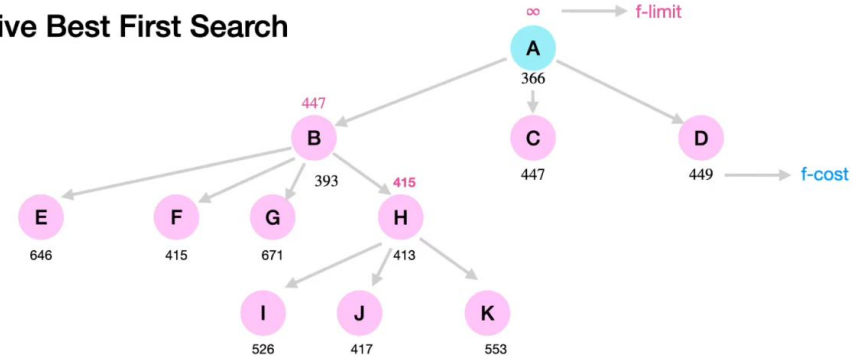


Recursive Best First Search



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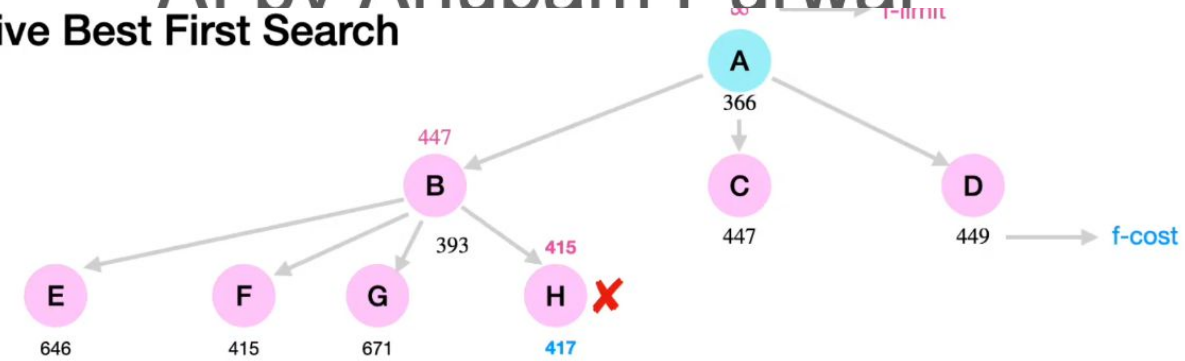
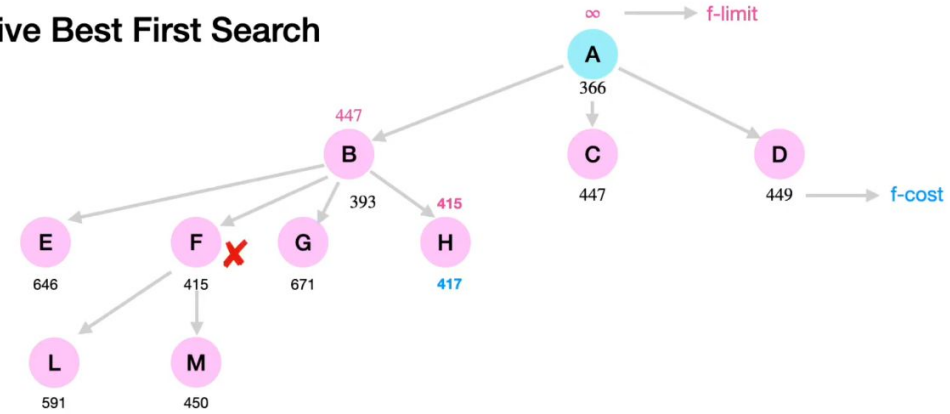
Recursive Best First Search



Recursive Best First Search



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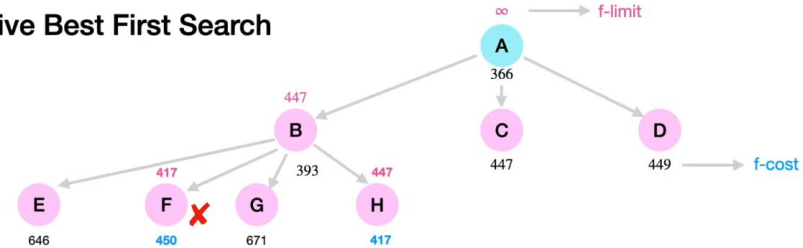
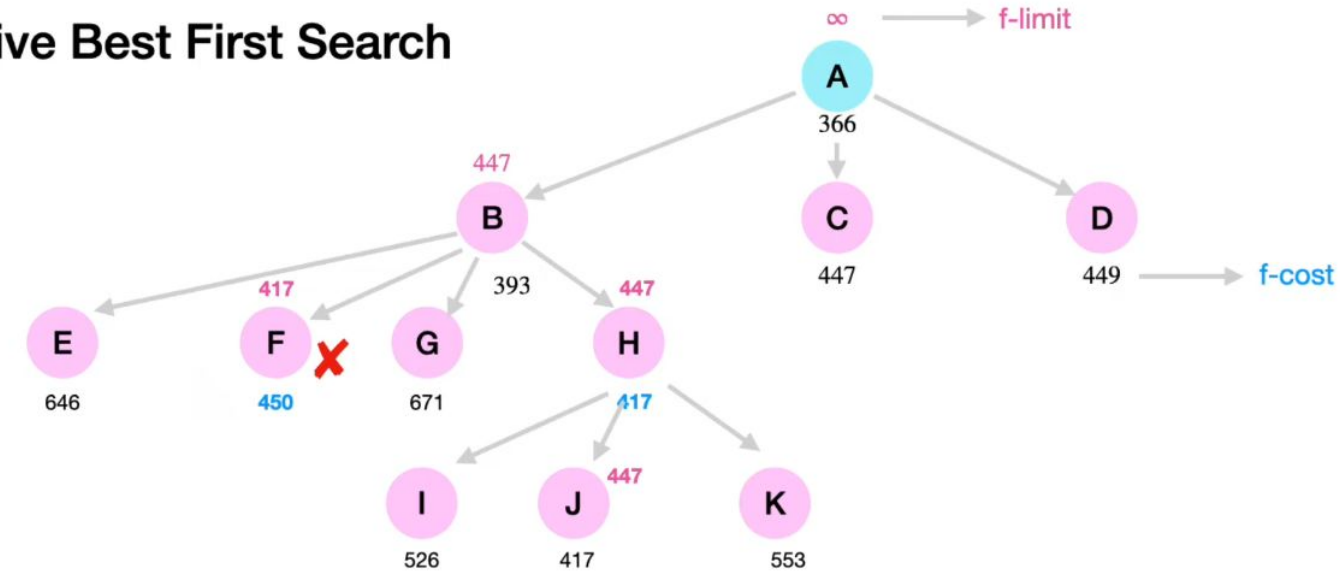
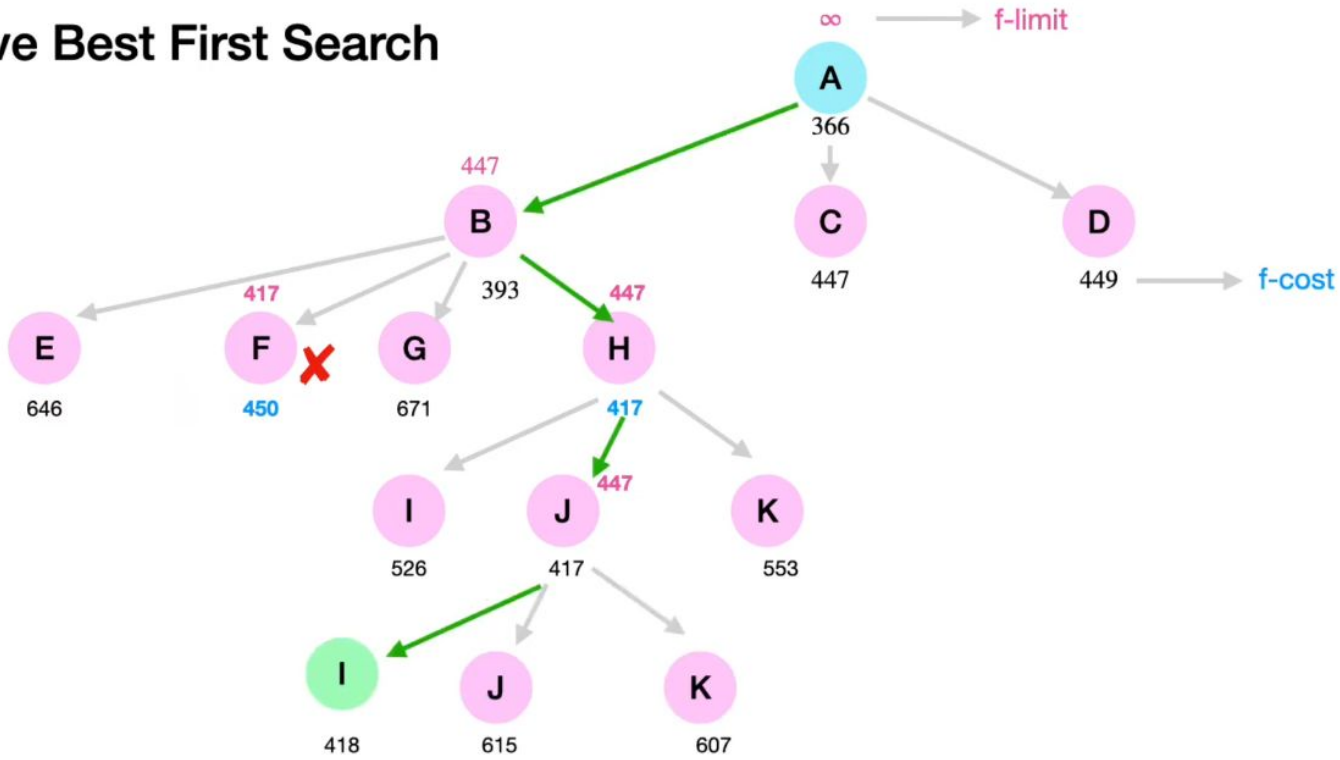


Recursive Best First Search



Recursive Best First Search



Time and space complexity of algorithms: IDA*, RBFS, BFS, DFS

- **IDA*** (Iterative Deepening A*)
- **Recursive Best-First Search** (RBFS)
- **Breadth-First Search** (BFS)
- **Depth-First Search** (DFS)

Algorithm	Time Complexity	Space Complexity	Complete	Optimal
IDA*	$O(b^d)$	$O(d)$	Yes	Yes (with admissible heuristic)
Recursive Best-First Search (RBFS)	$O(b^d)$ (can be more in practice)	$O(bd)$	Yes (with admissible heuristic)	Yes (with admissible heuristic)
Breadth-First Search (BFS)	$O(b^d)$	$O(b^d)$	Yes	Yes (if all step costs are equal)
Depth-First Search (DFS)	$O(b^m)$	$O(m)$	No	No

Notes”

b = branching factor

d = depth of the shallowest goal node

m = maximum depth of the search tree

IDA* and RBS-A*

IDA* and **RBFS** are informed search algorithms, using heuristics.

DFS and **BFS** are uninformed (blind) search algorithms.

DFS can get stuck in infinite paths in infinite-depth spaces (hence not complete).

BFS can consume a lot of memory, making it impractical for large search trees.

IDA* combines the space efficiency of DFS with the optimality of A*.