# 1.2 Searching Your World (Search Techniques)

## Problem Formulation

* Define initial state, actions, transition model, goal test, path cost
* Explain why search is necessary in your world

## Uninformed Search Techniques

Select and describe three techniques:

### Breadth-First Search (BFS)

* Complete, optimal (if step cost = 1)
* Time/space complexity:

### Uniform-Cost Search

* Optimal for varying path costs
* Uses priority queue based on path cost

### Depth-First Search (DFS)

* Low memory usage
* May not be complete or optimal

## Informed Search Techniques

Select and describe three techniques:

### Greedy Best-First Search

* **Evaluation function**: Fast but not always optimal
* Uses only the heuristic to estimate closeness to goal.
* Pros: Fast, low memory usage.
* Cons: Not optimal or complete.
* Use case: When speed is more important than optimality.

### A Search\*

* **Evaluation function**:
* Combines actual cost so far and estimated cost to goal.
* Pros: Complete, optimal (if heuristic is admissible and consistent).
* Cons: High memory usage.
* Use case: When optimal paths are needed and memory is sufficient.

### Recursive Best-First Search (RBFS)

* Evaluation function: Same as A\*, but uses linear memory.
* Pros: Optimal with admissible heuristic, memory-efficient.
* Cons: May re-expand nodes, time complexity hard to characterise.
* Use Case: When memory is constrained but optimality is desired

## Performance Evaluation

* Compare techniques using:
  + Completeness
  + Optimality
  + Time complexity
  + Space complexity
* Use experimental results (tables/graphs)

# Conclusion

* Summarize key findings
* Reflect on agent suitability and search efficiency
* Suggest improvements or future work