# Introduction to Artificial Intelligence

Syllabus: Unit 2: Problem Solving Methods [12 Hrs]

- 2.1 Definition of a Problem, Problem as a state space representation, Problem formulation, Well-defined problems, Constraint satisfaction problem, Water jug problem-Queen problem, Cryptarithmetic problem, Graph coloring problem

- 2.2 Problem solving by searching, types of searching, measuring problem solving performance, General State Space Search

- 2.3 Uninformed: Breadth-First Search, Depth-First Search, Depth-Limited Search, Iterative Deepening depth first Search, Bidirectional Search, using uninformed search techniques for solving N-Queens Problem, Puzzle problem etc.

- 2.4 Informed search: Greedy Best-First Search, A* Search, Optimality of A*, Local search: Hill Climbing, Simulated Annealing,

- 2.5 Game Playing, Optimal Decisions in Games, Alpha — Beta Pruning, Minimax Algorithm, Tic-Tac —Toe Problem, Stochastic Games

Search or planning Agents are agents that plan ahead
Evaluates how the model evolves based on the future action sequence
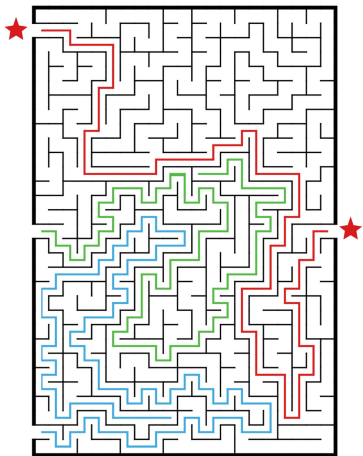
- Model how the world evolves in response to action
- Agent evaluates future action sequences
- Usually have a definite goal
- Optimality is to achieve least cost path

Problem Formulation:

A search Problem consists of :

- A state space S
- An initial state s_0
- Actions $A(s)$ in each state
- Transition model Result(s,a)
- Goal Test G(s)
- Action cost c(s,a,s')

Solution of search problem is an action sequence that reaches a goal state.
An optimal solution has least cost among all solutions.