



**SNS COLLEGE OF ENGINEERING**  
**Kurumbapalayam (Po), Coimbatore – 641 107**  
**AN AUTONOMOUS INSTITUTION**



Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

**Department Name: Artificial Intelligence and Data Science**  
**Course Code & Name: 23ADT202& Artificial Intelligence Laboratory**  
**Semester & Year: 3th Semester & 2 nd year (A&B)**  
**Faculty name:Gulshan Banu.A**

## UNIT 2 puzzles

### 1. Maze Solver with Weighted Paths

- **Puzzle:** A maze with paths that have different "costs" associated with them. The goal is to find the least costly path from start to finish.
- **Heuristic:** Use the shortest distance to the goal while also considering the cost of each path.

### 2. 8-Puzzle

- **Puzzle:** A sliding puzzle with a 3x3 grid containing 8 numbered tiles and one empty space. The objective is to move the tiles until they are in numerical order.
- **Heuristic:** Use the Manhattan distance (the sum of the distances of each tile from its goal position) to estimate the number of moves needed.

### 3. Traveling Salesman Problem

- **Puzzle:** A map with several cities. The goal is to find the shortest route that visits each city exactly once and returns to the starting city.
- **Heuristic:** Use the nearest neighbor heuristic, where the next city chosen is the closest unvisited one.

### 4. Robot Navigation

- **Puzzle:** A robot needs to navigate from one corner of a grid to another, avoiding obstacles.
- **Heuristic:** Use the A\* algorithm, combining the cost to reach a node with the estimated cost to the goal, often using the Manhattan distance as the heuristic.

### 5. Sudoku Solver

- **Puzzle:** A classic 9x9 Sudoku grid where the goal is to fill in the missing numbers according to the rules.

- **Heuristic:** Use constraint propagation and the minimum remaining value heuristic, choosing the cell with the fewest possible numbers remaining.

## 6. Word Ladder

- **Puzzle:** Transform a given word into another word by changing one letter at a time, with each intermediate step also being a valid word.
- **Heuristic:** Use the number of letters that differ between the current word and the target word as a heuristic to guide the search.

## 7. Knight's Tour

- **Puzzle:** A chessboard where a knight must visit every square exactly once.
- **Heuristic:** Use Warnsdorff's rule, which prioritizes squares with the fewest onward moves to reduce backtracking.

## 8. Queens on a Chessboard (N-Queens Problem)

- **Puzzle:** Place N queens on an  $N \times N$  chessboard so that no two queens threaten each other.
- **Heuristic:** Use the minimum conflicts heuristic, placing each queen in a way that minimizes the number of conflicts with other queens.

## 9. Treasure Hunt

- **Puzzle:** A grid with hidden treasures and obstacles. The player must find the shortest path to collect all treasures.
- **Heuristic:** Use the A\* algorithm with a heuristic based on the distance to the nearest treasure and the number of treasures remaining.

## 10. Puzzle Cube Solver (Rubik's Cube)

- **Puzzle:** Solve a Rubik's Cube, returning all sides to their original color.
- **Heuristic:** Use a heuristic that estimates the number of moves needed to solve each face, prioritizing moves that bring more tiles into alignment.