# Artificial Intelligence and Machine Learning (CS52)

## Term: October 2024 – Jan 2025

## Unit 1 - Problems

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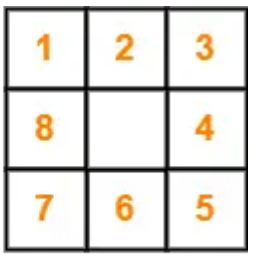
1. Write the PEAS description and task environment characteristics for:
   - Robot vacuum cleaner operating in a household setting.
   - Automated medical diagnostic system for identifying skin cancer.
   - Voice-activated personal assistant (like Siri or Alexa) in a smart home.
   - Stock trading bot designed to maximize returns on stock investments.
   - Agricultural robot responsible for monitoring and optimizing crop growth in a farm field.
   - Speech-based language translation app for real-time conversation translation.
   - Search and rescue drone designed for locating people in a disaster-stricken area.
   - Recommendation system that suggests movies or TV shows to users based on their preferences.
   - AI-driven chatbot for customer service that assists users with common questions and issues.
   - Intelligent traffic management system that controls traffic lights to reduce congestion in a city.
   - Facial recognition system used for security purposes in airports.
   - AI-powered news aggregator that curates personalized news feeds for users.
   - Automated plant-watering system for indoor plants in a greenhouse.
   - Real-time game-playing AI agent designed to play chess against human players.
   - self-driving car navigating urban traffic.
2. Given an initial state of a 8-puzzle problem and final state to be reached-

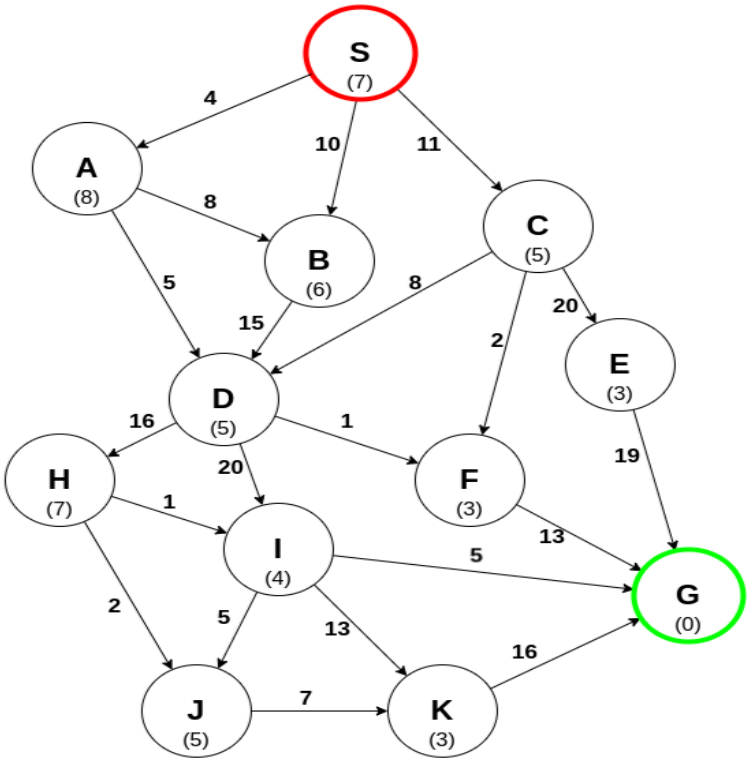

Initial State




Final State

Find the most cost-effective path to reach the final state from initial state using A* Algorithm. Consider g(n) = Depth of node and h(n) = Number of misplaced tiles.

3. Consider the following graph to find the shortest path from **S** to **G** using A* Algorithm:




4. Consider the following graph. The numbers written on edges represent the distance between the nodes. The numbers written on nodes represent the heuristic value. Find the most cost-effective path to reach from start state A to final state J using A* Algorithm.