PAK-AUSTRIA FACHHOCHSCHULE:
INSTITUTE OF APPLIED SCIENCES AND TECHNOLOGY

Lab Task
Beam Search Algorithm
(AI Green)

Question 1:

Apply Beam Search to find the shortest path in a weighted grid.

Requirements:

- Represent the grid as a 2D array where each cell has an associated cost.
- Implement Beam Search to find the path from a start cell to a goal cell with the minimum total cost.
- At each step, consider moving to adjacent cells (up, down, left, right) and compute the cumulative cost.
- Retain only the top beam_width paths at each level based on the cumulative cost.

Constraints:

- Avoid revisiting the same cell in a single path.
- Handle grids with obstacles (cells that cannot be traversed).

Question :

Use Beam Search to solve the 8-puzzle problem.

Requirements:

- Represent the puzzle state as a 3x3 array.
- Define the goal state and implement a heuristic function (e.g., Manhattan distance).
- Implement Beam Search to find the sequence of moves that leads from the initial state to the goal state.
- At each step, generate all possible moves (up, down, left, right) and compute their heuristic scores.
- Retain only the top beam_width states at each level.

Constraints:

- Ensure that the algorithm avoids cycles (repeating the same state).
- Limit the depth of the search to prevent infinite loops in unsolvable configurations.