IDS	45	C3	CS	فارس ناجح عبدالعال عبدالعال
BFS	17	C4	CS	محمد حمدي بسيوني عواد
DFS	19	C10	IS	احمد هاشم رشاد بيومي الغنام
A* Search	17	C10	IS	احمد محمود احمد عجلان
Hill Climbing	50	C12	IS	محمد ابراهيم محمد منصور عمر

Problem Description

The **8-Puzzle** is a famous game. It is a 3x3 small board with 8 numbered tiles (from 1 to 8) and one empty space.

- **The Problem:** The numbers start in a random messy order (Start State).

- **The Goal:** We need to slide the tiles to put them in the correct order (1, 2, 3...) using the empty space.

Algorithms

1. **BFS (Breadth-First Search):** It checks all possible moves step-by-step (layer by layer). It is slow but always finds the **Shortest Path**.

2. **DFS (Depth-First Search):** It picks one path and goes very deep until the end. It is fast but usually gives a **Very Long Solution** (not good for this game).

3. **IDS (Iterative Deepening Search):** It is a mix of BFS and DFS. It tries to search step-bystep but uses less memory than BFS.

4. *A* Search (A-Star):* This is the **Smartest Algorithm**. It uses a "Heuristic" (math calculation) to guess which move is better. It finds the best solution very fast.

5. **Hill Climbing:** It looks only at the immediate neighbors and picks the best one. It is very fast, but sometimes it gets stuck and fails.

Algorithm	Status	Steps	Time	Nodes Exp
BFS	Solved	5	0.0010 s	59
DFS	Solved	37651	95.0889 s	40455
IDS	Solved	5	0.0098 s	30
A*	Solved	5	0.0000 s	6
Hill Climbing	Solved	5	0.0010 s	5

- Best Solution Optimality : A*, BFS, IDS, and Hill Climbing are excellent. They all solved the game in just 5 steps. DFS was very bad. It took 37,651 steps to solve the same simple game

- Speed & Intelligence: Hill Climbing and A* are the winners here. Hill Climbing checked only 5 nodes The smartest . A* checked only 6 nodes Very smart . IDS checked 30 nodes. BFS checked 59 nodes. DFS wasted resources and checked over 40,000 nodes.

Final: A* and Hill Climbing are the best algorithms for this project because they are extremely fast and find the shortest way instantly.