

# *PicPuzzle Game*

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# 1 Introduction

A picture puzzle is a form of entertainment that involves solving a visual challenge. It usually consists of a picture or an image that has been altered or divided into smaller pieces, and the objective is to rearrange those pieces to recreate the original image

## 2 Problem Formulations

### **Initial State:**

Random arrangement of boxes

### **Successor function:**

Blank move left, right, up, down

### **Goal test:**

Boxes in their places

### **Path cost:**

Each move cost one

## **3 PEAS:**

### **\* Performance Measure:**

In Picpuzzle game, the performance measure could be the time taken to reach the goal (exit) or the number of steps or moves required.

### **\* Environment:**

the environment includes pictures that are not arranged.

### **\* Actuators:**

The action in the PicPuzzle game are the actions that the player can take moving the pictures in different directions (up, down, left, right).

### **\* Sensors:**

The sensors in the PicPuzzle game Screen.

## 4 ODESA

- \* **Observable: Full / Partial**

**PicPuzzle** is fully observable.

- \* **Deterministic / Stochastic / Strategic**

**PicPuzzle** is deterministic.

- \* **Episodic / Sequential**

**PicPuzzle** is Sequential.

- \* **Static/Dynamic / Semi-dynamic**

**PicPuzzle** is Static as the environment remains unchanged.

- \* **Discrete / Continuous**

**PicPuzzle** is discrete.

- \* **Agent: Single / Multi**

**PicPuzzle** is single agent.

## **AI algorithms that consist:**

### **\* Uninformed search and informed**

#### **Uninformed search: 1 BFS:**

is a simple strategy in which the root node is expanded first, then all the successors of the root node are expanded next, then their successors, and so on. BFS can be implemented by a first-in-first-out (FIFO) queue, assuring that the nodes that are visited first will be expanded first.

**2 DFS:** depth-first search explores as far as possible along each branch before backtracking

#### **3 UCS:**

a type of uninformed search that performs a search based on the lowest path cost. UCS helps us find the path from the starting node to the goal node with the minimum path cost

#### **informed: 1 A\*Tree Search**

meaning that it is formulated in terms of weighted graphs: starting from a specific starting node of a graph, it aims to find a path to the given goal node having the smallest cost (least distance travelled, shortest time, etc).

#### **2 A\*Graph Search:**

a simple and efficient search algorithm that can be used to find the optimal path between two nodes in a graph. It will be used for the shortest path finding. It is an extension of Dijkstra's shortest path algorithm