DA221 : INTRODUCTION TO AI

**Experimenting with Heuristic Search using 8-puzzle :**

Solving 8-puzzle instance with A\*-algorithm

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# Introduction :

**What is A\*-algorithm?**

A\* is an informed search algorithm, or a best-first 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.). It does this by maintaining a tree of paths originating at the start node and extending those paths one edge at a time until the goal node is reached.

At each iteration of its main loop, A\* needs to determine which of its path to extend. It does so based on the cost of the path and an estimate of the cost required to extend the path all the way to the goal. Specifically, A\* selects the path that minimizes

*f(n)* = *g(n)* + *h(n)*

Where n is next node on the path, *g(n)*  is the cost of the path from the start node to *n,* and *h(n)* is a heuristic function that estimates the cost of the cheapest path from *n* to the goal. The heuristic function is problem-specific. If the heuristic function is admissible – meaning that if never overestimates the actual cost to get to the goal – A\* is guaranteed to return a least-cost path from start to goal.

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