3. During the lecture you have discussed two heuristics for the 8-puzzle: Manhattan distance and misplaced tiles (see slides if not yet covered in class). Your tasks for this week are:
• Implement a Greedy and A* agent for the 8-puzzle. The agents should be able to switch between both heuristics. Make sure to produce proper output to “visualize” the working of your program.
• Compare the performance of the solvers and the two heuristics. Provide data in your report to support your arguments (number of visited nodes, path cost, execution time, etc). Which works better?

Algorithm	Heuristic	Transitions/ Cost	Time	Frontier Push	Frontier Pop	Extensions
A*	Manhattan	15	00:00:00.03	107	66	174
A*	Misplaced Tiles	15	00:00:52.60	5874	3699	10048
Greedy	Manhattan	23	00:00:00.05	142	83	224
Greedy	Misplaced Tiles	15	00:00:52.83	5874	3699	10048

From the statistics provided, it is evident that Manhattan distance has less cost in terms of time compared to misplaced tiles. Also, it shows that A* provides the optimal solution, while in Greedy algorithm, the optimality is not guaranteed.

The code has been attached inside the src folder. The transitions of tile states can be viewed inside the src_output folder files. In the end of each file is a summary of their statistics which are more detailed compared to the provided above.

The code can be executed using Python3. The files output files were generated using the following commands in terminal,

- python Main.py A* ManhattanDistance > src_out/Astar_Manhattan.txt
- python Main.py A* NumberOfTiles > src_out/Astar_NumberOfTiles.txt
- python Main.py Greedy NumberOfTiles > src_out/Greedy_NumberOfTiles.txt
- python Main.py Greedy ManhattanDistance > src_out/Greedy_Manhattan.txt

The input and goal states can also be varied by changing the Input.py file.

References:
1. PDF Document: CompSci 171: Intro AI-PDF, Accessed on: 15-11-2018, \\URL: https://www.ics.uci.edu/~welling/teaching/271fall09/HW3_sol.pdf\\
2. Stuart Russell and Peter Norvig, ‘Artificial Intelligence A Modern Approach- Third Edition’, Pearson Education Limited, ISBN:1292153962, 2016.