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Course : CS561/CS571 - AI
Assignment : End Semester
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Input Files : input_success.txt, input_failure.txt
Output Files : output_h1_success.txt, output_h2_success.txt, output_h1_failure.txt, output_h2_failure.txt

1. **Different Heuristics**
   - **h1(n) Manhattan Distance Heuristic is admissible as it always underestimates the true cost of optimal solution**
   - **h2(n) Euclidean Distance Heuristic is admissible as it is actual cost of number of swaps needed to reach the goal state given that only adjacent swaps are allowed**

2. h3(n) = h1(n) + h2(n) - is not admissible as it gives an estimate higher than the true cost of optimal solution. h3(n) is always greater than or equal to h2(n) where h2(n) is the actual cost to reach the goal.

3. What happens if you consider the blank tile as another tile?

- **If blank tile is considered as another tile, then the heuristics h1 and h2 are no longer admissible.**
- **If the blank tile is not considered as another tile and only a blank, then h1 and h2 are admissible.**

4. If the search algorithm gets stuck into local optimum, then we can perform one of the following techniques
- **We can try other variants of it, like random *restart hill-climbing*. It will increase the probability of finding a global maximum.**
- **Use a Simulated Annealing approach which uses the concept of temperature and probability. There is a decrease in Temperature every time we move from a more optimum state to a less optimum state in order to reach global optimum. Initially the cost of movement from more optimum state to less optimum state is cheaper and high probability. After few steps cost increases and there is low probability that movement from more optimum state to less optimum state is allowed**

5. If all neighbourhoods of the neighbourhood have the same value, then we have reached the state of plateau. We can move sideways to look for a better optimal solution but there should be a limit for maximum sideways movement. In our implementation we have set it to 10.