

Assignment-2

hillClimbing.cpp contains implementation of HillClimbing (Steepest Ascent search) technique of finding local maxima. This greedy algorithm many a time fails to find global optima as optimal path depends on start state.

procedures

```
int cal_h(const string&);
```

```
vector<string> getNextState(const string&);
```

```
bool hill_climb(const string&, const string&);
```

```
void printPath(string);
```

```
int main();
```

```
int cal_h(const string&)::
```

input: current_state as a string

return: $-1 \times (\text{number of tiles displaced from its respective position in goal_state})$.

```
vector<string> getNextState(const string&)::
```

input: current state as a string

return: vector of string containing possible next states obtained by up, down, right, left movement of blank tile (taken as '0' in string) .

```
bool hill_climb(const string&, const string&)::
```

input: start_state as a string, goal_state as a string

return: 'true' if goal_state reachable from start_state using greedy strategy followed by steepest ascent, else 'false'.

```
void printPath(const string&)::
```

input: string

it prints (sub) optimal path of reaching goal_state from start_state.

Uses a map<string,string> to get parent of a state.

hillClimbing.cpp::

compile:: `g++ hillClimbing.cpp -o hillClimbing`

run:: `hillClimbing < inp.txt`

----- example run-----

inp.txt::

8 1 3

0 2 4

7 6 5

run::

```

    \Documents\iitp_sem7\AI\assign2>hillClimbing <inp.txt
Start_State Matrix of size=3*3
                                HILL CLIMB
start_state: 813024765
goal_state:  123804765
SUCCESS
Solution Steps::

|8|1|3|
|0|2|4|
|7|6|5|

|0|1|3|
|8|2|4|
|7|6|5|

|1|0|3|
|8|2|4|
|7|6|5|

|1|2|3|
|8|0|4|
|7|6|5|

States Discovered = 9
Solution at depth = 3
SUCCESS
```

----- example run 2 -----

input:: provide 'start_state' as '9 tile numbers' in range [0,8] delimited by 'space/line'.

```

    \Documents\iitp_sem7\AI\assign2>hillClimbing
Start_State Matrix of size=3*3
2 3 4 0 8 5 7 6 1
                                HILL CLIMB
start_state: 234085761
goal_state:  123804765
FAIL!
```

