

AI Assignment 1 Report
Sourabh Shenoy
UIN: 225009050

Game Playing:

Min Max:

To run the code, type:

python playinggame.py minmax <input>

1) python playinggame.py minmax (((1 (4 7)) (3 ((5 2) (2 8 9) 0 -2) 7 (5 7 1)) (8 3)) (((8 (9 3 2) 5) 2(9 (3 2) 0)) ((3 1 9) 8 (3 4))))

Result:

```
[1, 2, 2, 2, 3]
0.00477886199951 seconds

Sourabhs-MacBook-Pro:Desktop Sourabh$
```

2)python playinggame.py minmax (((1 4) (3 (5 2 8 0) 7 (5 7 1)) (8 3)) (((3 6 4) 2 (9 3 0)) ((8 1 9) 8(3 4))))

Result:

```
[2, 1, 3, 1]
0.00553202629089 seconds

Sourabhs-MacBook-Pro:Desktop Sourabh$
```

3) python playinggame.py minmax ((4 (7 9 8) 8) (((3 6 4) 2 6) ((9 2 9) 4 7 (6 4 5))))

Result:

```
[1, 2, 2]
0.00465083122253 seconds
Sourabhs-MacBook-Pro:Desktop Sourabh$
```

4) python playinggame.py minmax (5 (((4 7 -2) 7) 6))

Result:

```
[2, 1, 1, 2]
0.00457787513733 seconds
Sourabhs-MacBook-Pro:Desktop Sourabh$
```

5) python playinggame.py minmax ((8 (7 9 8) 4) (((3 6 4) 2 1) ((6 2 9) 4 7 (6 4 5))))

Result:

```
[1, 2, 2]
0.00555205345154 seconds
Sourabhs-MacBook-Pro:Desktop Sourabh$
```

Analysis: Min Max has exponential complexity because it explores each and every possibility, even if it is not needed. Advanced methods like alpha beta pruning, reduces the computation by avoiding unnecessary ones. Complexity of Alpha Beta Pruning is $O(b^{m/2})$, where as that of min max is $O(b^m)$.