AI Programming Assignment 1

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There are several files present in the folder. The main code is written in the

- nqueues.py
- n_puzzle.py

test.py file is created to test these two codes. Rest are files for storing and input purpose.

1) N Puzzles

N value	DFS Time (secs)	BFS Time (secs)	A* Search Time (sec)	IDA* Search Time (sec)
3 [2 0 1 3]	0.0021	0.0034	0.0007	0.0007
3 [0 1 3 2]	0.0015	0.0037	0.0005	0.0005
8 [1,5,2,0,4,6,7,3,8]	1.1519	0.8918	0.0277	0.0185
8 [0,2,3,1,4,6,7,5,8]	0.0304	0.0704	0.0007	0.0006
8 [4 1 2 8 0 3 7 6 5]	5.081	0.4566	0.0096	0.0067
15 [1 2 3 4 5 6 0 8 9 10 7 15 13 14 12 11]	1.1238	0.9862	0.0054	0.0058
24 [1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 0 18 19 21 22 23 24 20]	0.0591	0.0674	0.001	0.0009

In this the different matrices of different were generated with different n values. They were then checked whether they are solvable or not.
Many took minutes to run while some took only seconds (depends on the nature, length, position of the path).
Here are some of the examples that took a few seconds for comparison purpose.
Observations made are -

- Runtime of BFS and DFS is comparable. In some situations DFS runtime is more than BFS while in others it is less.
- Runtime of A* and IDA* is comparable in most cases. In some situations A* runtime is more than IDA* while in others it is less.
- Runtime of A*,IDA* is always less than BFS and DFS.

Inference -
Informed searches like A*,IDA* is faster than uninformed searches like BFS and DFS and solves N_puzzle problem faster.

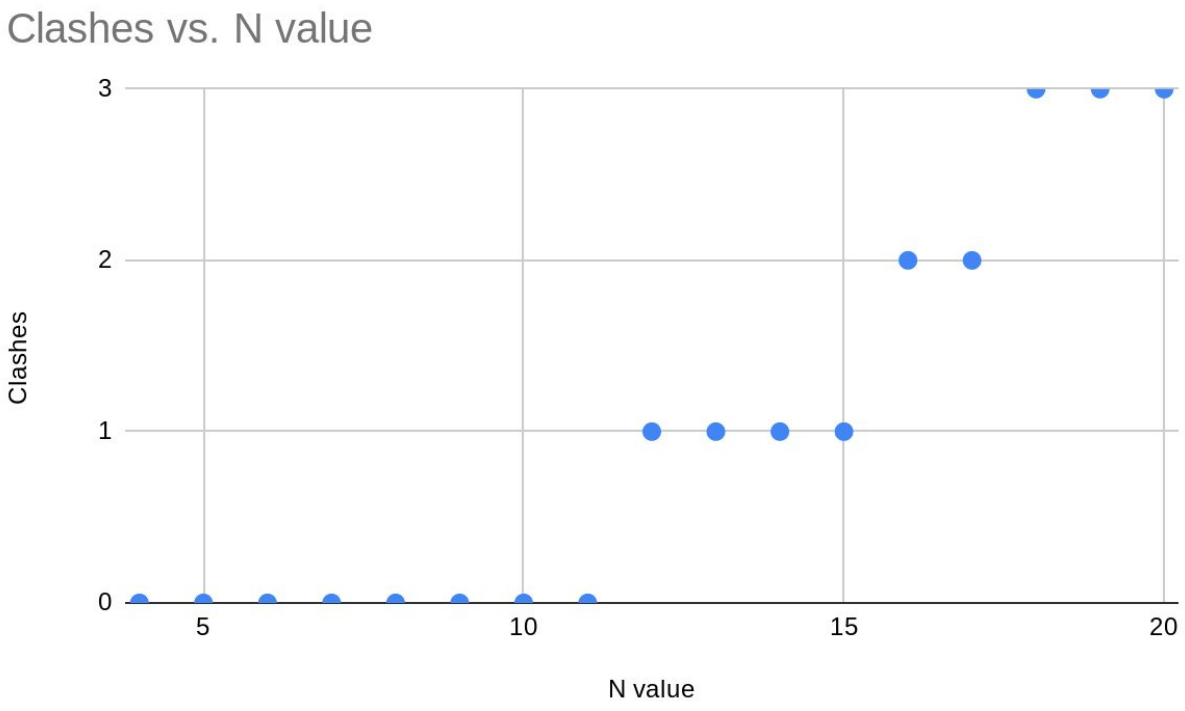
2) N Queenes

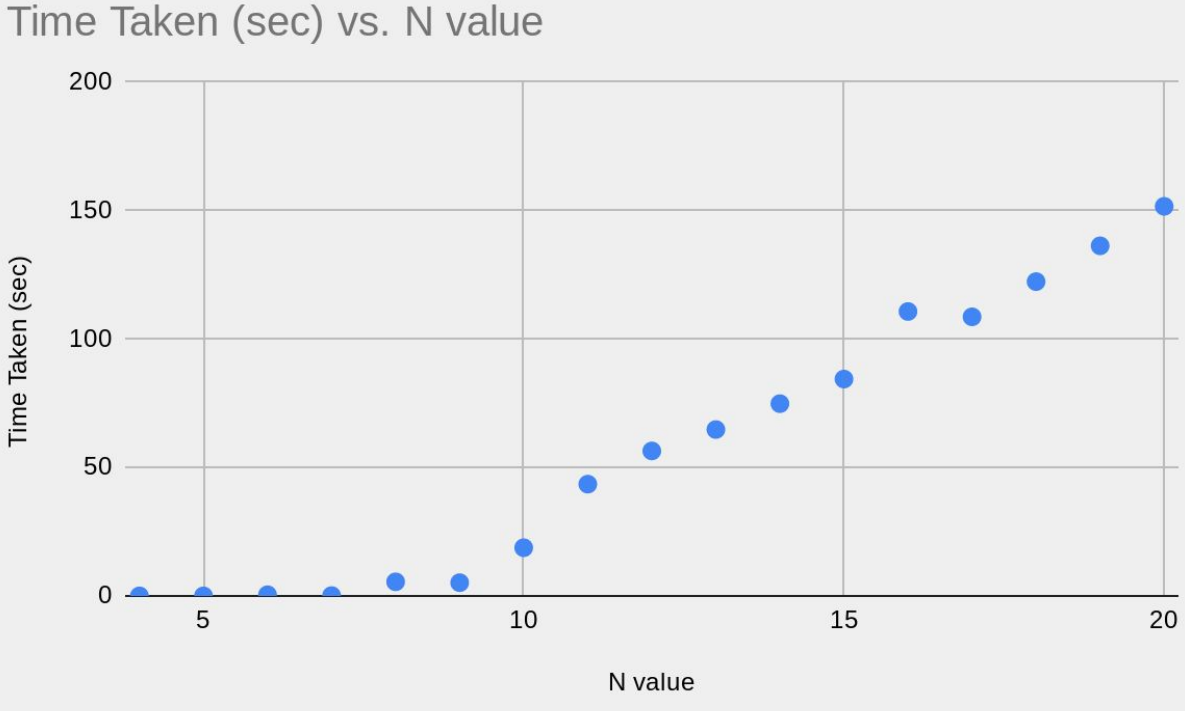
Population Size = 100
Parents Selected = 10
Children are generated by mutation (swapping two random indices of parent)
Iterations = 5000

The algorithm stops when either the optimal solution (best solution possible) or the number of iterations is over.

N value	Time Taken (sec)	Clashes

4	0.007955	0
5	0.008338	0
6	0.447815	0
7	0.121858	0
8	5.473765	0
9	5.139707	0
10	18.743430	0
11	43.4937	0
12	56.425352	1
13	64.754453	1
14	74.833824	1
15	84.400111	1
16	110.705043	2
17	108.634684	2
18	122.343206	3
19	136.280996	3
20	151.643843	3


Clashes vs. N value
3
2
1
0
Clashes
5
10
15
20
N value


Time Taken (sec) vs. N value
200
150
100
50
0
Time Taken (sec)
5
10
15
20
N value