N-Queens Problem

Algorithm and Problem Solving

Course Code: **17ECSE309**

By,

Shivakumar V H

01FE15BEC181

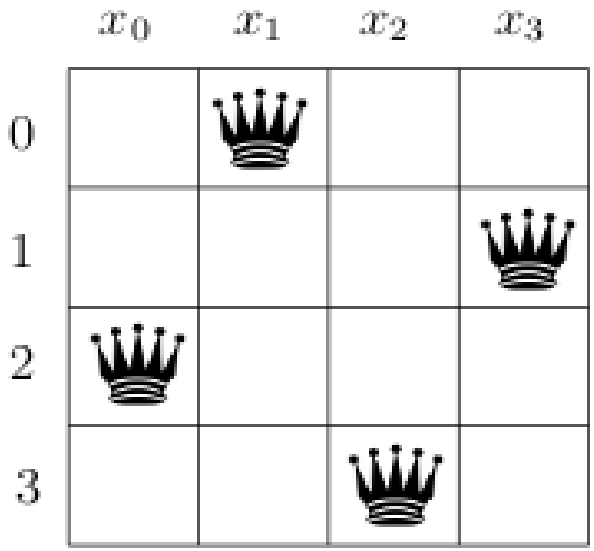
What is N Queen Problem?

- Placing N Queens on N×N chessboard.
- So that no two queens attack each other.

How to arrive at the solution?

- Naive Algorithm
- Backtracking

Possible solution for 4×4



Matrix Representation

{ 0, 1, 0, 0}
{ 0, 0, 0, 1}
{ 1, 0, 0, 0}
{ 0, 0, 1, 0}

- Trivial Solution for N=1
- No solution for N=2 & N=3

- We start with the empty board and then place queen 1 in the first possible position of its row, which is in column1 of row 1.
- Then we place queen 2, after trying unsuccessfully columns 1 and 2, in the first acceptable position for it, which is square (2,3), the square in row 2 and column 3. This proves to be a dead end because there is no acceptable position for queen 3.

	1	2	3	4
1	Q1			
2				
3				
4				

	1	2	3	4
1	Q1			
2			Q2	
3				
4				

- So, the algorithm backtracks and puts queen 2 in the next possible position at (2,4).
- Then queen 3 is placed at (3,2), which proves to be another dead end. The algorithm then backtracks all the way to queen 1 and moves it to (1,2). Queen 2 then goes to (2,4), queen 3 to (3,1), and queen 4 to (4,3), which is a solution to the problem.

	1	2	3	4
1	Q1			
2				Q2
3				
4				

	1	2	3	4
1	Q1			
2				Q2
3		Q3		
4				

	1	2	3	4
1		Q1		
2				Q2
3	Q3			
4			Q4	

References

- http://www.datagenetics.com/blog/august42012/
- https://www.geeksforgeeks.org/backtracking-set-3-n-queen-problem/