

N Queens Problem using Backtracking

Q_1, Q_2, Q_3, Q_4

Given the chess board
 5x5 board All Queen under attack
 under attack: same row
 same column
 same diagonal

We want all solution

not optimal one

↳ if then we need to use DP

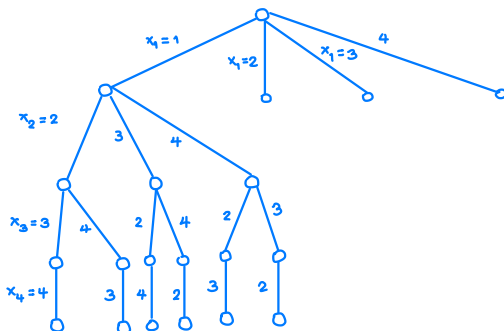
	1	2	3	4
1				
2				
3				
4				

x				
	1	2	3	4

column no.

→ Column of queen Q_i

State Space Tree



Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2		Q_2		
3			Q_3	
4				Q_4

x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2		Q_2		
3			Q_3	
4			Q_4	

x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2			Q_2	
3		Q_3		
4				Q_4

x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2			Q_2	
3			Q_3	
4		Q_4		

x				
	1	2	3	4

column no.

$$\text{Total} = 1 + 4 + 4(3) + 4(3)(2) + 4(3)(2)(1)$$

$$= 1 + \sum_{n=0}^3 \left[\frac{n!}{(n-j)!} \right]$$

$$= 65 \text{ nodes}$$

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2				Q_2
3		Q_3		
4			Q_4	
x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2				Q_2
3			Q_3	
4		Q_4		
x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1		Q_1		
2				Q_2
3		Q_3		
4			Q_4	
x				
	1	2	3	4

column no.

Q_1, Q_2, Q_3, Q_4

	1	2	3	4
1	Q_1			
2				Q_2
3			Q_3	
4		Q_4		
x				
	1	2	3	4

column no.

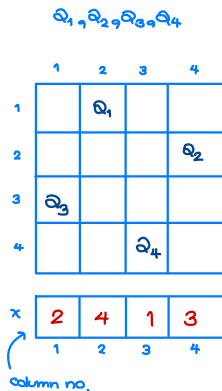
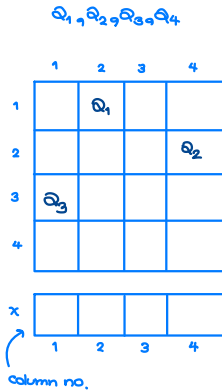
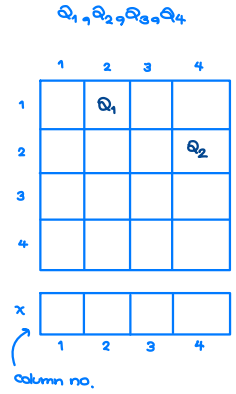
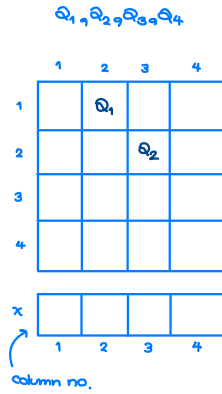
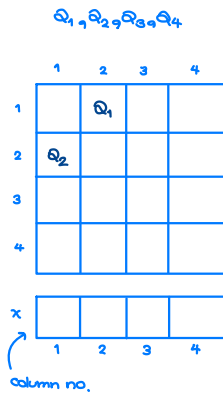
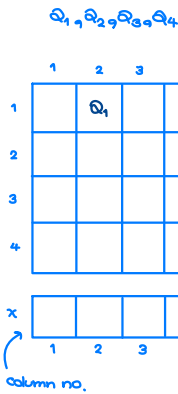
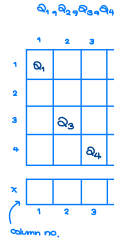
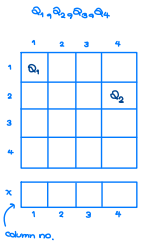
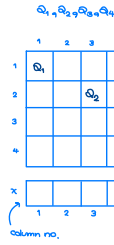
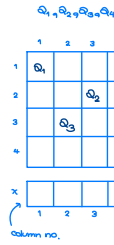
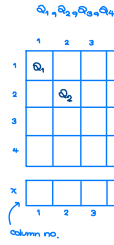
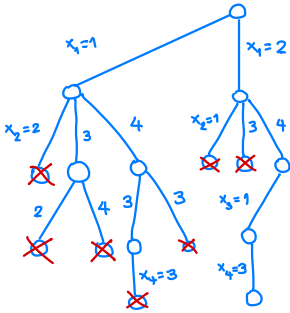
...

ସମସ୍ତ ସମ୍ଭାବ୍ୟ All possible

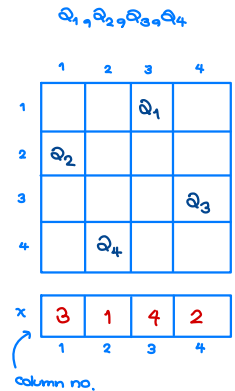
State Space Tree

using Bounding function = not in same col, row, diag

X kill the one that under attack



0 = 0



∴ Solution : 2, 4, 1, 3
3, 1, 4, 2