Assignment No.4

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Roll NO - 20U401
Class- TE4
Subject -

Problem statement -

Implement a solution for a constraint ~~Stat~~ satisfaction Problem using Branch & Bound & Backtracking for n-queens Problem or a graph coloring problem.

Theory-

*What is constraint statisfaction Problem.

- CSP share some common features and have specialized methods.
- View Problems as a set of variables to which we have to assign values that satisfy number of Problem specific constraints.
- Constraint solvers constraint logic Programming.
- State is defined by variables x with values from Domain D:
- Goal test is a set of constraints specifying allocoable combinations of values for subsets of variables.
- Solution is a complete, consistent assignment.

Applications-

- Crew assignments to fightly
- Management of transportation fleet.
- Fight / rail schedules.
- Job shop scheduling
- Task scheduling in Port operations.
- Design, including spatial, layout design.
- Radio surgical procedures.

* What is N queen Problem

N queen is the Problem of Placing N chess queens on an N x N chessboard so that no other two queens attack each other.

* Solve N=4 queen problem.

- Since we have to place 4 queens such as q_1, q_2, q_3 and q_4 on the Chessboard such that no two queens attack each other. In such Conditional each queen must be placed on different row i.e., we put queen "i" on row "i".
- Now we place queen in q_1 in the very first acceptable position(1,1). Next we put queen q_2 so that both those queens do not attack each other.
- We find that if we have place q_2 in column 1 and 2 then them dead end is encounterred. Thus the first acceptable Position for q_2 in column 3 i.e (2,3) but then no position is left for placing queen 'q_3' saftey.
- So we backtrack one step & place the queen q_2 in (2,4). The next best possible solution.
- Then we obtain the position for Placing 'q_3' which is (3,2) But later this position also leads to a dead end & no place is found where 'q_4' can be placed saftely.
- Then we have to backtrack till 'q_1' and place it to (1,2) and then all other queens Placed saftely by moving q_2 to (2,4), q_3 to (3,1) and q_4 to (4,3). That is we get the solution (2,4,1,3) for another possible solution the whole Method is repeated for all partial solutions. The other 4 queens Problem is (3,1,4,2) i.e.

	1	2	3	4
1			q1	
2	q2			
3				q3
4		q4		

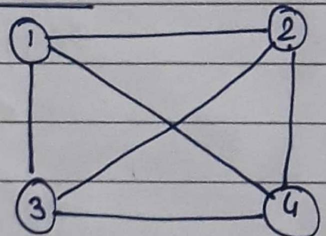
solve N=8 queens Problems.

	1	2	3	4	5	6	7	8
1				q_1				
2						q2		
3								q3
4		q4						
5							q5	
6	q6							
7			q7					
8					q8			

* what is graph coloring problem coith example.

- Graph coloring Problem is to assign to colors to Cortain elements of a graph Subject to certain constraints.
- Vertex colouring is most Common graph Coloring Problem.

Example.



$V = \{1,2,3,4\}$

$D = \{RED, GREEN, BLUE\}$

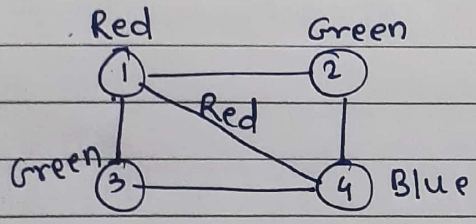
$C = \{1 \neq 2, 1 \neq 3, 1 \neq 4, 2 \neq 4, 3 \neq 4\}$

step1 -

Vertex & Domain	1	2	3	4
Initial	RGB	RGB	RGB	RGB
1=R	R	GB	GB	GB
2=G	R	G	B	B
3=B	R	G	B	B

Step2 -

Vertex & Domain	1	2	3	4
Initial	RGB	RGB	RGB	RGB
1=R	R	GB	GB	GB
2=G	R	G	B	B
3=G	R	G	B	B.



* what is intelligent backtracking?

Intelligent backtracking alogrithms such as backJumping & dependency directed backtracking were designed to addrees this diffculty but the exact utility and range of applicability of these techniques have not been fully explored.

* What is branch & bound method.

- Branch & bound is an algorithm design parodigm which is generally used for solving combinational optimization problems.
- These problems are typically exponential in terms of time Complexity and may require exploring all possible permutations in worst case.

Conclusion -