

NAME: KRUNAL RANK

Adm. No: U18C00081

BTECH 3RD YEAR

AIML
Tutorial 8

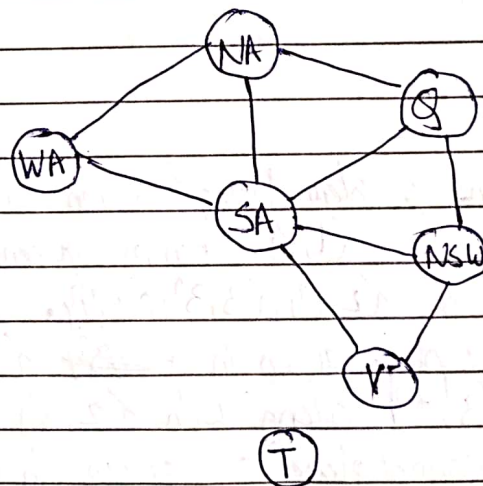
- Ans 1. Some of the benefits of Constraint Satisfaction Problem are:-
- Reduces further states on the basis of current state.
 - Used to implement Map Colouring, Scheduling jobs, Line drawing implementation, etc.
 - Clear specification of many problems, generic goals, successor functions & heuristics.
 - CSP knows which variable violates a constraint.
 - CSP automatically prunes off all branches that violate constraints.

- Ans 2. For the four queens problem, Using column wise iteration.
- Let us place 1 queen in $\{1, 1\}$. Then, no queen can be further placed in $\{1, 2\}$ or $\{2, 2\}, \{3, 3\}, \{4, 4\}$.
 - So for next column we place queen in $\{2, 2\}$ or $\{3, 2\}$. Then this restricts queen in $\{3, 3\}$ along with $\{2, 3\}, \{1, 4\}, \{4, 3\}$.
 - So, due to this, we cannot place any queen in column 3 and backtrack.
 - Now, we remove queen from $\{3, 2\}$ and place it in $\{4, 2\}$. This restricts queen in $\{4, 3\}, \{3, 3\}, \{2, 4\}$.
 - Now, for next column, we can place queen in $\{2, 3\}$.
 - This restricts the queen in $\{3, 4\}$. Hence, we backtrack and reach to column 1.
 - Now, we start from beginning again.
 - We place first queen in $\{2, 1\}$. This restricts queen in $\{3, 2\}, \{4, 3\}, \{1, 2\}$ and $\{2, 4\}$.
 - We place the next queen in $\{4, 2\}$. This restricts queen in $\{3, 3\}, \{1, 3\}$.

- We place the next queen in ~~1,3,4~~ 1,3,5. This restricts And the last queen in 1,3,4,5.

- Hence, the valid solution is found.
- This is how Constraint Satisfaction Problems can be solved.

Ans 3: The given problem can be visualised as a graph colouring problem:-



We need to colour each node using colours R, G, B such that no two adjacent nodes have same colour.

- First we colour WA using R.
- Then, using ~~BR~~ ^{BR}, we find that NA has B, G available. Colour it using B. ~~This~~ Remove B possibility from its neighbours.
- Then, for SA we have ~~B~~ ^G available only. Use G to colour it and remove G as a possibility from its neighbouring nodes.
- Then for Q, it has R as possibility, hence mark it as R. Remove R as a possibility from NSW.
- ~~Color~~ Then ~~NSW~~ NSW has only single possibility of B.

This restrict

blems can be

a graph colouring

us R, G, B such
ame colour.

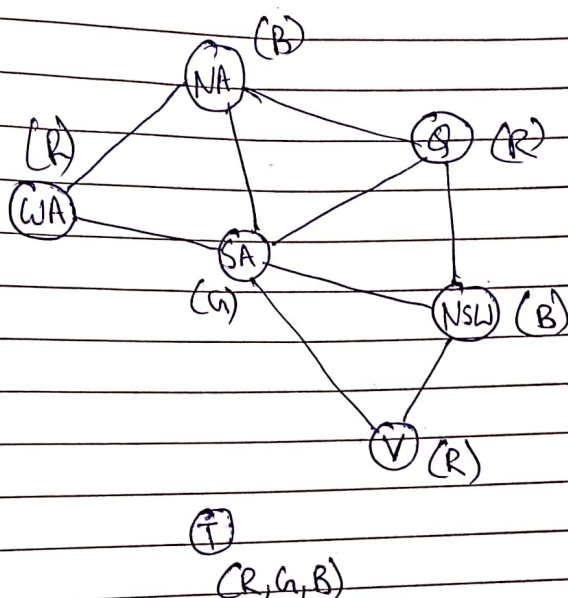
, G available. Colour
its neighbours.
se G to colour B
its neighbouring nodes.
mark it as R.

ssibility of B.

• Similarly V has single possibility R.

• Note that ~~Team~~ T has all three possibilities available.

Thus, the result is:-



Ans: An atomic proposition is a statement or assertion that must be true or false.

Example :- "5 is a prime number".

"Program P terminates in 5 seconds."

A compound proposition is a combination of atomic statements which needs to be true or false but not both.

Example :- "It is confirmed that he is an impostor now that he sabotaged the reactor just few seconds after calling the meeting."