AI Assignment - 5

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Aim : Assignment on constraint satisfaction problem :-
1. Implement graph colouring problem.
2. Implementation of constraint satisfaction problem for solving crypt-arithmetic problem.

Objective : 1.) Understand the concept of CSP i.e. Constraint Satisfaction Problem.
2.) Implement CSP ## techniques to solve any problem.

Theory :

CSP is a technique where a problem is solved when its values satisfies certain constraints or # rules of the problem such type of technique leads to a deeper understanding of the problem structure as well as its complexity.

Constraint Satisfaction depends on three components namely -

$\mathcal{X}$: It is a set of variablems.
D : It is a set of domains where the variables resizes.

C : It is a set of constraints which are followed by set of variables.

In constraint satisfaction, domains are the spaces where the variables resides, following the problem specific constraint, the constraint value consists of a pair of {scope, rel} The scope is a tuple of variables which properties in the constraint and relation is a relation which includes a list to satisfy the constraint of the problem.

The requirements to solve a CSP is -

1.) A state space.
2.) The notation of the solution.

A state space is defined by assigning values to some or all variables such as,

{ $x_1 = v_1$ $x_2 = v_2$ & so on }.

There are 2 types of domain in CSP :-

1.) Discrete (infinite domain) we can have one state for multiple variables.

2.) Finite domain :- One domain for one specific variables (continuous domain).

Constraints types in CSP :-

1.) Unary constraints :-
Constraints that restricts the value of single variables.

2.) Binary Constraints :-
Constraint types which relates two variables.

3.) Global Constraints :
Constraints types which involves an arbitory number or variables.

Constraint Propogation :-

Constraint propogation is a special type of inference which helps in reducing the legal number of values for the variables. The idea behind constraint propogation is local consistancy.

① Node Consistancy ② Are Consistancy
③ Path Consistancy ④ K- Consistancy.

CSP Problems :-

1. Graph Coloring
2. Sudoku Playing
3. n-queen problem.
4. cross word.
5. Latin square problem.

Conclusion :

In this way, I understand the concept CSP i.e constraint satisfaction problem & also implement it to solve a problem.