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AIES

Assignment 3

Aim: Solve constraint satisfaction problem like SEND+
MORE = MONEY

Objective: To solve constraint satisfication problem like SEND + MORE = MONEY

Theory:
Constraint Satisfication Method: It is a problem-solving
technique that plays a crucial role in various areas
of AI. It is particularly useful when dealing with
problems that involves variables and a set of constraints
that these variables must adhere to In this method, you
typically have a collection of variables, and each
variable has a defined a domain of possible values
it can take. The primary objective is to find an assignment
of values to these variables that simultaneously
satisfies all the special constraints. Examples of
problems include sudoku, map colouring, etc.

Bactracking search: It is a depth first search algorithmemployed for solving problems like constraint satisfication, combinatorial optimization and decision making tasks. It works by systematically trying out possible solv and if it encounters a situation where a constraint cannot be satisfied or an invalid solv is reached it backtracks to the

previous decision point and explores a different branch of search tree. This process continues a valid sol is found or all possible options have been exhausted.

Input: Initial values for some letters in given problem.

output: Unique values for letters S.E.N.D.M.O.R.Y

Algorithm: Constraint Satisfaction Method.

FAS'S

1) What are the other constraint satisfaction problems other satisfaction problems include:

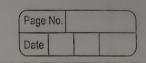
1. N-Queen Problem

- 2. Sudokut solbe laum sallation south Lat
 - 3. Map Colouring

2. What do you mean by constraint propagation?

Dinstraint Propagation is a fundamental techniques in constraint satisfaction problems. It involves using the anstraints to deduce any and update possibly values (domains) for variables. When you propagate constraints, you iteratively enforce consistency and eliminate values from variables domain that are inconsistent with constraints.

This process continues until no further deduction can be made thelping to reduce the search space and guide the search towards a solution.



3. Why backtracking search can be used to solve constr-aint satisfaction problem?

It is a effective approach for solving constraint

sutisfaction problem.

It systematically explores potential soln by making choice for variable and checks if they lead to valid assignment of values to all variables- If a conflict is detected it backtracks and tries alternative assignments.

This process continues until a valid soll is found or it determines that no soll exists.

AIES Lab 3

```
def solutions():
    all solutions = list()
    for s in range(9, -1, -1):
        for e in range(9, -1, -1):
            for n in range(9, -1, -1):
                for d in range(9, -1, -1):
                    for m in range(9, 0, -1):
                        for o in range(9, -1, -1):
                            for r in range(9, -1, -1):
                                for y in range(9, -1, -1):
                                     if len(set([s, e, n, d, m, o, r,
y])) == 8:
                                         send = 1000 * s + 100 * e + 10
* n + d
                                         more = 1000 * m + 100 * o + 10
* r + e
                                         money = 10000 * m + 1000 * o +
100 * n + 10 * e + y
                                         if send + more == money:
all solutions.append((send, more, money))
    return all solutions
print(solutions())
[(9567, 1085, 10652)]
```