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Experiment 1.5

AIM

To minimize a given DFA

ALGORITHM

1. Start
2. Create a DFA Data Structure that represents the input characters as numbers between 0 to m-1 and the states as 0 to n-1 where n and m are the number of states and input characters respectively.
3. Read the DFA as follows:
    1. The first line contains number of states n, number of final states f, and number of input characters m.
    2. The next line contains f space separated numbers representing the final states.
    3. Next line contains a single string denoting the input characters.
    4. Next n lines contain m space separated integers representing the n*m transition table of the DFA.
4. Create a 2D boolean n*n grid to mark distinguishable state pairs.
5. For each pair of states (i,j) set grid[i][j] = true if and only if exactly one of the two states is a final state.
6. Mark all distinguishable pairs by repeating the following till no changes are made:
    1. For each pair (i,j) where i>j and grid[i][j] is false (i.e they haven't been marked as distinguishable), do the following:
        1. For each input symbol c:
            1. Let x, y be the transition state for i and j respectively for the given character c.
            2. If grid[x][y] is true, set grid[i][j] = grid[j][i] =true and and mark that a change has been made.
7. Initialize a Disjoint Set Union structure d for all states.
8. For each pair (i,j) where i>j and grid[i][j] is false, merge the states i and j in d
9. Based on the DSU, create a DFA where each state represents a set in the DFA.

10. For each transition from x to y with character c in the original DFA, add transition from the state corresponding to the sets containing x and y in the new DFA
11. Display the new DFA
12. Stop

RESULT

Successfully minimized given DFA.