MINIMIZING THE NUMBER OF STATES OF DFA - SCHEDULED FOR 19.12.07 6th HOUR

Aim: To construct minimum state DFA by reducing the number of states in a given DFA to the bare minimum without affecting the language that is being recognized.

String w distinguishes state s from state t if, by starting with DFA M in state s and feeding it input w, we end up in accepting state but starting in state t and feeding input w, we end up in non accepting state or vice versa. Algorithm works by finding all groups of states that can be distinguished by some input string. A group of states that cannot be distinguished is then merged to single group.

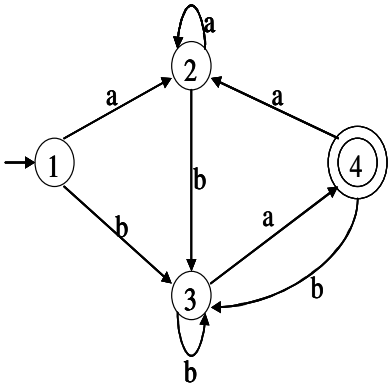
Algorithm:

1. Construct an initial partition π of set of states with two groups: the accepting states F and non accepting states S-F.
2. Apply the procedure of fig.1 to π to construct new partition πnew.
3. If πnew = π, let πfinal = π and continue with step 4. other wise repeat step 2 with π= πnew.
4. Choose one state in each group of partition πfinal as the representative for that group. The representatives will be the states of the reduced DFA.

fig. 1

```
for each group G of π do begin
        partition G into subgroups such that two states s and t
        of G are in the same subgroup if and only if for all
        input symbols a, states s and t have transitions on a
        to states in the same group of π;
replace G in πnew by the set pf all subgroups formed
end
```

Minimizing DFA - Example



Groups: {1,2,3} {4}

{1,2} {3}

no more partitioning

a	b
1->2	1->3
2->2	2->3
3->4	3->3

So, the minimized DFA