LECTURE 6

Kleene's Theorem

Finite State Automata to Regular Expression

Introduction

Every regular expression can be associated with a finite state automata.

1. Converting FSA to RE (State Elimination Method):

The state elimination method is widely used approach for converting DFA to RE. In this approach, states of DFA are removed one by one until we left with only starting and final state. For each removed state, RE is generated. This newly generated regular expression act as input for a state which is next to removed state.

The following examples illustrate the state elimination methods.

Example 1:

Convert the following FSM to a regular expression.

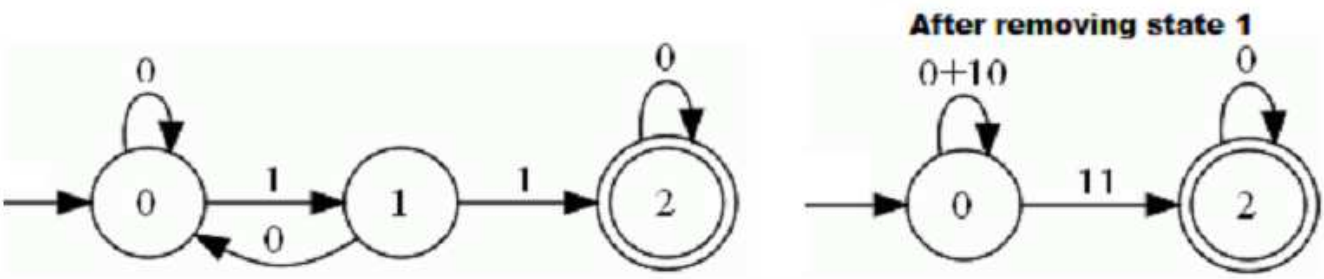


Figure 2.3: An example of state elimination method.

Example 2:

Convert the following FSM to a regular expression.

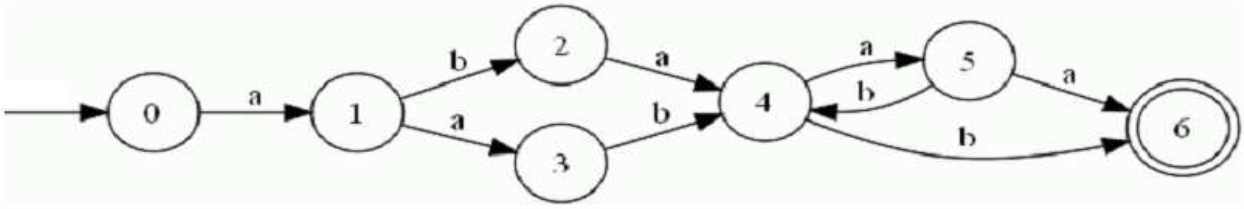


Figure 2.4: An example of different removal sequence of states gives different RE

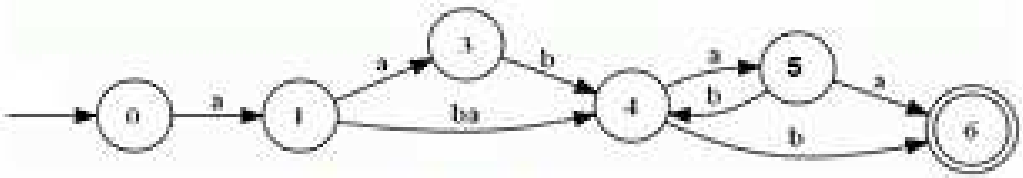


Figure 2.5: DFA after removing state 2

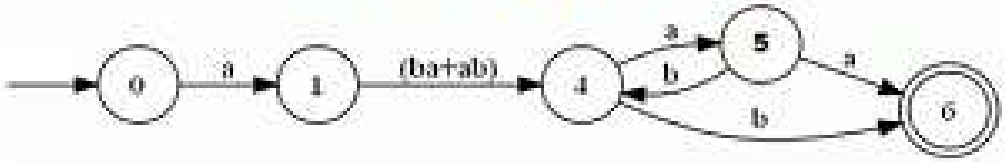


Figure 2.6: DFA after removing state 3

Figure 2.7: DFA after removing state 5

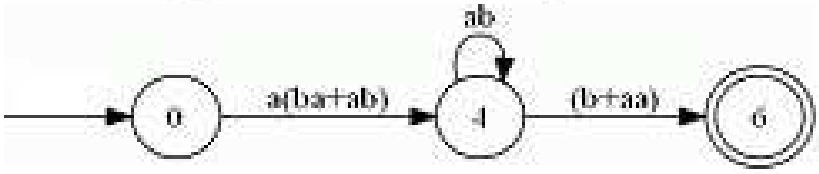


Figure 2.8: DFA after removing state 1

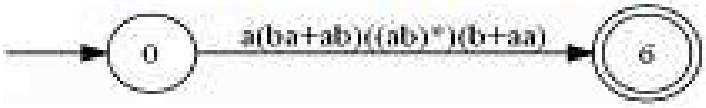
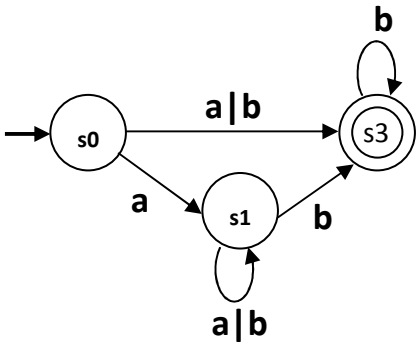


Figure 2.9: DFA after removing state 4

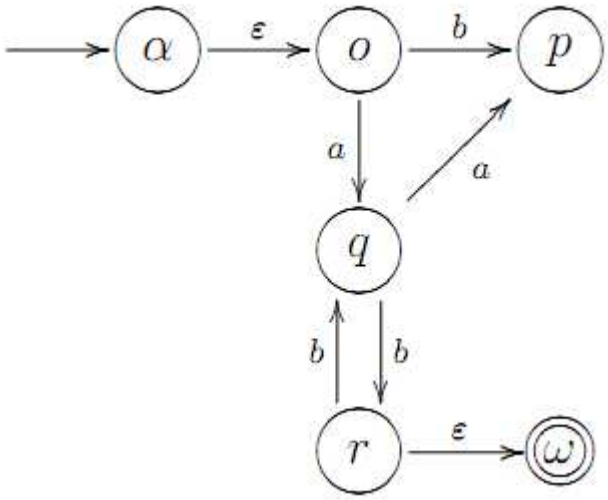
Example 3:

Convert the following FSM to a regular expression.



Solution:

(a|b)b* | a(a|b)*bb*



2. Homework:

HW 1:

Write down the regular expression representing the following FSM: