CS 310 – Fall 2016
Pacific University

CS310

Converting NFA to DFA

Examples

September 16, 2016
Lecture 8

Practice, DFA or NFA

\[ \Sigma = \{0, 1\} \]

- \{ w | w contains an odd number of 0s and an even number of 1s \}
  - Provide a description of what each state represents

- \{ w | w does not contain the substring 01 \}
  - Provide a description of what each state represents

- \{ w | w ends with a different symbol than w begins with \}
  - Provide a description of what each state represents
Practice, DFA or NFA

\( \Sigma = \{0, 1\} \)

- \{ w | w contains (both 00 and 11) or (neither 00 and 11) \}
  - Provide a description of what each state represents

- \{ w | w contains either 01 or contains 10 \}
  - Provide a description of what each state represents

- \{ w | w ends with a different symbol than w begins with \}
  - Provide a description of what each state represents

From Sipser, page 88

1.32 Let

\[ \Sigma_3 = \left\{ \left[ \begin{array}{c} 0 \\ 0 \\ 0 \end{array} \right], \left[ \begin{array}{c} 0 \\ 1 \\ 0 \end{array} \right], \left[ \begin{array}{c} 0 \\ 0 \\ 1 \end{array} \right], \ldots, \left[ \begin{array}{c} 1 \\ 1 \\ 1 \end{array} \right] \right\} \]

\( \Sigma_3 \) contains all size 3 columns of 0s and 1s. A string of symbols in \( \Sigma_3 \) gives three rows of 0s and 1s. Consider each row to be a binary number and let

\( B = \{ w \in \Sigma_3^* | \text{the bottom row of } w \text{ is the sum of the top two rows} \} \).

For example,

\[ \left[ \begin{array}{c} 0 \\ 1 \\ 0 \end{array} \right] \left[ \begin{array}{c} 1 \\ 0 \\ 1 \end{array} \right] \in B, \quad \text{but} \quad \left[ \begin{array}{c} 0 \\ 0 \\ 1 \end{array} \right] \left[ \begin{array}{c} 1 \\ 1 \\ 0 \end{array} \right] \notin B. \]

Show that \( B \) is regular. (Hint: Working with \( B^R \) is easier. You may assume the result claimed in Problem 1.31.)