Lecture #3: Design of a Deterministic Finite Automaton

Assumptions

- Preliminary material for this lecture has been reviewed.

Questions for Review

You should be able to answer the following questions.

1. When you are asked to "design a deterministic finite automaton," what information are you given? What do you want to achieve?

2. What "very important question" about the deterministic finite automaton must be answered, if you are going to successfully design it?

3. If the language of the desired DFA is a language over the alphabet Σ then you should be able to identify a collection of subsets of $\Sigma^\star$ when this question is answered. How will these subsets be related to the states in your DFA?

4. Remaining steps in the process are supposed to help you to make sure that your answer to the above "very important question" makes sense and help you to use to complete the design of a deterministic finite automaton.

   What is the first property of these subsets (possibly called a **sanity check**) that you should verify? Why is it important?

5. What is the second property of these subsets (or **sanity check**) that should be verified? Explain how (or why) this allows you to identify the **start state** of the DFA that is being designed.

6. What is the third property of these subsets (or **sanity check**) that should be verified? Explain how (or why) this allows you to identify the set of **accepting states** of the DFA that is being designed.

7. What is the fourth property of these subsets (or **sanity check**) that should be verified? Explain how (or why) this allows you to define the **transition function** for the DFA that is being designed, and to complete it.

8. What should you do if a sanity check fails? How is understanding **why** it failed useful?

Problem To Be Solved

Let $\Sigma = \{a, b\}$ and let $L \subseteq \Sigma^\star$ be the following language:

$$L = \{w \in \Sigma^\star \mid \omega \text{ ends with } abb\}.$$

The goal for this presentation is to use the process for DFA, given in the lecture slides, to design a DFA with this language.

Summary of Design Process

Application of Design Process

Breakout Session

Please feel free to discuss the following during the breakout session if you do not wish to discuss lecture material. When they make the movie of your life, which of the following past or present performers should portray you?

(a) Cher

(b) Madonna

(c) Bette Davis

(d) Meryl Streep

(e) Tom Hanks

(f) Tom Cruise

(g) Sean Connery

(h) Jimmy Stewart

(i) Lassie[1]

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[1]OK, OK, OK. I know. Lassie was almost certainly portrayed by *multiple* individuals over the years. Feel free to pick whichever you prefer, if you make the last of the above choices.