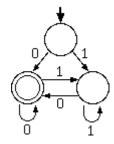
Ars Digita University Theory of Computation Recitation 4, 05/08/01

Topics

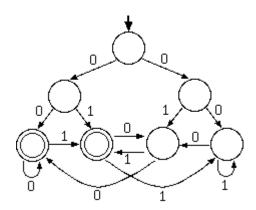
- How to minimize DFA's and why one would.
- Turning a DFA into a Grammar
- Decision Problems.
- Some applications of Regular expressions
- Everything is a string / number.

Problems to work on

- 1. Why do we care about minimizing DFA's?
- 2. Minimize the following DFA. What Language does it generate?

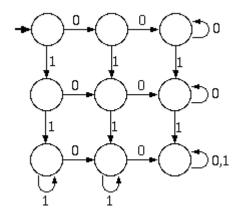


3. Minimize the following DFA. What Language does it generate?

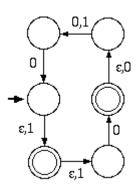


4. Minimize the following DFA. What Language does it generate?

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- 5. Give a regular grammar that generates the same language as the DFA in problem 2.
- 6. Give a regular grammars that generates the same language as the following regular expressions:
 - a. 010*
 - b. a(ab + bc)*
- 7. Is the following a valid argument? Why or why not? The language $L = \{0^m 1^m 2^n \mid m, n >= 0\}$ is not regular, since we already know that $M = \{0^m 1^m \mid m >= 0\}$ is not regular by the pumping lemma, and since L contains M it cannot therefore be regular.
- 8. Prove that the language { $x^{2^n} \mid n \ge 0$ } is not regular.
- 9. Give a decision algorithm which takes as input a regular language L and decides whether L contains the string 1000101.
- 10. Give a decision algorithm which takes as input a regular language L and decides whether L equals the language {1000101}
- 11. Give a decision algorithm which takes as input a regular language L and decides whether L contains the language given by the regular expression 10*10*1
- 12. Miscellaneous problem: Eliminate the espilon transitons of this NFA, without converting it to a DFA (ie, figure out an easier way)



- 13. Mildy Challenging and Surprising Problem: Let L be any language over the alphabet {0}, not necessarily regular. Show that L* is regular.
- 14. Wicked hard challenging problem: Describe a grammar that generates the language $\{0^p \mid p \text{ is a prime }\}$

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