CSCI 341 Problem Set 2

Language Acceptance; Finite and Infinite Automata; Finitely Recognizable Languages

Due Friday, September 12

Language Acceptance

Problem 1 (Pythonic Automaton III)**.** Write a Python script in the same format as the Pythonic Automaton I that implements state s_1 in abstract state diagram (A) from the games and puzzles section. Submit your program as a .py file.

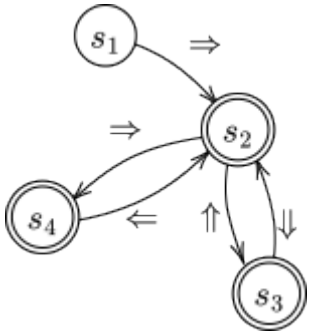

Figure 1: Abstract state diagram (A).

Finite and Infinite Automata

Problem 2 (Unravelling a Language)**.** Draw a state diagram of all of the languages that are reachable from the language $L = \{\varepsilon, aa, ba, cab, c, acab\}$ in the Brzozowski automaton (by taking derivatives). Include all of the double-circles to indicate which languages are accepting states of the Brzozowski automaton. What language is accepted by L?

Problem 3 (Language Accepts Itself)**.** Let $L \subseteq A^*$ be any language. Prove that $\mathcal{L}(\mathcal{A}_{Brz}, L) \subseteq L$.

Finitely Recognizable Languages

Problem 4 (Total vs Partial)**.** Prove that $\mathsf{DFin} = \mathsf{TDFin}$ by describing how to turn a deterministic automaton into a total deterministic automaton without changing the languages accepted by the states.