6CCS3COM Computational Models

Tutorial 2

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1. Build finite automata with alphabet $\{0, 1\}$ to recognise:
   - the language of strings that have three consecutive 0s;
   - the language of strings that do not have three consecutive 1s.
2. Let A be a finite automaton. Show that the set of subwords (that is, prefixes, suffixes, or any continuous segment) of the words in the language associated with A, $L(A)$, can also be recognised by a finite automaton.
3. How can a push-down automaton recognise the language

   $$\{w\bar{w}|w \text{ is a string of } 0\text{s and } 1\text{s and } \bar{w} \text{ is its mirror image}\}?$$

   Give an informal description of such an automaton, and then build the automaton.
4. **Challenge:** Use the Pumping Lemma to show that the language L containing all the words of the form $a^n b^n c^n$, for any $n \geq 0$, cannot be recognised by a finite automaton.