COSE215: Theory of Computation

Lecture 21 — Course Review

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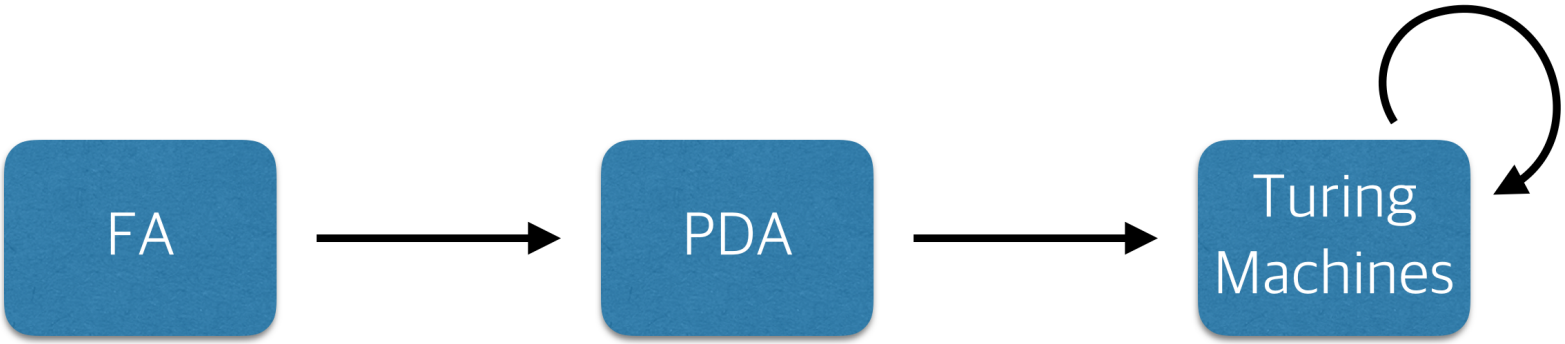
Retrospective: Goal of This Course

In this course, you will learn the most fundamental ideas in computer science:

- What is a computer?
- What is the unique characteristic of computers?
- What can be done by a digital computer?
- What cannot be done by a digital computer?

Restrospective: RoadMap



- Turing Machines
  - Decidability, universal Turing machine
- Pushdown Automata
  - Context-free languages and grammars
  - Applications: e.g., compilers, programming languages, natural language processing, webs, etc.
- Finite Automata
  - Regular expressions and languages
  - Applications: text search, pattern matching, etc.

Restrospective: Overview

- **Part 0:** basic concepts, mathematical backgrounds
- **Part 1:** finite automata, deterministic finite automata, nondeterministic finite automata, equivalence, regular languages, regular expressions, regular grammars, connections between regular languages and expressions/between languages and grammars, closure properties, pumping lemma, etc
- **Part 2:** context-free grammars/languages, parsing and ambiguity, normal forms, nondeterministic pushdown automata, relation with context-free languages, deterministic pushdown automata, pumping lemmas, closure properties, decision algorithms
- **Part 3:** turing machines, standard turing machine, Turing's thesis, variations of Turing machines, nondeterministic Turing machines, universal Turing machine, recursively enumerable languages, computability, decidability, halting problem, reduction, recursive functions, complexity, P/NP

Final Exam

- June 19 (Tue), 2pm
- Coverage: Lectures 10–20

The End

수고 많았습니다!