Welcome to CS301

Why Study Automata?
What the Course is About

◆When developing solutions to real problems, we often confront the limitations of what software can do.

- *Undecidable* things – no program whatever can do it.

- *Intractable* things – there are programs, but no fast programs.

◆We'll learn how to deal formally with discrete systems.

- ◆ Proofs: You never really prove a program correct, but you need to be thinking of why a tricky technique really works.

◆We'll gain experience with abstract models and constructions.

Course Outline

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◆Finite automata, nondeterministic finite automata, regular expressions.

◆Regular Languages and their descriptors.

◆Closure properties of regular languages.

Course Outline

◆pushdown automata,

◆Context-free grammars,

◆Context-free languages and their descriptors,

◆Decision and closure properties.

Course Outline

◆LBA,

◆Context-sensitive grammars,

◆Context-sensitive languages and their descriptors,

◆Decision and closure properties.

Course Outline

◆ Turing machines, decidability of problems.

◆ Recursive and recursively enumerable languages.

◆ Intractable problems.

  ◆ Problems that (appear to) require exponential time.

  ◆ NP-completeness and beyond.

Text

◆ Hopcroft, Motwani, Ullman, *Automata Theory, Languages, and Computation*.

◆ K. L. P Mishra, *The Theory of Automata*

◆ Peter Linz, *Introduction to Formal Languages and Automata*.