Formal definition of PDAs

Atri Rudra
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Announcements

- Turn in your H/W #5
- Pick up a copy of H/W #6

A request

- If you do not understand something in class, ASK a question
- Even if it is a doubt in the slides
  - Where I am thinking of going a bit fast

Puzzle for the day

- Design a PDA for the following language
  \[ \{ xy \mid x,y \in \{0,1\}^* \text{ and } |x|=|y| \text{ but } x \neq y \} \]

Last Lecture

- Designed a few Push Down Automatons
  - PDA = DFA + stack
- Let’s recap by another example
  \[ \{ w \# w^n \mid w \in \{0,1\}^* \} \]

Let’s look at a string in the language

- 1101 # 1011
- How does 1101 look when it is pushed onto a stack?
  - It looks the same as the stuff after the #
  - Just “match” off the rest
Formal definition of a PDA

- PDA $M = (Q, \Sigma, \Gamma, \delta, s, F)$
- $Q$: set of states
- $\Sigma$: input alphabet
- $\Gamma$: stack alphabet
  - Symbols that can be pushed and popped
- $\delta: Q \times \Sigma \cup \{\epsilon\} \times \Gamma \cup \{\epsilon\} \rightarrow 2^{Q \times \Gamma \cup \{\epsilon\}}$  
  - Transition function
- $s \in Q$: start state
- $F \subseteq Q$: final states

Using the previous example

- $Q = \{A,B,C,D\}$
- $\Sigma = \{0,1,\#\}$
- $\Gamma = \{0,1,\$,\#\}$
- $s = A$
- $F = \{D\}$
- The transition from $C$ to $D$
  - $(D,\epsilon) \in \delta(C,\epsilon,\$$)$

Up next…

- Use non-determinism more critically

- $\{ w w^R \mid w \in \{0,1\}^* \}$