A Field Guide to the Chomsky Construction of a grammar from a PDA

Notation: [pXq] will generate all strings w so that $(p,w,X) \stackrel{*}{\Rightarrow} (q,e,e)$

i.e., [pXq] represents all strings that take the PDA from state p to state q while popping X off the stack.

Rule 1: S => $[QZ_0p]$ where Q is the start state, p is any state

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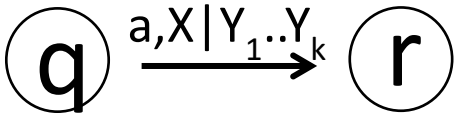
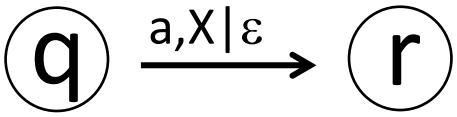
Rule 2: Suppose the PDA has transition



Then for every sequence of k states $r_1..r_k$

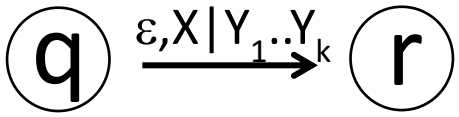
$[qXr_k] \Rightarrow a[rY_1r_1][r_1Y_2r_2] \ldots [r_{k-1}Y_kr_k]$

Rule 3: If there is a transition



then [qXr] => a

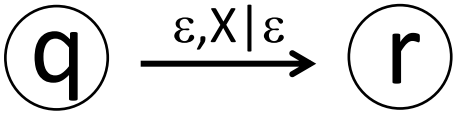
Rule 4: Suppose there is a transition



then for any sequence of states $r_1..r_k$

$[qXr_k] \Rightarrow [rY_1r_1][r_1Y_2r_2] \ldots [r_{k-1}Y_kr_k]$

Rule 5: Suppose there is a transition



then there is a rule $[qXr] \Rightarrow e$