Prove the union of CFLs is a CFL

John Carlyle

December 8, 2013

Define the G_u to be the union of the grammars G_1, G_2. More concretely $G_u = (V_u, \Sigma, S_u, P_u)$, $G_1 = (V_1, \Sigma, S_1, P_1)$ and $S_2 = (V_2, \Sigma, S_2, P_2)$. Assume that $V_1 \cap V_2 = \phi$ since the elements can be arbitrarily renamed.

Let $V_u = V_1 \cup V_2 \cup \{S_u\}$ where S_u is not in V_1 or V_2.

Let $P_u = P_1 \cup P_2 \cup \{S \to S_1 \mid S_2\}$

We must show that $L(G_u) = L_1 \cup L_2$

Firstly $L(G_u) \subseteq L_1 \cup L_2$

bam

Secondly $L_1 \cup L_2 \subseteq L(G_u)$