

10/11/2016

$$G = (\{S, A, B\}, \{a\}, R, S)$$

①

$$R: S \rightarrow AB$$

$$A \rightarrow a$$

$$B \rightarrow \lambda$$

$$\text{NULLABLE} = \{B\}$$

REMOVE λ -RULES

$$S \rightarrow A | AB$$

$$A \rightarrow a$$

$$B \rightarrow$$

CHAINS

$$\text{CHAIN}(S) = \{S, A\}$$

$$\text{CHAIN}(A) = \{A\}$$

$$\text{CHAIN}(B) = \{B\}$$

REMOVE UNIT-RULES

$$S \rightarrow a | AB$$

$$A \rightarrow a$$

$$B \rightarrow$$

CHAINS

$$\text{CHAIN}(S) = \{S\}$$

$$\text{CHAIN}(A) = \{A\}$$

$$\text{CHAIN}(B) = \{B\}$$

REMOVE UNIT-RULES

$$S \rightarrow AB$$

$$A \rightarrow a$$

$$B \rightarrow \lambda$$

$$\text{NULLABLE} = \{B\}$$

REMOVE λ -RULES

$$S \rightarrow A | AB$$

$$A \rightarrow a$$

$$B \rightarrow$$

OOPS!
ORDER DOES MATTER
DO λ -REMOVAL
THEN UNIT-REMOVAL

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(2)

NOW HAVE $G = (\{S, A, B\}, \{a\}, R, S)$

R: $S \rightarrow a \mid AB$

$A \rightarrow a$

$B \rightarrow$

PRODUCTIVE = $\{S, A\}$

REMOVE UNPRODUCTIVE

$S \rightarrow a$

$A \rightarrow a$

USEFUL = $\{S, a\}$

REMOVE UNREACHABLE

$S \rightarrow a$

USEFUL = $\{S, A, B\}$
REMOVE UNREACHABLE
 $S \rightarrow a \mid AB$

$A \rightarrow a$

$B \rightarrow$

PRODUCTIVE = $\{S, A\}$
REMOVE UNPRODUCTIVE
 $S \rightarrow a$
 $A \rightarrow a$

OOPS

ORDER DOES MATTER

DO UNPRODUCTIVE-REMOVAL
THEN UNREACHABLE-REMOVAL

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CFG

Start with Reduced CFG

If $|RHS| = 1$ then $RHS \in \Sigma$

$A \rightarrow a$

So in CUF

If $|RHS| > 1$ then can be mix

of characters from $V \cup \Sigma$

Change ~~not~~ symbols in Σ , say a ,

To $\langle a \rangle$ and add $\langle a \rangle$ to V ,

Plus add rule

$\langle a \rangle \rightarrow a$

Now if $|RHS| > 1$, it is over V +
iteratively change $|RHS| > 2$
like

$A \rightarrow B_1 B_2 \dots B_{k+1}$

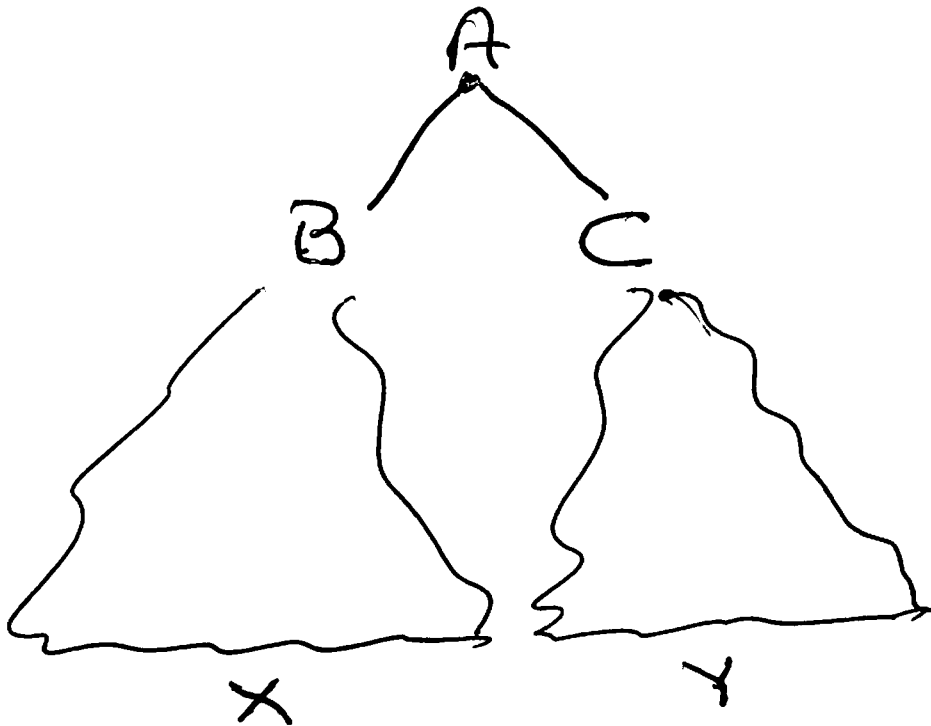
To $A \rightarrow B_1 \langle B_2 \dots B_{k+1} \rangle$

and add
 $\langle B_2 \dots B_{k+1} \rangle \rightarrow B_2 \dots B_{k+1}$
iterate until all $|RHS| \leq 2$

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(4)

$A \rightarrow BC$



IF $|XY| = R$ THEN HAVE CASES

$|X| = 1$ $|Y| = R - 1$

$\vdots$

$|X| = R - 1$ $|Y| = 1$