

Lenguajes Independientes del Contexto

Simplificación de una GIC

Ejercicios

1. $S \rightarrow AB$
 $A \rightarrow aA|abB|aCa|B$
 $B \rightarrow bA|BC|\varepsilon$
 $C \rightarrow \varepsilon$
 $D \rightarrow dB|BCB$

Algoritmo 1

$$\begin{aligned} N' &= \{B, C, A, D, S\} \\ P' &= \{ \\ &\quad B \rightarrow \varepsilon|bA|BC \\ &\quad C \rightarrow \varepsilon \\ &\quad A \rightarrow abB|aCa|B|aA \\ &\quad D \rightarrow dB|BCB \\ &\quad S \rightarrow AB \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB \\ A &\rightarrow abB|aCa|B|aA \\ B &\rightarrow \varepsilon|bA|BC \\ C &\rightarrow \varepsilon \\ D &\rightarrow dB|BCB \end{aligned}$$

Algoritmo 2

$$\begin{aligned} N' &= \{S, A, B, C\} \\ \Sigma' &= \{a, b\} \\ P' &= \{ \\ &\quad S \rightarrow AB \\ &\quad A \rightarrow abB|aCa|B|aA \\ &\quad B \rightarrow \varepsilon|bA|BC \\ &\quad C \rightarrow \varepsilon \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB \\ A &\rightarrow abB|aCa|B|aA \\ B &\rightarrow \varepsilon|bA|BC \\ C &\rightarrow \varepsilon \end{aligned}$$

Algoritmo 3

$$\begin{aligned} \mathcal{N} &= \{B, C, A, S\} \\ P' &= \{ \\ &\quad S \rightarrow AB|A|B|\varepsilon \\ &\quad A \rightarrow abB|aCa|B|aA|ab|aa|a \\ &\quad B \rightarrow bA|BC|b|B|C \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB|A|B|\varepsilon \\ A &\rightarrow abB|aCa|B|aA|ab|aa|a \\ B &\rightarrow bA|BC|b|B|C \end{aligned}$$

Algoritmo 4

$$\begin{aligned} \text{Unitario (S)} &= \{S, A, B, C\} \\ \text{Unitario (A)} &= \{A, B, C\} \\ \text{Unitario (B)} &= \{B, C\} \\ P' &= \{ \\ &\quad S \rightarrow AB|A|B|\varepsilon|abB|aCa|aA|ab|aa|a|bA|BC|b \\ &\quad A \rightarrow abB|aCa|B|aA|ab|aa|a|bA|BC|b \\ &\quad B \rightarrow bA|BC|b|B|C \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB|\varepsilon|abB|aCa|aA|ab|aa|a|bA|BC|b \\ A &\rightarrow abB|aCa|aA|ab|aa|a|bA|BC|b \\ B &\rightarrow bA|BC|b \end{aligned}$$

Algoritmo 1

$$\begin{aligned} N' &= \{S, A, B\} \\ P' &= \{ \\ &\quad S \rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ &\quad A \rightarrow ab|aa|a|b|abB|aA|bA \\ &\quad B \rightarrow b|bA \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ A &\rightarrow ab|aa|a|b|abB|aA|bA \\ B &\rightarrow b|bA \end{aligned}$$

Algoritmo 5

Paso 1

$$\begin{aligned} S &\rightarrow \varepsilon|C_aC_b|C_aC_a|a|b|AB|C_aC_bB|C_aA|C_bA \\ A &\rightarrow C_aC_b|C_aC_a|a|b|C_aC_bB|C_aA|C_bA \\ B &\rightarrow b|C_bA \\ C_a &\rightarrow a \\ C_b &\rightarrow b \end{aligned}$$

Paso 2

$$\begin{aligned} S &\rightarrow \varepsilon|C_aC_b|C_aC_a|a|b|AB|C_aD_1|C_aA|C_bA \\ A &\rightarrow C_aC_b|C_aC_a|a|b|C_aD_1|C_aA|C_bA \\ B &\rightarrow b|C_bA \\ C_a &\rightarrow a \\ C_b &\rightarrow b \\ D_1 &\rightarrow C_bB \end{aligned}$$

Algoritmo 3

$$\begin{aligned} \mathcal{N} &= \{B, C, A, D, S\} \\ P' &= \{ \\ &\quad S \rightarrow AB|A|B|\varepsilon \\ &\quad A \rightarrow aA|abB|aCa|B|a|ab|aa \\ &\quad B \rightarrow bA|BC|b|B|C \\ &\quad D \rightarrow dB|BCB|d|CB|BB|BC|B|C \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB|A|B|\varepsilon \\ A &\rightarrow aA|abB|aCa|B|a|ab|aa \\ B &\rightarrow bA|BC|b|B|C \\ D &\rightarrow dB|BCB|d|CB|BB|BC|B|C \end{aligned}$$

Algoritmo 4

$$\begin{aligned} \text{Unitario (S)} &= \{S, A, B, C\} \\ \text{Unitario (A)} &= \{A, B, C\} \\ \text{Unitario (B)} &= \{B, C\} \\ \text{Unitario (D)} &= \{D, B, C\} \\ P' &= \{ \\ &\quad S \rightarrow AB|A|B|\varepsilon|abB|aCa|aA|ab|aa|a|bA|BC|b \\ &\quad A \rightarrow abB|aCa|B|aA|ab|aa|a|bA|BC|b \\ &\quad B \rightarrow bA|BC|b|B|C \\ &\quad D \rightarrow dB|BCB|d|CB|BB|BC|B|C|bA|b \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow AB|\varepsilon|abB|aCa|aA|ab|aa|a|bA|BC|b \\ A &\rightarrow abB|aCa|aA|ab|aa|a|bA|BC|b \\ B &\rightarrow bA|BC|b \\ D &\rightarrow dB|BCB|d|CB|BB|BC|bA|b \end{aligned}$$

Algoritmo 1

$$\begin{aligned} N' &= \{S, A, B, D\} \\ P' &= \{ \\ &\quad S \rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ &\quad A \rightarrow ab|aa|a|b|abB|aA|bA \\ &\quad B \rightarrow b|bA \\ &\quad D \rightarrow d|b|dB|BB|bA \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ A &\rightarrow ab|aa|a|b|abB|aA|bA \\ B &\rightarrow b|bA \\ D &\rightarrow d|b|dB|BB|bA \end{aligned}$$

Algoritmo 2

$$\begin{aligned} N' &= \{S, A, B\} \\ \Sigma' &= \{a, b\} \\ P' &= \{ \\ &\quad S \rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ &\quad A \rightarrow ab|aa|a|b|abB|aA|bA \\ &\quad B \rightarrow b|bA \\ &\} \end{aligned}$$

$$\begin{aligned} S &\rightarrow \varepsilon|ab|aa|a|b|AB|abB|aA|bA \\ A &\rightarrow ab|aa|a|b|abB|aA|bA \\ B &\rightarrow b|bA \end{aligned}$$

Algoritmo 5

Paso 1

$$\begin{aligned} S &\rightarrow \varepsilon|C_aC_b|C_aC_a|a|b|AB|C_aC_bB|C_aA|C_bA \\ A &\rightarrow C_aC_b|C_aC_a|a|b|C_aC_bB|C_aA|C_bA \\ B &\rightarrow b|C_bA \\ C_a &\rightarrow a \\ C_b &\rightarrow b \end{aligned}$$

Paso 2

$$\begin{aligned} S &\rightarrow \varepsilon|C_aC_b|C_aC_a|a|b|AB|C_aD_1|C_aA|C_bA \\ A &\rightarrow C_aC_b|C_aC_a|a|b|C_aD_1|C_aA|C_bA \\ B &\rightarrow b|C_bA \\ C_a &\rightarrow a \\ C_b &\rightarrow b \\ D_1 &\rightarrow C_bB \end{aligned}$$

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Simplificación de una GIC

Ejercicios

2.
- $S \rightarrow ACBa \mid D$
 $A \rightarrow bbC \mid \varepsilon$
 $B \rightarrow Sc \mid ddd$
 $C \rightarrow eA \mid f \mid C$
 $D \rightarrow E \mid SABC$
 $E \rightarrow gh \mid \varepsilon$

Algoritmo 1

$N'=\{A, B, C, E, S, D\}$
 $P'=\{$
 $A \rightarrow \varepsilon \mid bbC$
 $B \rightarrow ddd \mid Sc$
 $C \rightarrow f \mid eA \mid C$
 $E \rightarrow gh \mid \varepsilon$
 $S \rightarrow ACBa \mid D$
 $D \rightarrow E \mid SABC$
 $\}$

$S \rightarrow ACBa \mid D$
 $A \rightarrow \varepsilon \mid bbC$
 $B \rightarrow ddd \mid Sc$
 $C \rightarrow f \mid eA \mid C$
 $D \rightarrow E \mid SABC$
 $E \rightarrow gh \mid \varepsilon$

Algoritmo 2

$N'=\{S, A, C, B, D, E\}$
 $\Sigma'=\{a, b, d, c, f, e, g, h\}$
 $P'=\{$
 $S \rightarrow ACBa \mid D$
 $A \rightarrow \varepsilon \mid bbC$
 $B \rightarrow ddd \mid Sc$
 $C \rightarrow f \mid eA \mid C$
 $D \rightarrow E \mid SABC$
 $E \rightarrow gh \mid \varepsilon$
 $\}$

$S \rightarrow ACBa \mid D$
 $A \rightarrow \varepsilon \mid bbC$
 $B \rightarrow ddd \mid Sc$
 $C \rightarrow f \mid eA \mid C$
 $D \rightarrow E \mid SABC$
 $E \rightarrow gh \mid \varepsilon$

Algoritmo 3

$\mathcal{N}=\{A, E, D, S\}$
 $P'=\{$
 $S \rightarrow ACBa \mid D \mid \varepsilon \mid CBa$
 $A \rightarrow bbC$
 $B \rightarrow ddd \mid Sc \mid c$
 $C \rightarrow f \mid eA \mid C \mid e$
 $D \rightarrow E \mid SABC \mid ABC \mid SBC \mid BC$
 $E \rightarrow gh$
 $\}$

$S \rightarrow ACBa \mid D \mid \varepsilon \mid CBa$
 $A \rightarrow bbC$
 $B \rightarrow ddd \mid Sc \mid c$
 $C \rightarrow f \mid eA \mid C \mid e$
 $D \rightarrow E \mid SABC \mid ABC \mid SBC \mid BC$
 $E \rightarrow gh$

Algoritmo 4

Unitario (S)={S, D, E}
Unitario (A)={A}
Unitario (B)={B}
Unitario (C)={C}
Unitario (D)={D, E}
Unitario (E)={E}

$P'=\{$
 $S \rightarrow ACBa \mid \textcolor{red}{D} \mid \varepsilon \mid CBa \mid SABC \mid ABC \mid SBC \mid BC \mid gh$
 $A \rightarrow bbC$
 $B \rightarrow ddd \mid Sc \mid c$
 $C \rightarrow f \mid eA \mid \textcolor{red}{C} \mid e$
 $D \rightarrow \textcolor{red}{E} \mid SABC \mid ABC \mid SBC \mid BC \mid gh$
 $E \rightarrow gh$
 $\}$

$S \rightarrow ACBa \mid \varepsilon \mid CBa \mid SABC \mid ABC \mid SBC \mid BC \mid gh$
 $A \rightarrow bbC$
 $B \rightarrow ddd \mid Sc \mid c$
 $C \rightarrow f \mid eA \mid e$
 $D \rightarrow SABC \mid ABC \mid SBC \mid BC \mid gh$
 $E \rightarrow gh$

Algoritmo 5

Paso 1

$S \rightarrow ACBC_a \mid \varepsilon \mid CBC_a \mid SABC \mid ABC \mid SBC \mid \textcolor{blue}{BC} \mid \textcolor{blue}{C_g}C_h$
 $A \rightarrow C_bC_bC$
 $B \rightarrow C_dC_dC_d \mid \textcolor{blue}{SC_c} \mid \textcolor{blue}{c}$
 $C \rightarrow \textcolor{blue}{f} \mid \textcolor{blue}{C_e}A \mid \textcolor{blue}{e}$
 $D \rightarrow SABC \mid ABC \mid SBC \mid \textcolor{blue}{BC} \mid \textcolor{blue}{C_g}C_h$
 $E \rightarrow \textcolor{blue}{C_g}C_h$
 $C_a \rightarrow \textcolor{blue}{a}$
 $C_g \rightarrow \textcolor{blue}{g}$
 $C_h \rightarrow \textcolor{blue}{h}$
 $C_b \rightarrow \textcolor{blue}{b}$
 $C_d \rightarrow \textcolor{blue}{d}$
 $C_c \rightarrow \textcolor{blue}{c}$
 $C_e \rightarrow \textcolor{blue}{e}$

Paso 2

$S \rightarrow \textcolor{blue}{AD}_1 \mid \varepsilon \mid \textcolor{blue}{CD}_2 \mid \textcolor{blue}{SD}_3 \mid \textcolor{blue}{AD}_4 \mid \textcolor{blue}{SD}_4 \mid \textcolor{blue}{BC} \mid \textcolor{blue}{C_g}C_h$
 $A \rightarrow \textcolor{blue}{C_b}D_5$
 $B \rightarrow \textcolor{blue}{C_d}D_6 \mid \textcolor{blue}{SC_c} \mid \textcolor{blue}{c}$
 $C \rightarrow \textcolor{blue}{f} \mid \textcolor{blue}{C_e}A \mid \textcolor{blue}{e}$
 $D \rightarrow \textcolor{blue}{SD}_3 \mid \textcolor{blue}{AD}_4 \mid \textcolor{blue}{SD}_4 \mid \textcolor{blue}{BC} \mid \textcolor{blue}{C_g}C_h$
 $E \rightarrow \textcolor{blue}{C_g}C_h$
 $C_a \rightarrow \textcolor{blue}{a}$ $D_1 \rightarrow \textcolor{blue}{CD}_2$
 $C_g \rightarrow \textcolor{blue}{g}$ $D_2 \rightarrow \textcolor{blue}{BC}_a$
 $C_h \rightarrow \textcolor{blue}{h}$ $D_3 \rightarrow \textcolor{blue}{AD}_4$
 $C_b \rightarrow \textcolor{blue}{b}$ $D_4 \rightarrow \textcolor{blue}{BC}$
 $C_d \rightarrow \textcolor{blue}{d}$ $D_5 \rightarrow \textcolor{blue}{C_b}C$
 $C_c \rightarrow \textcolor{blue}{c}$ $D_6 \rightarrow \textcolor{blue}{C_d}C_d$
 $C_e \rightarrow \textcolor{blue}{e}$