Разпознаване дали някоя дума е в граматиката

Нека $\alpha = a_1 a_2 \dots a_n$

$V[i][j] = \{A \in V \mid A \overset{*}{\Delta} a_i \dots a_j\}$

$V[i][i] = \{A \in V \mid A \to a\}$ (дадено в граматиката)

def. belong(G, α) (Алгоритъм)

$n = |\alpha|$

for all $i < n$

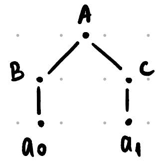
$V[i][i] = \{A \in V \mid A \to \alpha[i]\}$

for all $j = i+1$ to $n-1$

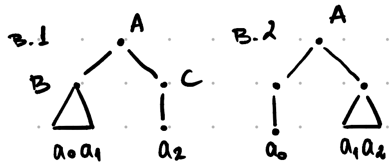
$V[i][j] = \emptyset$

Начална стъпка

разгл. $A \overset{*}{\Delta} a_0 a_1$



разгл. $A \overset{*}{\Delta} a_0 a_1 a_2$

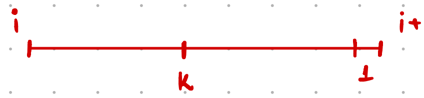


разгл. . . .

for $s=1$ to $n-1$ do: подава интервал

for $i=0$ to $n-s-1$ do: търси мн-вото $V[i][i+s]$

for $k=i$ to $i+s-1$ do: разцепва мн-вото на познати такива



for all $A \to BC$ in G & $B \in V[k][i+k]$ & $C \in V[i+k+1][i+s]$ do:

в лява под. в дясна под.

put A into $V[i][i+s]$

if $S \in V[0][n-1]$ return true

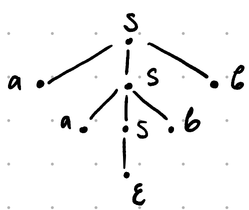
else return false.

Недетерминирани стекови автомати

$\mathcal{L}^{\ell+1}_G(A) = \dots \mathcal{L}^{\ell}(B)$

Нека имаме граматика G:

$S \to aSb \mid \varepsilon$



Обхождане по дълбочина

def. $P(Q, \Sigma, \Gamma, \#, \Delta, q_{start}, q_{accept})$

Q - крайно мн-во състояния, $q_{start}, q_{accept} \in Q$

Σ - входна азбука

Γ - азбука на стека

$\#$ - специален символ, $\# \in \Gamma$, $\# \notin \Sigma$

Δ - функция на преход $\quad \Delta: Q \times (\Sigma \cup \{\varepsilon\}) \times \Gamma \longrightarrow \underset{\text{(power set)}}{\mathcal{P}}(Q \times \Gamma^{\leq 2})$

$\vdash_P$ бинарна релация над мн-вото $Q \times \Sigma^* \times \Gamma^*$

$$\frac{\Delta(q, x, A) \ni (p, \mu)}{(q, x\alpha, A\beta) \vdash_P (p, \alpha, \mu\beta)}$$

в норм. автомати $\quad \dfrac{\delta(q, x) = p}{(q, x\alpha) \vdash (p, \alpha)}$

$$\mathcal{L}(P) = \{\alpha \in \Sigma^* \mid (q_{start}, \alpha, \#) \vdash_P^* (q_{accept}, \varepsilon, \varepsilon)\}$$

Нека $k \in Q \times (\Sigma \cup \{\varepsilon\}) \times \Gamma^*$

$$\frac{}{k \vdash_P^0 k} \qquad \frac{k \vdash_P k' \quad k' \vdash_P^{\ell} k^*}{k \vdash_P^{\ell+1} k^*} \qquad k \vdash_P^* k' \iff (\exists \ell)[k \vdash_P^{\ell} k']$$

$L = \{a^n b^n \mid n \in \mathbb{N}\}$ деф. стеков автомат P $\quad L = \mathcal{L}(P)$

$\Gamma = \{\#, a\}$

$Q = \{q_{start}, q, q_{accept}\}$

1. $\Delta(q_{start}, \varepsilon, \#) = \{(q_{accept}, \varepsilon)\}$
2. $\Delta(q_{start}, a, \#) = \{(q_{start}, a\#)\}$
3. $\Delta(q_{start}, a, a) = \{(q_{start}, aa)\}$
4. $\Delta(q_{start}, b, a) = \{(q, \varepsilon)\}$
5. $\Delta(q, b, a) = \{(q, \varepsilon)\}$
6. $\Delta(q, \varepsilon, \#) = \{(q_{accept}, \varepsilon)\}$

върх на стека

$(q_{start}, a^2b^2, \#) \vdash^{(2)} (q_{start}, ab^2, a\#)$

$\vdash^{(3)} (q_{start}, b^2, a^2\#)$

$\vdash^{(4)} (q, b, a\#)$ (намерили сме a отг. на b)

$\vdash^{(5)} (q, \varepsilon, \#)$ (прочели сме думата)

$\vdash^{(6)} (q_{accept}, \varepsilon, \varepsilon)$ finish

$L = \{ \omega\omega^{rev} \mid \omega \in \{a,b\}^* \}$

$\Gamma = \{a, b, \#\}$

$Q = \{q, p, f\}$

q ↑ начално, f ↑ финално

$\Delta(q,\varepsilon,\#) = \{(f,\varepsilon)\}$

$\Delta(q,x,\#) = \{(q,x\#)\}$ $\quad x = a$ или $x = b$

$\Delta(q,x,y) = \{(q,xy)\}$ $\quad x \in \{a,b\} \quad y \in \{a,b\}$

$\Delta(q,x,x) = \{(q,xx),(q,\varepsilon)\}$

$\Delta(p,x,x) = \{(p,\varepsilon)\}$

$\Delta(p,\varepsilon,\#) = \{(f,\varepsilon)\}$

пример

$\underline{abbb|bbba}$

	$\cancel{b}$
p	$\cancel{b}$
p	$\cancel{b}$
p	$\cancel{a}$
p	$\#$

Твърдение
$$\frac{(q, \alpha_1, A_1) \vdash^{l_1} (p,\varepsilon,\varepsilon) \qquad (p,\alpha_2,A_2) \vdash^{l_2} (r,\varepsilon,\varepsilon)}{(q, \alpha_1\alpha_2, A_1A_2) \vdash^{l_1+l_2} (r,\varepsilon,\varepsilon)} \qquad l_1, l_2 \neq 0$$

$$\frac{\dfrac{(q,\alpha_1,A_1) \vdash^{l_1} (p,\varepsilon,\varepsilon)}{(q,\alpha_1\alpha_2,A_1A_2) \vdash^{l_1} (p,\alpha_2,A_2)} \qquad (p,\alpha_2,A_2) \vdash^{l_2} (r,\varepsilon,\varepsilon)}{(q,\alpha_1\alpha_2,A_1A_2) \vdash^{l_1+l_2} (r,\varepsilon,\varepsilon)}$$

$$\frac{(q,\alpha,\beta) \vdash (p,\alpha',\beta')}{(q,\alpha\alpha_2,\beta\rho) \vdash (p,\alpha\alpha_2,\gamma\rho)}$$

$$\frac{(q,\alpha,A_\gamma) \vdash^{l} (p,\varepsilon,\varepsilon)}{(q,\alpha_1,A) \vdash^{l_1} (r,\varepsilon,\varepsilon) \quad (r,\alpha_2,\gamma) \vdash^{l_2} (p,\varepsilon,\varepsilon)} \qquad l_1 + l_2 = l$$