⇒ AUDITORNE

aa ≥ ab b>a

aaab ⇒ aabab ⇒ aabaa

aabaa

aa - ab

aa b ab

V(i,j)

V(3,3) = D("aaa", "aab") = 1

V(i,j) = V(i-1, j-1) + cost(S[i], T[j]) ⇒ poravnamo 2 znaka

V(i-1, j) + cost(S[i], -) znak sa -

V(i, j-1) + cost(-, T[j]) + sa znakom

V(0,0) = 0 V(i,0) = V(i-1,0) + cost(S[i], -)

V(0,j) = V(0,j-1) + cost(-, T[j])

① S = a c b c d b T = c a b a b

		0	1	2	3	4	5
		-	c	a	b	d	b
0		0	1	2	3	4	5
1	a	1	1	1	2	3	4
2	c	2	1	2	2	3	4
3	b	3	2	2	2	3	3
4	c	4	3	3	3	3	4
5	d	5	4	4	4	3	4
6	b	6	5	5	4	4	3

② xEWi uko xEL(Gi) CYK parser

W1 W2

S⇒AB S⇒AB

A⇒AbB|a A⇒AaB|b

B⇒bC|a B⇒aC|b

C⇒a|b C⇒a|b

x = "babaa"

S ⇒ AB

A ⇒ ADB | a

D ⇒ b

B ⇒ DC | a

C ⇒ a | b

A ⇒ a	Chomsky
A ⇒ BC	oblik

S ⇒ AB
A ⇒ EB | a
E ⇒ AD
B ⇒ DC | a

C ⇒ a | b
D ⇒ b

duljina riječi

5					
4					
3					
2					
1	C,D	A,B,C	C,D	A,B,C	A,B,C
	b	a	b	a	a

niz počinje sa tim rukom

isto, samo veće →

5	/				
4	/	S			
3	/	S,A	/		
2	B	E	B	S	
1	C,D	A,B,C	C,D	A,B,C	A,B,C
	b	a	b	a	a

ba
(b) (a)
(C,D) (A,B,C)

ab
(a) (b)
(A,B,C) (C,D)

(a) (a)
(A,B,C) (A,B,C)

bab
(b) (ab)
(C,D) (E) / → (ba) (b)
(B) (C,D) /

aba
(a) (ba)
(A,B,C) (B) → (ab) (a)
(E) (A,B,C)

baa
(b) (aa)
(DC) (S)

(ba) (a)
(B) (A,B,C)

baba
(b) (aba)
(DC) (SA) /

(ba) (ba)
(B) (B) /

(bab) (a)
/

abaa
(a) (baa)
(A,B,C) /

(ab) (aa)
(E) (S) /

(aba) (a)
(S,A) (A,B,C)

babaa
(b) (abaa)
(C,D) (S,A)

(ba) (baa)
(B) /

(bab) (aa)
/ (S)

(baba) (a)
/ (A,B,C)

$\vec{x} \in w_i$ ako $P(w_i|\vec{x}) > P(w_j|\vec{x}) \quad \forall j \neq i$

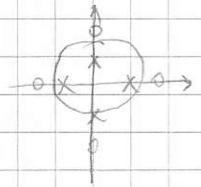
$$p(\vec{x}|w_i) \cdot P(w_i) > p(\vec{x}|w_j) P(w_j)$$

$$p(\vec{x}|w_i) = \frac{1}{(2\pi)^{d/2} |C_i|^{1/2}} e^{-\frac{1}{2}(\vec{x}-m_i)^T C_i^{-1} (\vec{x}-m_i)}$$

$$d_i = \ln P(w_i) - \frac{1}{2} \ln |C_i| - \frac{1}{2}\left[(\vec{x}-m_i)^T C_i^{-1} (\vec{x}-m_i)\right]$$

③ $w_1 = \{ [-1,0], [0,-1], [1,0], [0,1] \}$

$w_2 = \{ [-2,0], [0,-2], [2,0], [0,2] \}$.



$$P(w_1) = \frac{N_1}{N} = \frac{4}{8} = \frac{1}{2}$$

$$P(w_2) = \frac{N_2}{N} = \frac{1}{2}$$

$$\vec{m}_1 = \frac{1}{N_1} \sum_{x \in w_i} \vec{x} = \frac{1}{4}\left(\begin{bmatrix}-1\\0\end{bmatrix} + \begin{bmatrix}0\\1\end{bmatrix} + \begin{bmatrix}1\\0\end{bmatrix} + \begin{bmatrix}0\\1\end{bmatrix}\right)$$

$$= \frac{1}{4}\begin{bmatrix}0\\0\end{bmatrix} = \vec{0}$$

$$\vec{m}_2 = \frac{1}{N_2} \sum_{x \in w_2} \vec{x} = \vec{0}$$

$$C_1 = \frac{1}{N_1} \sum_{x \in w_1} (\vec{x} - \vec{m}_1)(\vec{x} - \vec{m}_1)^T = \frac{1}{4}\left(\begin{bmatrix}-1\\0\end{bmatrix}\begin{bmatrix}-1&0\end{bmatrix} + \begin{bmatrix}0\\-1\end{bmatrix}\begin{bmatrix}0&-1\end{bmatrix} + \begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}1&0\end{bmatrix} + \begin{bmatrix}0\\1\end{bmatrix}\begin{bmatrix}0&1\end{bmatrix}\right)$$

$$= \frac{1}{4}\left(\begin{bmatrix}1&0\\0&0\end{bmatrix} + \begin{bmatrix}0&0\\0&1\end{bmatrix} + \begin{bmatrix}1&0\\0&0\end{bmatrix} + \begin{bmatrix}0&0\\0&1\end{bmatrix}\right) = \frac{1}{4}\begin{bmatrix}2&0\\0&2\end{bmatrix} =$$

$$\begin{bmatrix}1/2&0\\0&1/2\end{bmatrix} = \frac{1}{2} I$$

$$C_2 = \frac{1}{N_2} \sum_{x \in w_2} (\vec{x} - \vec{m}_2)(\vec{x} - m_2)^T = 2I$$

$$|C_1| = \begin{vmatrix}1/2&0\\0&1/2\end{vmatrix} = \frac{1}{4} \qquad |C_2| = \begin{vmatrix}2&0\\0&2\end{vmatrix} = 4$$

$$C_1^{-1} = \begin{bmatrix}2&0\\0&2\end{bmatrix} \qquad C_2^{-1} = \begin{bmatrix}\frac{1}{2}&0\\0&1/2\end{bmatrix}$$

$$d_i(\vec{x}) = \ln P(w_i) = \frac{1}{2} \ln |C_i| - \frac{1}{2}\left[(\vec{x}-m_i)^T C_i^{-1} (\vec{x}-\vec{m}_i)\right]$$

$$d_1 - d_2 = 0$$

$$-\frac{1}{2}\ln|C_1| - \frac{1}{2}\left[(\vec{x}-\vec{m}_1)^T C_1^{-1}(\vec{x}-m_1)\right] + \frac{1}{2}\ln|C_2| + \frac{1}{2}\left[(\vec{x}-\vec{m}_2)^T C_2^{-1}(\vec{x}-\vec{m}_2)\right] = 0$$

$$-\frac{1}{2}\ln\left(\frac{1}{4}\right) - \frac{1}{2}\vec{x}^T 2I\vec{x} + \frac{1}{2}\ln(4) + \frac{1}{2}\vec{x}^T \frac{1}{2} I \vec{x} = 0$$

$$0{,}693 - \vec{x}^T\vec{x} + 0{,}693 + \frac{1}{4}\vec{x}^T\vec{x} = 0$$

$$1{,}386 - \frac{3}{4}(\vec{x}^T\vec{x}) = 0$$

$$1{,}386 - \frac{3}{4}(x_1^2 + x_2^2) = 0 \quad / \cdot 4/3$$

$$x_1^2 + x_2^2 = 1{,}848$$

$$r = 1{,}36$$

④ $x_1 = [0, 0]^T$

$x_2 = [2, 3]^T$

$x_3 = [5, 3]^T$

$x_4 = [3, 2]^T$

$x_5 = [1, 4]^T$

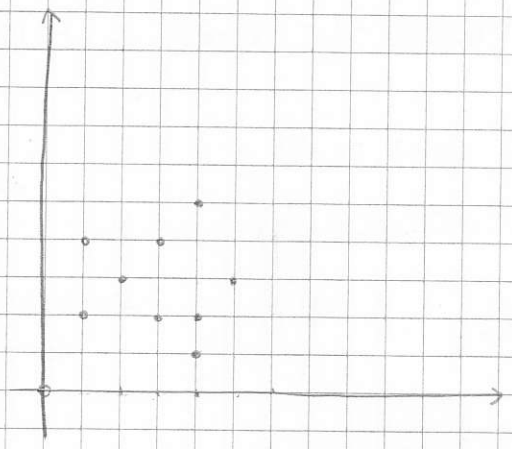
$x_6 = [4, 1]^T$

$x_7 = [1, 2]^T$

$x_8 = [3, 4]^T$

$x_9 = [4, 5]^T$

$x_{10} = [4, 2]^T$



$c = 0{,}5$

① $\vec{z}_1 = \vec{x}_1 = [0, 0]^T$

	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}
z_1	$\sqrt{13}$	$\sqrt{34}$	$\sqrt{13}$	$\sqrt{17}$	$\sqrt{17}$	$\sqrt{5}$	$\sqrt{25}$	$\sqrt{41}$	$\sqrt{20}$
z_2	$\sqrt{8}$	$\sqrt{5}$	$\sqrt{10}$	$\sqrt{10}$	$\sqrt{16}$	$\sqrt{18}$	$\sqrt{2}$		$\sqrt{9}$
z_3	$\sqrt{8}$	$\sqrt{5}$	$\sqrt{2}$	$\sqrt{18}$		$\sqrt{10}$	$\sqrt{10}$		1

② približim od tu ↓

③ po max od zaokruženih ⇒ $\sqrt{16} = 4 = D_{max}$

$c \cdot T = 0{,}5 \cdot \sqrt{41} = 3{,}2$

$D_{max} > c \cdot T$

$\vec{z}_3 = \vec{x}_6 = [4, 1]^T$

④ $D_{max} = \sqrt{10} < c \cdot T$ algoritam staje

$S_1 = \{ \vec{x}_1, \vec{x}_7 \}$

$S_2 = \{ \vec{x}_9, \vec{x}_2, \vec{x}_3, \vec{x}_5, \vec{x}_8 \}$

$S_3 = \{ \vec{x}_6, \vec{x}_4, \vec{x}_{10} \}$

5. $x_1 = [0,0]^T$

$x_2 = [3,8]^T$

$x_3 = [2,2]^T$

$x_4 = [1,1]^T$

$x_5 = [5,3]^T$

$x_6 = [4,8]^T$

$x_7 = [6,3]^T$

$x_8 = [5,4]^T$

$x_9 = [6,4]^T$

$x_{10} = [7,5]^T$

① $\vec{z}_1 = \vec{x}_1 = [0,0]^T$

$\vec{z}_2 = \vec{x}_2 = [3,8]^T$

$\vec{z}_3 = \vec{x}_3 = [2,2]^T$

$S_1(1) = \{\vec{x}_1, \vec{x}_4\}$

$S_2(1) = \{\vec{x}_2, \vec{x}_6, \vec{x}_{10}\}$

$S_3(1) = \{\vec{x}_3, \vec{x}_5, \vec{x}_7, \vec{x}_8, \vec{x}_9\}$

$\vec{z}_1(2) = \frac{1}{2}\left(\begin{bmatrix}0\\0\end{bmatrix} + \begin{bmatrix}1\\1\end{bmatrix}\right) = \begin{bmatrix}1/2\\1/2\end{bmatrix}$

$\vec{z}_2(2) = \frac{1}{3}(\quad) = \begin{bmatrix}14/3\\7\end{bmatrix}$

$\vec{z}_3(2) = \frac{1}{5}(\quad) = \begin{bmatrix}24/5\\16/5\end{bmatrix}$

$S_1 = \{\vec{x}_1, \vec{x}_4, \vec{x}_3\}$

$S_2 = \{\vec{x}_2, \vec{x}_6\}$

$S_3 = \{\vec{x}_5, \vec{x}_7, \vec{x}_8, \vec{x}_9, \vec{x}_{10}\}$

$z_1 = \frac{1}{3}(\quad) = \begin{bmatrix}1\\1\end{bmatrix}$

$z_2 = \frac{1}{2}(\quad) = \begin{bmatrix}3,5\\8\end{bmatrix}$

$z_3 = \frac{1}{5}(\quad) = \begin{bmatrix}5,8\\3,8\end{bmatrix}$

$S_1 = \{\vec{x}_1, \vec{x}_4, \vec{x}_3\}$

$S_2 = \{\vec{x}_2, \vec{x}_6\}$

$S_3 = \{\vec{x}_5, \vec{x}_7, \vec{x}_8, \vec{x}_9, \vec{x}_{10}\}$