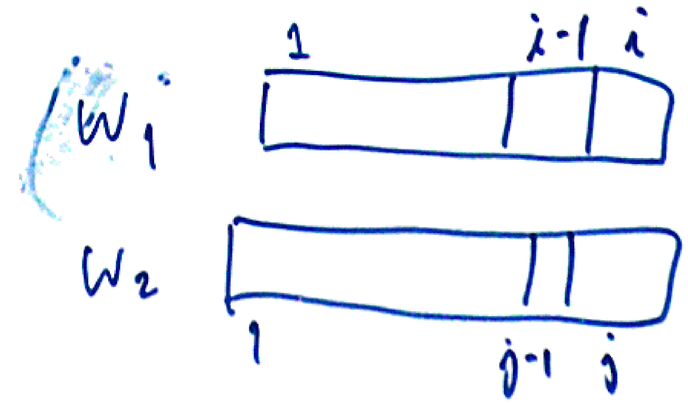
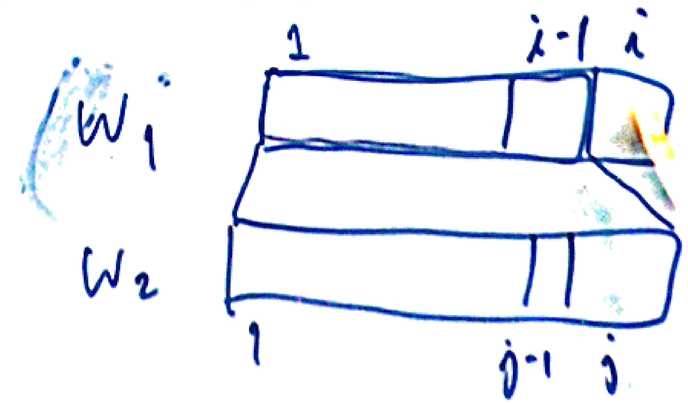
$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$



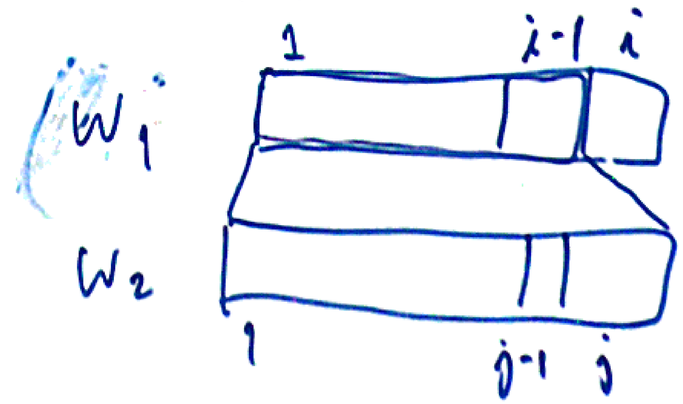
$$ed(i,j) = \begin{array}{l} ed(i-1,j)+1 \\ ed(i,j \end{array}$$

$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$



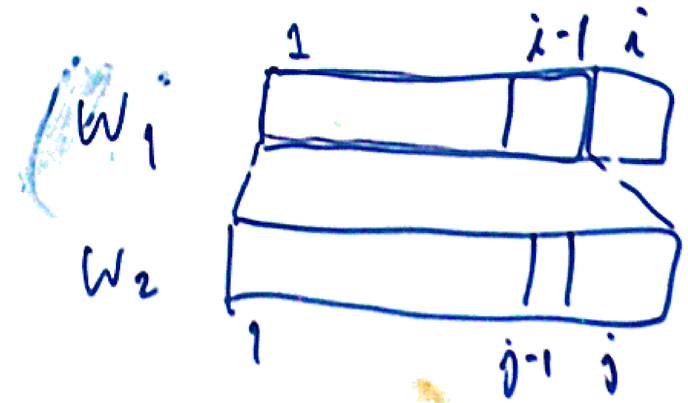
$$ed(i,j) = \begin{cases} ed(i-1,j)+1 \\ ed(i,j \end{cases}$$

$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$



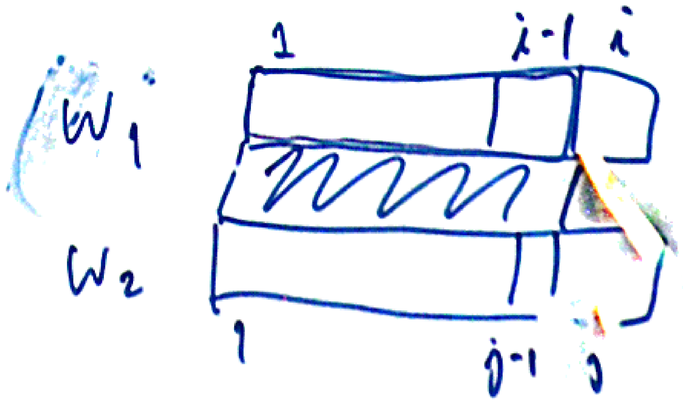
$$ed(i,j) = \begin{array}{l} ed(i-1,j)+1 \\ ed(i,j \end{array}$$

$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$



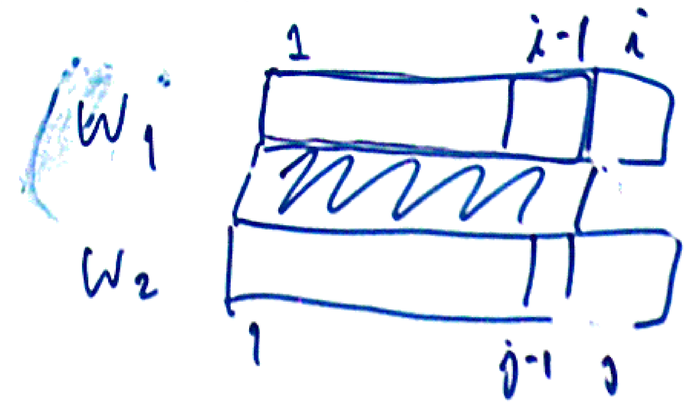
$$ed(i,j) = \begin{array}{l} ed(i-1,j)+1 \\ ed(i,j-1) \end{array}$$

$$ed(i,j) = ed(w_1[1,i],\ w_2[1,j])$$



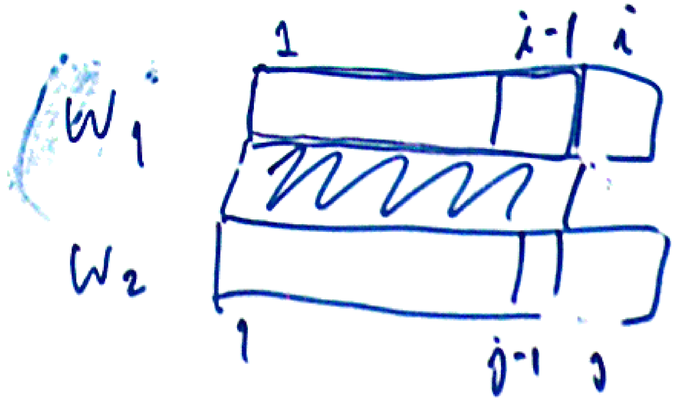
$$ed(i,j) = \min\{ ed(i-1,j)+1,\ ed(i,j-1)+1,\ ed(i-1,j-1) + dif(i,j) \}$$

$$ed(i,j) = ed(w_1[1,i],\ w_2[1,j])$$



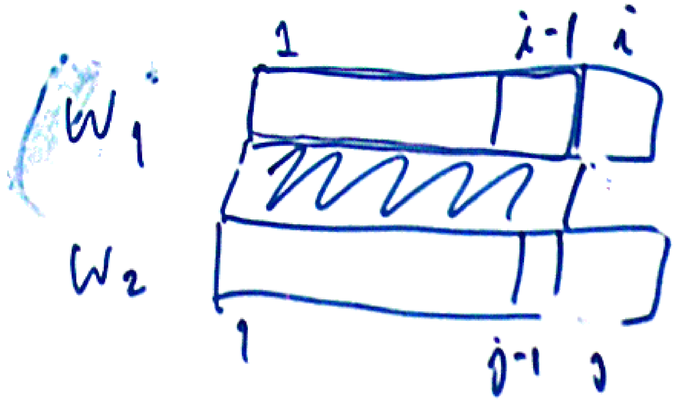
$$ed(i,j) = \min\{ ed(i-1,j)+1,\ ed(i,j-1)+1,\ ed(i-1,j-1) + dif(i,j) \}$$

$$ed(i,j) = ed(w_1[1,i],\ w_2[1,j])$$



$$ed(i,j) = \min\{ ed(i-1,j)+1,\ ed(i,j-1)+1,\ ed(i-1,j-1) + dif(i,j) \}$$

$$ed(i,j) = ed(w_1[1,i],\ w_2[1,j])$$



$$ed(i,j) = \min\{ ed(i-1,j)+1,\ ed(i,j-1)+1,\ ed(i-1,j-1) + dif(i,j) \}$$

$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$

		A	S	A	D	O
C						
A						
S						
A						

$$ed(i,j) = ed(w_1[1,i], w_2[1,j])$$

		A	S	A	D	O
	0					
C						
A						
S						
A						

$$ed(i,j) = ed(w_1[1,i],\ w_2[1,j])$$

		A	S	A	D	O
	0					
C	1					
A	2					
S	3					
A						

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

CASA	A	S	A	D	O
0					
1					
2					
3					
4					

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1					
A	2					
S	3					
A	4					

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

CASA \ CASADO	0	1	2	3	4	5
	1					
	2					
	3					
	4					

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\quad\ \ \shortparallel$
$\quad\ \ \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1					
A	2					
S	3					
A	4					

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$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1					
A	2					
S	3					
A	4					

$= \ldots i$

A

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1					
A	2					
S	3					
A	4					

$= \ldots i$

A

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

A S A D O

	0	1	2	3	4	5
C	1	_				
A	2					
S	3					
A	4					

$i-1$ i

A $i-1, j-1$ $i-1, j$

$i, j-1$ i, j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

A S A D O

	0	1	2	3	4	5
C	1					
A	2					
S	3					
A	4					

$i-1$ i

$A_{i-1,j-1}$ $i-1,j$

$i,j-1$ i,j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1				
A	2	1				
S	3					
A	4					

$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$

$\parallel$

ε

A S A D O

	0	1	2	3	4	5
C	1	1	2			
A						
S						
A						

$i-1$ i

A $i-1, j-1$ $i-1, j$

$i, j-1$ i, j

$+1$

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$W_1[1,3]$

$W_2[1,0]$

$\parallel$

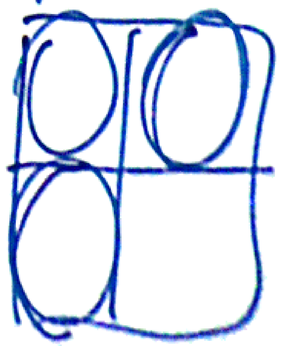
ε

A S A D O

	0	1	2	3	4	5
C	1	1	2			
A	2					
S	3					
A	4					

$i-1$

$A_{i-1,j-1}$ $\quad i-1,j$



$i,j-1$ $\quad i,j$

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

$i-1$

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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S	3					
A	4					

$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

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$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

i

$A_{i-1,j-1}$ $\quad i-1,j$

$i,j-1$ $\quad i,j$

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

$i-1$

A $i-1, j-1$ $\quad$ $i-1, j$

$i, j-1$ $\quad$ i, j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

$i-1$

$A_{i-1,j-1}$ $\quad i-1,j$

$i,j-1$ $\quad i,j$

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
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A	4					

$i-1$

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
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A	4					

$i-1$

$A_{i-1,j-1}$ $\quad i-1,j$

$i,j-1$ $\quad i,j$

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

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$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

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$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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S	3					
A	4					

$i-1$ i

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$i, j-1$ i, j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
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$i-1$ i

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$i,j-1$ i,j
$+1$

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$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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$i,j-1$ i,j

$+1$

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$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
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$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j
$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

$i-1$ i

A $i-1, j-1$ $\quad$ $i-1, j$

$i, j-1$ $\quad$ i, j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
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S	3					
A	4					

$i-1$ i

A $i-1,j-1$ $i-1,j$

$i,j-1$ i,j

$+1$

$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

$W_1[1,3]$

$W_2[1,0] = \varepsilon$

		A	S	A	D	O
	0	1	2	3	4	5
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$i,j-1$ i,j

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$W_1[1,3]$

$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
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$i-1$ i

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$i, j-1$ i, j

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$$ed(i,j) = ed(W_1[1,i],\ W_2[1,j])$$

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$W_2[1,0]$
$\parallel$
ε

		A	S	A	D	O
	0	1	2	3	4	5
C	1	1	2			
A	2	1				
S	3					
A	4					

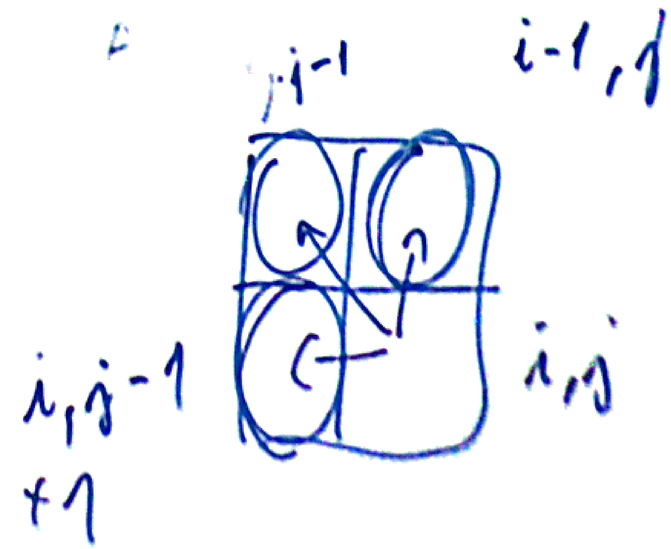
$i-1$ i

A $i-1, j-1$ $i-1, j$

$i, j-1$ i, j

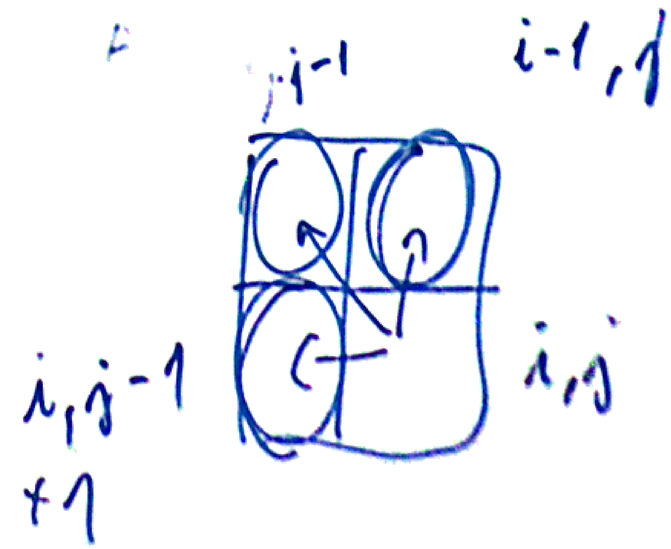
$+1$

$\tau : \Sigma \to \{0,1\}^*$



$\tau : \Sigma \to \{0,1\}^*$

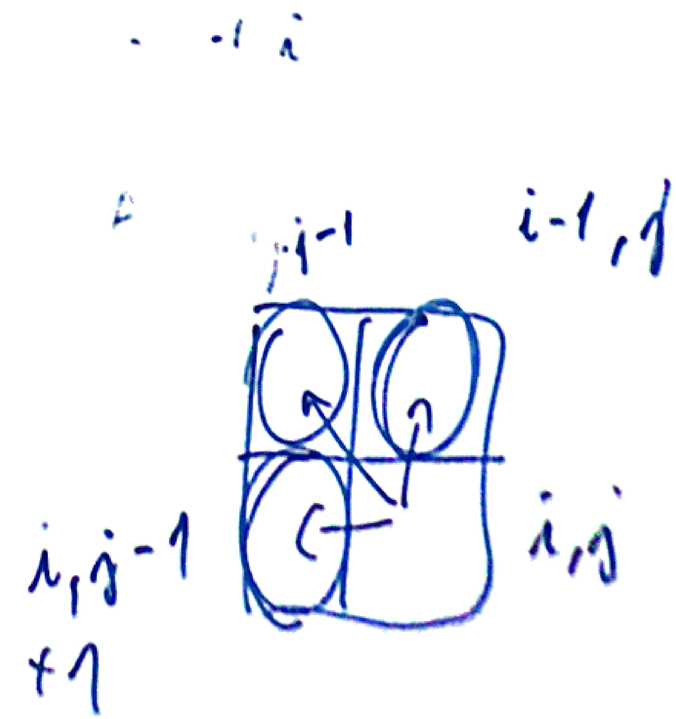
$\tau(a) \neq \varepsilon$



$\tau : \Sigma \to \{0,1\}^*$

$\tau(a) \neq \varepsilon$

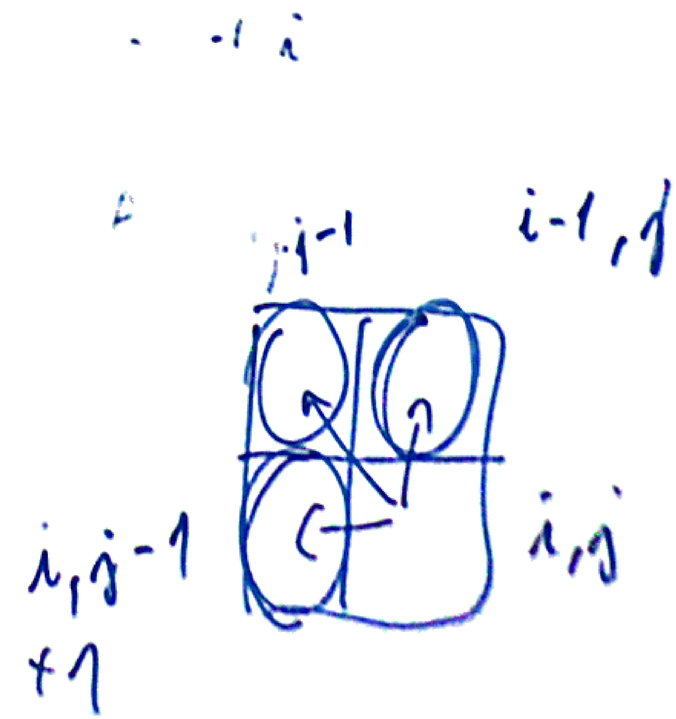
$\hat{\tau} : \Sigma^* \to \{0,1\}^*$



$\tau : \Sigma \to \{0,1\}^*$

$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$



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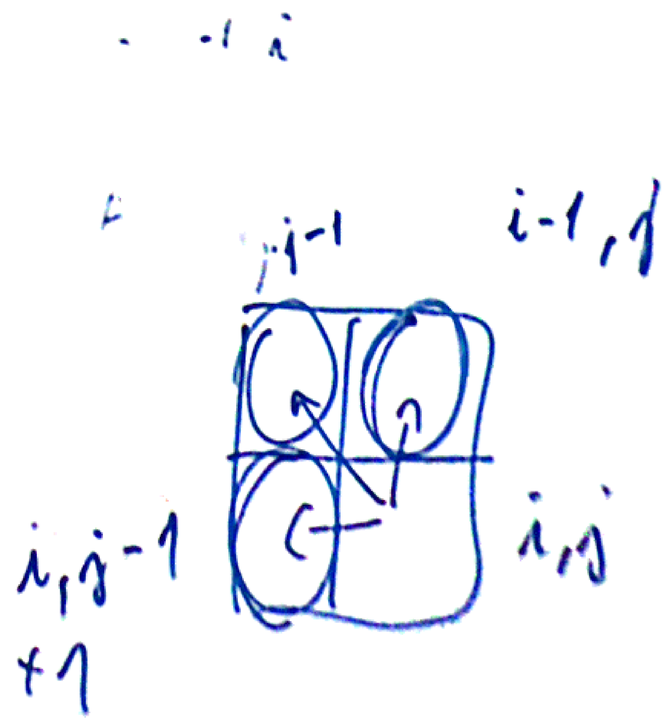
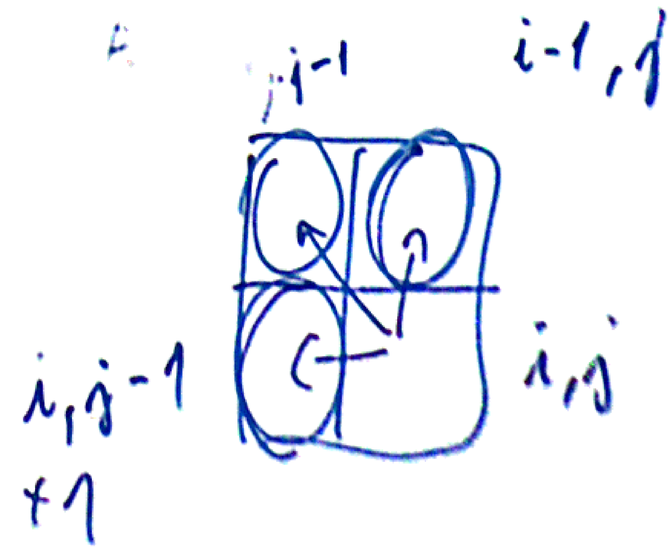


$\tau : \Sigma \to \{0,1\}^*$

$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$



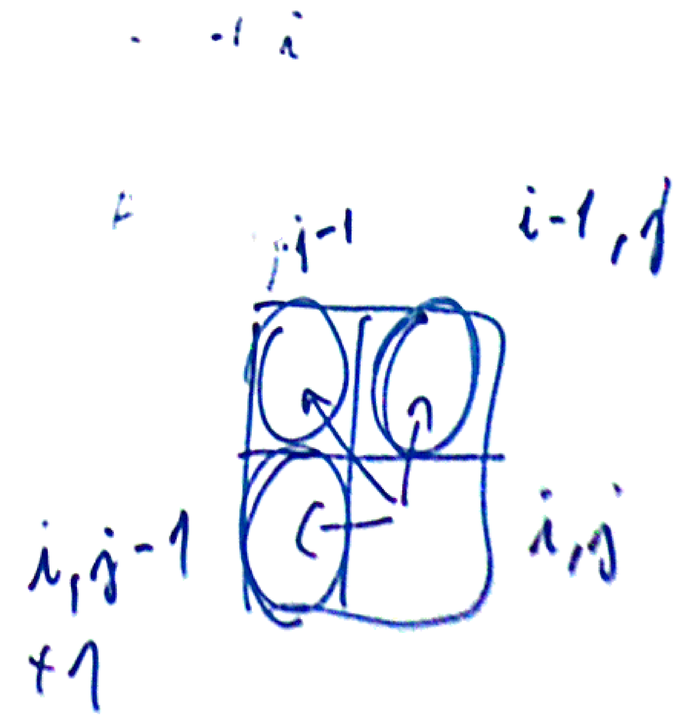
$\tau : \Sigma \to \{0,1\}^*$

$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$

$w \longmapsto \hat{\tau}(w)$

$\hat{\tau}(w_1) = \hat{\tau}(w_2)$



$\tau : \Sigma \to \{0,1\}^*$

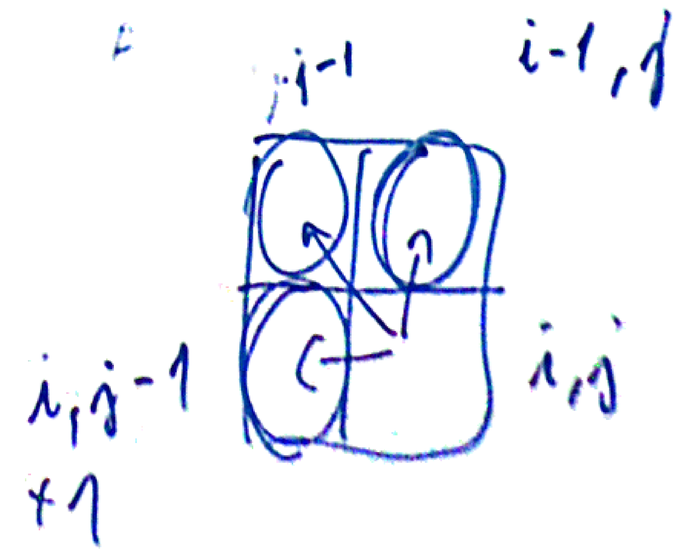
$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$

$w \longmapsto \hat{\tau}(w)$

$\hat{\tau}(w_1) = \hat{\tau}(w_2)$

$w_1 \neq w_2$



$\tau : \Sigma \to \{0,1\}^*$ $\qquad \tau(a) \neq \tau(b) \quad a \neq b$

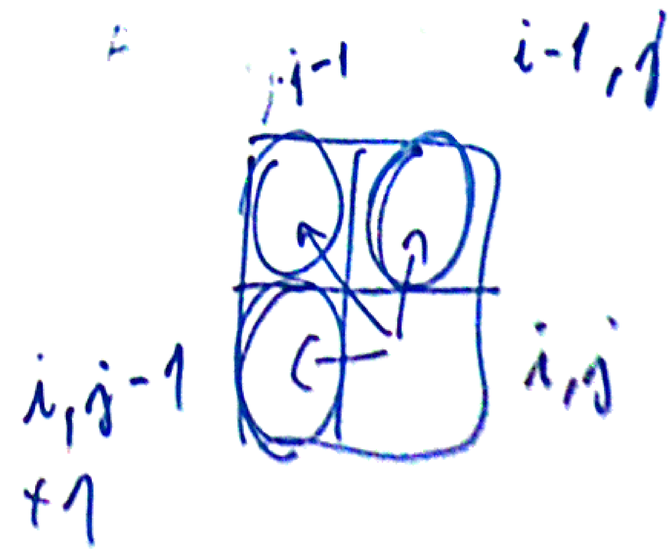
$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$

$w \longmapsto \hat{\tau}(w)$

$\hat{\tau}(w_1) = \hat{\tau}(w_2)$

$w_1 \neq w_2$



$\tau : \Sigma \to \{0,1\}^*$

$\tau(a) \neq \varepsilon$

$\hat{\tau} : \Sigma^* \to \{0,1\}^*$

$w \longmapsto \hat{\tau}(w)$

$\hat{\tau}(w_1) = \hat{\tau}(w_2)$

$w_1 \neq w_2$

$\tau(a) \neq \tau(b) \qquad a \neq b$

$a \longmapsto 001$

$b \longmapsto$

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$a \longmapsto 001$

$b \longmapsto 00$

$c \longmapsto 1$

$$\begin{tikzcd} & 001 & \\ a \arrow[ur, bend left] & & b \arrow[ul] \end{tikzcd}$$

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$b \longmapsto 01$

$c \longrightarrow 10$

001

$a \qquad b$

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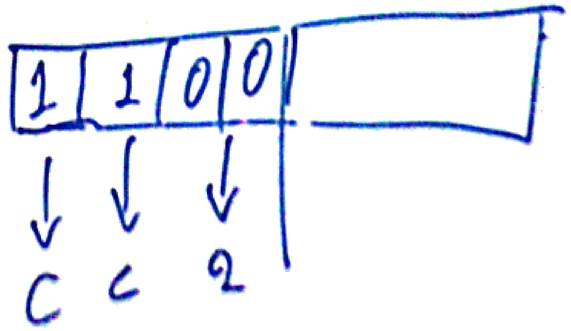

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$b \longmapsto 01$

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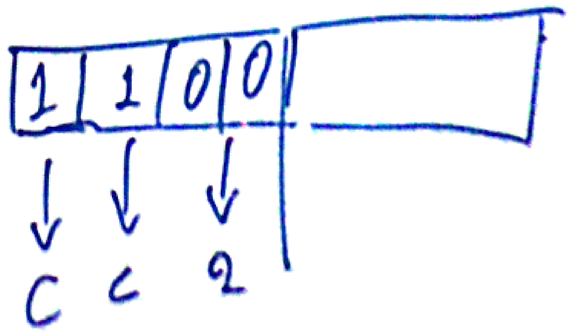

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$b \longmapsto 01$

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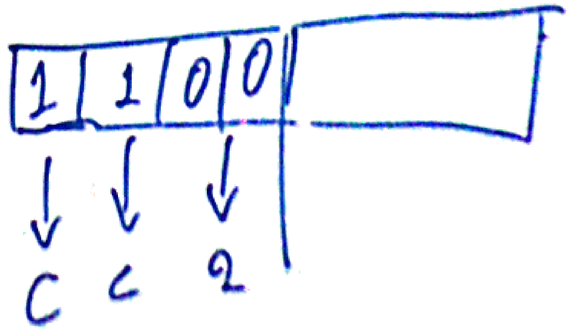

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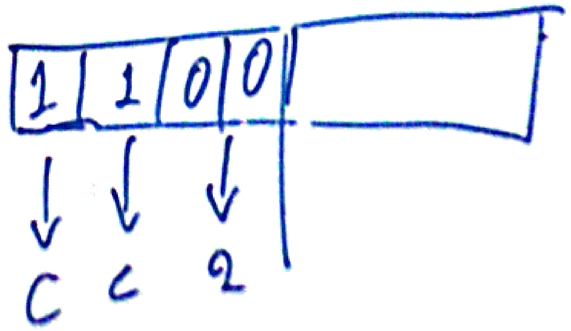

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$a \to 0$

$b \to 10$

$c \to 11$

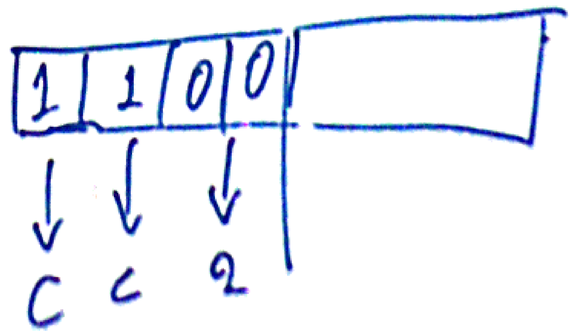
$d \to 1$

$\tau(a) \neq \tau(b) \quad a \neq b$

$a \longmapsto 00$

$b \longmapsto 01$

$c \longrightarrow 1$



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$a \to 0$

$b \to 100$

$c \to 101$

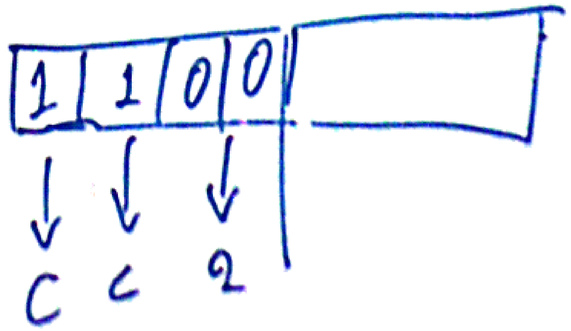
$d \to 110$

$\tau(a) \neq \tau(b) \quad a \neq b$

$a \longmapsto 00$

$b \longmapsto 01$

$c \longrightarrow 1$



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$a \longmapsto 00$

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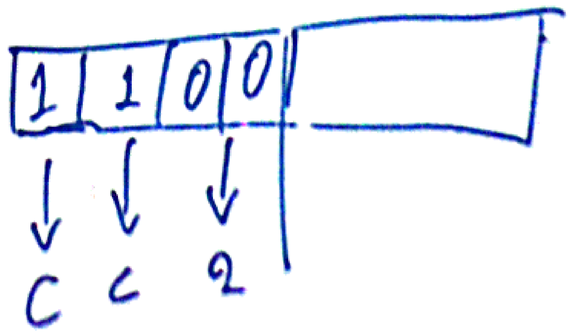
$c \longrightarrow 1$



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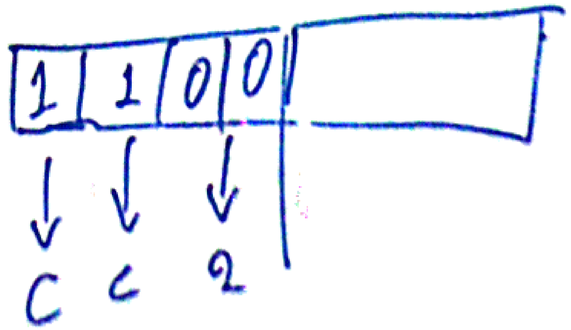

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$d \to 110$

$\tau(a) \neq \tau(b) \quad a \neq b$

$a \longmapsto 00$

$b \longmapsto 01$

$c \longmapsto 1$

$a \mapsto 0$

$b \to 01$

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0	1	

$\tau : \Sigma \to \{0,1\}^*$

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$a \longmapsto 00$

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$a \mapsto 0$

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W

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$a \to 0$

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$d \to 110$

$\tau(a) \neq \tau(b) \quad a \neq b$

$a \longmapsto 00$

$b \longmapsto 01$

$c \longmapsto 1$

$a \mapsto 0$

$b \to 01$

W

τ

$w \longrightarrow \hat{\tau}(w)$

$\tau(a) \neq \tau(b) \qquad a \neq b$

$$lpr_w(\tau) = \sum_{a \in \Sigma} fr_w(a) \cdot |\tau(a)|$$

$a \longmapsto 00$

$b \longmapsto 01$

$c \longrightarrow 1$

$a \mapsto 0$

$b \to 01$

$$|\hat{\tau}(w)| = |w| \cdot lpr_w(\tau)$$

τ

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$$lpr_w(\tau) = \sum_{a \in \Sigma} fr_w(a) \cdot |\tau(a)|$$

$$|w| \cdot lpr_w(\tau)$$

$$= |w| \cdot \sum_{a \in \Sigma}$$

$$|\hat{\tau}(w)| = |w| \cdot lpr_w(\tau)$$

τ

$w \longrightarrow \hat{\tau}(w)$

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$$|\hat{\tau}(w)| = |w| \cdot lpr_w(\tau)$$

$$|w| \cdot lpr_w(\tau)$$

$$= \cancel{|w|} \cdot \sum_{a \in \Sigma} \frac{\#_w(a)}{\cancel{|w|}} |\check{\tau}(a)|$$

τ

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$$lpr_w(\tau) = \sum_{a \in \Sigma} fr_w(a) \cdot |\tau(a)|$$

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$$|w| \cdot lpr_w(\tau)$$

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$w \longrightarrow \hat{\tau}(w)$

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τ

$w \longrightarrow \hat{\tau}(w)$

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τ

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τ

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500.000 × 01