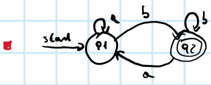
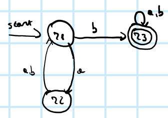
ESEMPIO - LINGUAGGI REGOLARI CHIUSI PER UNIONE

martedì 28 marzo 2023 09:46

Supponiamo di avere due DFA

- M_1 riconosce $L_1 \Rightarrow L(M_1)$
- M_2 riconosce $L_2 \Rightarrow L(M_2)$





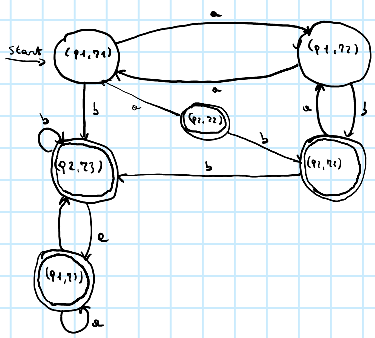
Supponiamo di voler costruire un DFA M_3 che riconosce l'unione $L(M_1) \cup L(M_2)$

1) La prima cosa da fare è definire l'insieme di stati, dato dal prodotto cartesiano

$Q_3 = \{(q_1,r_1), (q_1,r_2), (q_1,r_3), (q_2,r_1), (q_2,r_2), (q_2,r_3)\}$

2) Possiamo passare al disegno

- $\delta_3((q_1,r_1),a) = (\delta_1(q_1,a), \delta_2(r_1,a)) = (q_1,r_2)$
- $\delta_3((q_1,r_1),b) = (\delta_1(q_1,b), \delta_2(r_1,b)) = (q_2,r_3)$
- $\delta_3((q_1,r_2),a) = (\delta_1(q_1,a), \delta_2(r_2,a)) = (q_1,r_1)$
- $\delta_3((q_1,r_2),b) = (\delta_1(q_1,b), \delta_2(r_2,b)) = (q_2,r_1)$
- $\delta_3((q_2,r_1),a) = (\delta_1(q_2,a), \delta_2(r_1,a)) = (q_1,r_2)$
- $\delta_3((q_2,r_1),b) = (\delta_1(q_2,a), \delta_2(r_1,b)) = (q_2,r_3)$
- $\delta_3((q_2,r_2),a) = (\delta_1(q_2,a), \delta_2(r_2,a)) = (q_1,r_1)$
- $\delta_3((q_2,r_2),b) = (\delta_1(q_2,b), \delta_2(q_2,b)) = (q_2,r_1)$
- $\delta_3((q_2,r_3),a) = (\delta_1(q_2,a), \delta_2(r_3,a)) = (q_1,r_3)$
- $\delta_3((q_2,r_3),b) = (\delta_1(q_2,b), \delta_2(r_3,b)) = (q_2,r_3)$
- $\delta_3((q_1,r_3),a) = (\delta_1(q_1,a), \delta_2(r_3,a)) = (q_1,r_3)$
- $\delta_3((q_1,r_3),b) = (\delta_1(q_1,b), \delta_2(r_3,b)) = (q_2,r_3)$



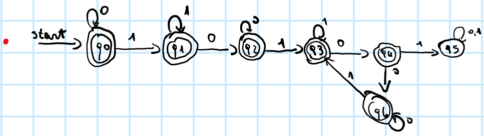
3) Gli stati accettanti $F_3 = \{(q_2,r_1), (q_2,r_2), (q_2,r_3), (q_1,r_3)\}$

ESERCITAZIONE - DFA

martedì 28 marzo 2023 14:36

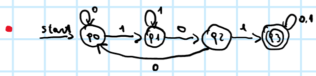
#1

Scrivere un DFA che accetta tutte le stringhe su $\Sigma = \{0,1\}$ che contengono al più un'occorrenza di 101



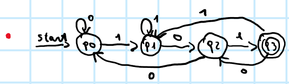
#2

Ora, fai un DFA che accetta almeno un'occorrenza di 101



#3

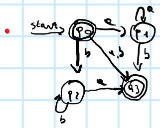
Un DFA che contiene un'occorrenza di 101 come suffisso



#4

Progettare un DFA che accetta tutte le stringhe che terminano con un simbolo che non occorre in nessun'altra posizione di w

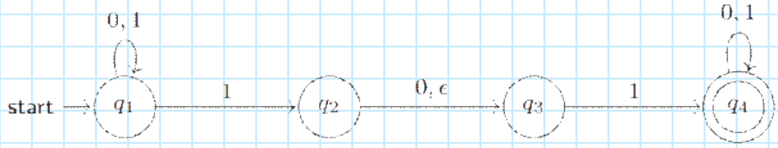
a^+b – b^+a



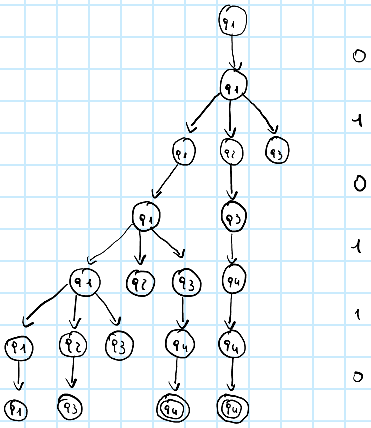
#5

ESEMPIO - ALBERO DI COMPUTAZIONE DI UN NFA

mercoledì 29 marzo 2023 10:08



Vogliamo controllare se la stringa 010110 è accettata, quindi procediamo con l'albero della computazione



In questo caso, la stringa è accettata.

ESERCITAZIONE - CONVERSIONE DA NFA A DFA

giovedì 30 marzo 2023 11:51

Trasformare il seguente NFA in DFA

δ	0	1	ε
q_0	$\{q_0\}$	$\{q_0\}$	$\{q_1\}$
q_1	$\{q_2\}$	$\emptyset$	$\emptyset$
q_2	$\emptyset$	$\emptyset$	$\emptyset$

$Q_M = \{\emptyset, \{q_0\}, \{q_1\}, \{q_2\}, \{q_0,q_1\}, \{q_0,q_2\}, \{q_1,q_2\}, \{q_0,q_1,q_2\}\}$

$\delta_M(\{q_0\},0) = E(\delta_N(\{q_0\},0)) = \{q_0\}$

$\delta_M(\{q_0\},1) = E(\delta_N(\{q_0\},1)) = \{q_0\}$

$\delta_M(\{q_1\},0) = E(\delta_N(\{q_1\},0)) = \{q_2\}$

$\delta_M(\{q_1\},1) = E(\delta_N(\{q_1\},1)) = \{\emptyset\}$

$\delta_M(\{q_2\},0) = E(\delta_N(\{q_2\},0)) = \{\emptyset\}$

$\delta_M(\{q_2\},1) = E(\delta_N(\{q_2\},1)) = \{\emptyset\}$

$\delta_M(\{q_0,q_1\},0) = E(\delta_N(\{q_0\},0)) \cup E(\delta_N(\{q_1\},0)) = \{q_0\} \cup \{q_2\} = \{q_0,q_2\}$

$\delta_M(\{q_0,q_1\},1) = E(\delta_N(\{q_0\},1)) \cup E(\delta_N(\{q_1\},1)) = \{q_0\} \cup \emptyset = \{q_0\}$

$\delta_M(\{q_0,q_2\},0) = E(\delta_N(\{q_0\},0)) \cup E(\delta_N(\{q_2\},0)) = \{q_0\} \cup \{\emptyset\} = \{q_0\}$

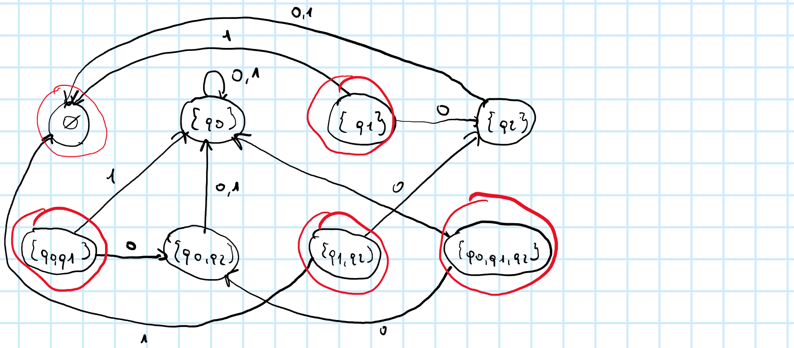
$\delta_M(\{q_0,q_2\},1) = E(\delta_N(\{q_0\},1)) \cup E(\delta_N(\{q_2\},1)) = \{q_0\} \cup \{\emptyset\} = \{q_0\}$

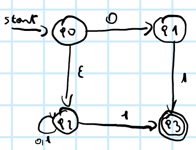
$\delta_M(\{q_1,q_2\},0) = E(\delta_N(\{q_1\},0)) \cup E(\delta_N(\{q_2\},0)) = \{q_2\} \cup \{\emptyset\} = \{q_2\}$

$\delta_M(\{q_1,q_2\},1) = E(\delta_N(\{q_1\},1)) \cup E(\delta_N(\{q_2\},1)) = \{\emptyset\} \cup \{\emptyset\} = \{\emptyset$

$\delta_M(\{q_0,q_1,q_2\},0) = E(\delta_N(\{q_0\},0)) \cup E(\delta_N(\{q_1\},0)) \cup E(\delta_N(\{q_2\},0)) = \{q_0\} \cup \{q_2\} \cup \emptyset = \{q_0,q_2\}$

$\delta_M(\{q_0,q_1,q_2\},1) = E(\delta_N(\{q_0\},1)) \cup E(\delta_N(\{q_1\},1)) \cup E(\delta_N(\{q_2\},1)) = \{q_0\}, \{\emptyset\} = \{q_0\}$





Vogliamo convertire questo NFA in un DFA

DFA $M = (Q_M, \Sigma, \delta_M, q_M, F_M)$

$Q_M = P(N)$

$\Sigma = \{0,1\}$

$q_M = E(q_N) = (q_0, q_2)$

$\delta_M(R,a) = \bigcup_{r \in R} E(\delta_N(r,a))$

$\delta_M(\{q_0,q_2\},0) = E(\delta_N(q_0,0)) \cup E(\delta_N(q_2,0)) = \{q_1, q_2\}$

$\delta_M(\{q_0,q_2\},1) = E(\delta_N(q_0,1)) \cup E(\delta_N(q_2,1)) = \{q_2, q_3\}$

$\delta_M(\{q_1,q_2\},0) = E(\delta_N(q_1,0)) \cup E(\delta_N(q_2,0)) = \{q_2\}$

$\delta_M(\{q_1,q_2\},1) = E(\delta_N(q_1,1)) \cup E(\delta_N(q_2,1)) = \{q_2, q_3\}$

$\delta_M(\{q_2,q_3\},0) = E(\delta_N(q_2,0)) \cup E(\delta_N(q_3,0)) = \{q_2\}$

$\delta_M(\{q_2,q_3\},1) = E(\delta_N(q_2,1)) \cup E(\delta_N(q_3,1)) = \{q_2,q_3\}$

$\delta_M(\{q_1, q_2\}, 1) = E(\delta_N(q_1, 1)) \cup E(\delta_N(q_2, 1)) = \{q_2\ q_3\}$

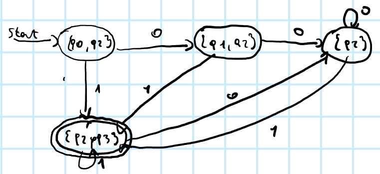
$\delta_M(\{q_2, q_3\}, 0) = E(\delta_N(q_2, 0)) \cup E(\delta_N(q_3, 0)) = \{q_2\}$

$\delta_M(\{q_2, q_3\}, 1) = E(\delta_N(q_2, 1)) \cup E(\delta_N(q_3, 1)) = \{q_2, q_3\}$

$\delta_M(\{q_2\}, 0) = E(\delta_N(q_2, 0)) = \{q_2\}$

$\delta_M(\{q_2\}, 1) = E(\delta_N(q_2, 1)) = \{q_2, q_3\}$

$F = \{q_2, q_3\}$



ESEMPIO - DA REGEX AD NFA

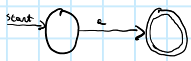
venerdì 31 marzo 2023 15:14

Troviamo un NFA che riconosce il linguaggio descritto dalla REGEX

- $(ab \cup a)^*$

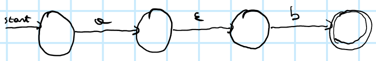
Procediamo per passi, individuando di volta in volta un NFA che riconosce un simbolo

- a

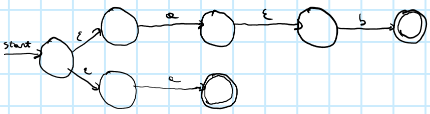


- b

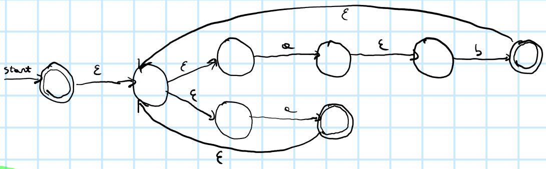
- ab



- $ab \cup a$



- $(ab \cup a)^*$

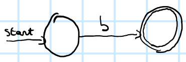


Troviamo un NFA che riconosce il linguaggio descritto dalla REGEX

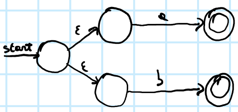
- $(a \cup b)^* aba$

- a

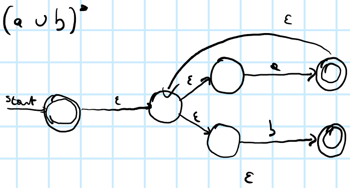
- b



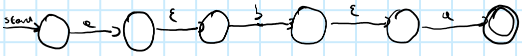
- $(a \cup b)$



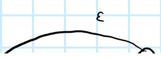
- $(a \cup b)^*$



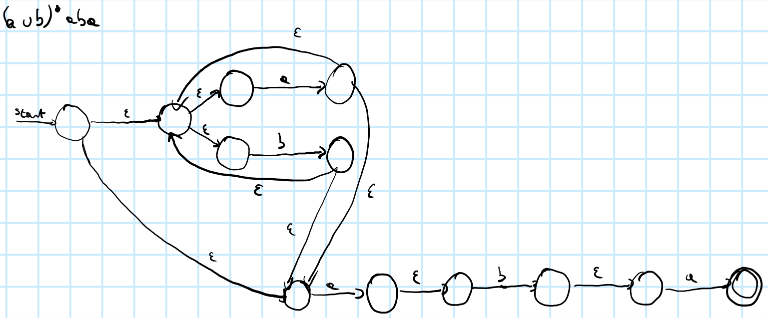
- aba



- $(a \cup b)^* aba$

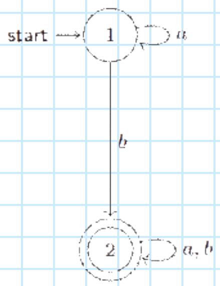


- $(a \cup b)^* aba$

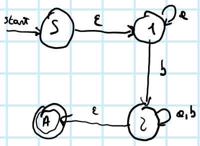


ESEMPI - DA DFA A REGEX

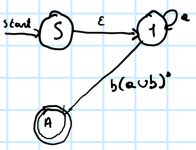
sabato 1 aprile 2023 16:26



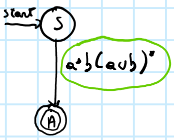
Per prima cosa, andiamo ad aggiungere uno stato iniziale e uno finale



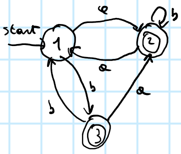
Concentriamoci sull'eliminare 2, convertendo tutte le transizioni

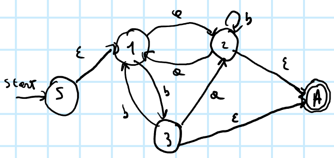


Ora eliminiamo anche 1

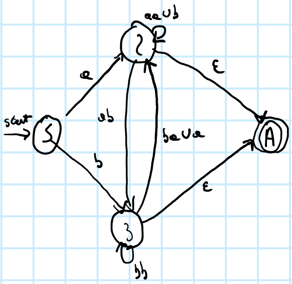


QUESTA È LA REGEX CORRISPONDENTE



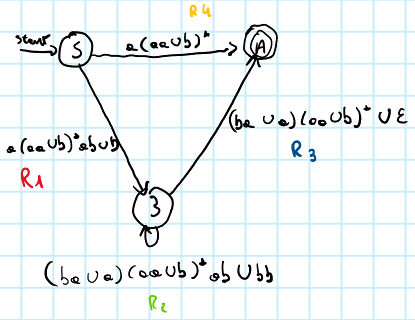


Procediamo con l'eliminazione di 1



Eliminiamo il 2

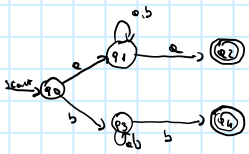
Eliminiamo il 2



$R_1(R_2)^* R_3 \cup R_4$

ESEMPIO DI PROVA SCRITTA

lunedì 3 aprile 2023 10:17



Dato il seguente NFA, dare la definizione della quintupla

$N = \{Q_N, \Sigma, \delta, q_0, F\}$

q_0 = stato iniziale

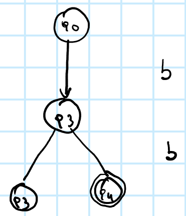
$F = \{q_2, q_4\}$

$Q_N = \{q_0, q_1, q_2, q_3, q_4\}$

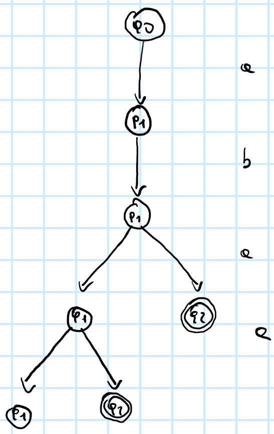
$\Sigma = \{a, b\}$

	a	b
→ q_0	$\{q_1\}$	$\{q_3\}$
q_1	$\{q_1, q_2\}$	$\{q_1\}$
* q_2	$\emptyset$	$\emptyset$
q_3	$\{q_3\}$	$\{q_3, q_4\}$
* q_4	$\emptyset$	$\emptyset$

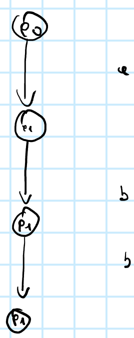
Determinare se le stringhe bb, abaa, abb appartengono a L(N)



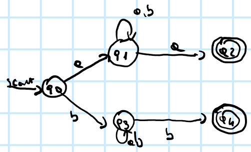
$bb \in L(N)$



$abaa \in L(N)$



$abb \notin L(N)$



Lo stato iniziale è q_0

$\delta_M = E(\{q_0\}, a) = \delta_N(E(\{q_0, a\}) = \{q_1\}$

$\delta_M = E(\{q_0\}, b) = \delta_N(E(\{q_0, b\}) = \{q_3\}$

$\delta_M = E(\{q_1\}, a) = \delta_N(E(\{q_1, a\}) = \{q_1, q_2\}$

$\delta_M = E(\{q_1\}, b) = \delta_N(E(\{q_1, b\}) = \{q_1\}$

$\delta_M = E(\{q_1, q_2\}, a) = \delta_N(E(\{q_1, a\})) \cup \delta_N(E(\{q_2, a\}) = \{q_1, q_2\} \cup \{\emptyset = \{q_1, q_2\}$

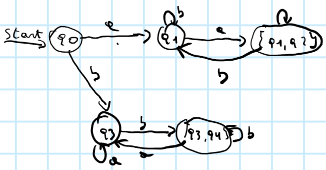
$\delta_M = E(\{q_1, q_2\}, b) = \delta_N(E(\{q_1, b\})) \cup \delta_N(E(\{q_2, b\}) = \{q_1\} \cup \{\emptyset\} = \{q_1\}$

$\delta_M = E(\{q_3, a\} = \delta_N(E(\{q_3, a\})) = \{q_3\}$

$\delta_M = E(\{q_3, b\} = \delta_N(E(\{q_3, b\})) = \{q_3, q_4\}$

$\delta_M = E(\{q_3, q_4\}, a) = \delta_N(E(\{q_3, a\})) \cup \delta_N(E(\{q_4, a\})) = \{q_3\} \cup \emptyset = \{q_3\}$

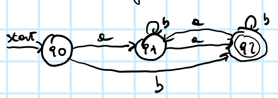
$\delta_M = E(\{q_3, q_4\}, b\} = \delta_N(E(\{q_3, b\})) \cup \delta_N(E(\{q_4, b\})) = \{q_3, q_4\} \cup \emptyset = \{q_3, q_4\}$

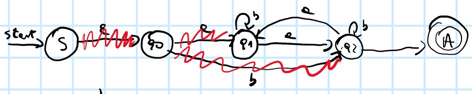


ESERCITAZIONE - DA DFA A REGEX

lunedì 3 aprile 2023 14:07

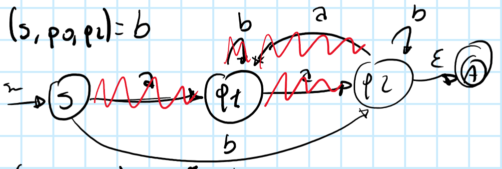
Convertire il seguente DFA in una REGEX





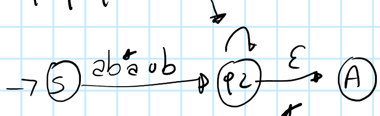
$(s, q_0, q_1) = a$

$(s, q_0, q_2) = b$

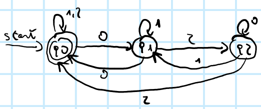


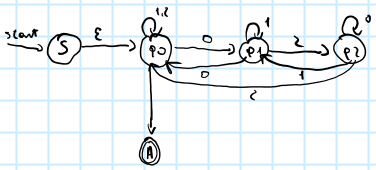
$(s, q_1, q_2) = ab^*a \cup b$

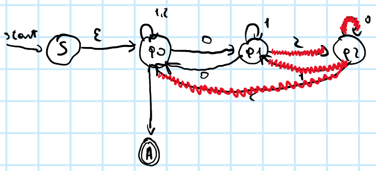
$(q_2, q_1, q_2) = ab^*a \cup b$



$(ab^*a \cup b)(ab^*a \cup b)^*$

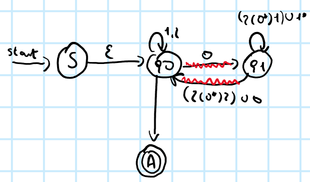


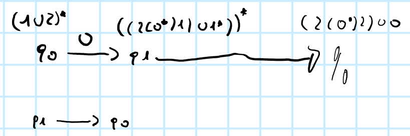




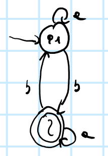
$q_1 \xrightarrow{2} \cancel{q_2}^{\,0} \xrightarrow{1} q_1 \equiv q_1 \xrightarrow{20^*1 \cup 1^*} q_1$

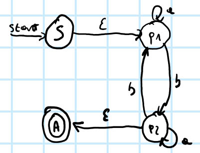
$q_1 \xrightarrow{2} q_2^{\,0} \xrightarrow{2} q_0 \equiv q_1 \xrightarrow{20^*2 \cup 0} q_0$





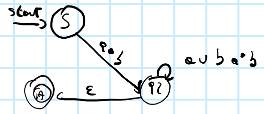
$(1\cup 2)^* \, 0 \, ((2(0^*)1)\cup 1^*))^* \, (2(0^*)2)\cup 0$



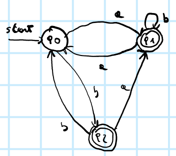


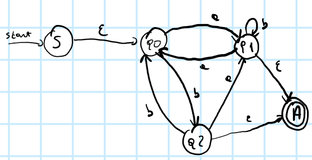
Togliamo p_1

$(S, p_1, q_2) = a^*b$
$(q_2, p_1, q_2) = ba^*b$

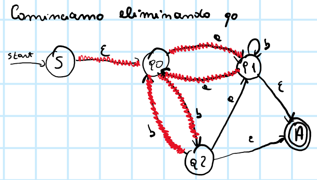


$(S, q_2, A) = a^*b(a\cup ba^*b)^*$



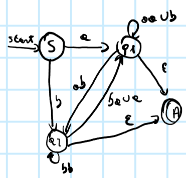


Cominciamo eliminando q_0



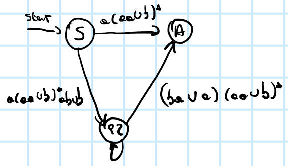
$(S, p_0, p_1) = a$
$(p_1, q_0, q_1) = aa\cup b$
$(S, q_0, q_2) = bb$
$(q_3, q_0, q_2) = ba \cup a$
$(q_2, p_0, q_3) = ab$

Rimuoviamo p_1

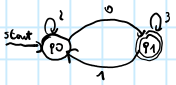


$(S, q_1, A) = a(aa \cup b)^*$

$(S, q_1, q_2) = a(aa \cup b)^* ab \cup b$



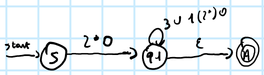
$(ba \cup a)(aa \cup b)^* ab \cup b$



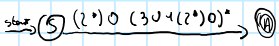
Vogliamo eliminare q_0

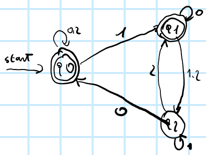
$(S, q_0, q_1) = 2^*0$

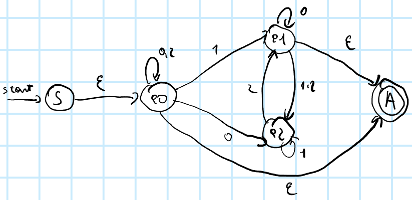
$(q_1, q_0, q_1) = 1\,2^*0$



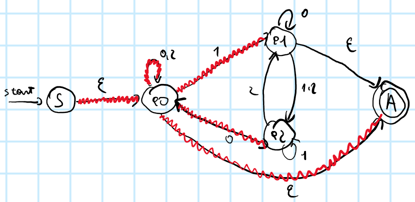
Eliminiamo q_1







Iniziamo togliendo q_0

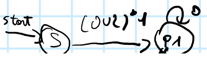


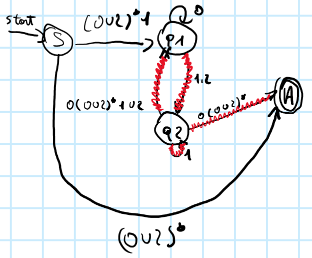
$(S, q_0, q_1) = S \xrightarrow{\varepsilon} \overset{\circlearrowleft 0,2}{q_0} \xrightarrow{1} q_1 = S \xrightarrow{(0\cup 2)^*1} q_1$

$(S, q_0, A) = S \xrightarrow{\varepsilon} \overset{\circlearrowleft 0,2}{q_0} \xrightarrow{\varepsilon} A = S \xrightarrow{(0\cup 2)^*} A$

$(q_2, q_0, q_1) = q_2 \xrightarrow{0} \overset{\circlearrowleft 0,2}{q_0} \xrightarrow{1} q_1 = q_2 \xrightarrow{0(0\cup 2)^*1} q_1$

$(q_2, q_0, A) = q_2 \xrightarrow{0} \overset{\circlearrowleft 0,2}{q_0} \xrightarrow{\varepsilon} \; = q_2 \xrightarrow{0(0\cup 2)^*} A$





Togliamo q2

$(q_1, q_2, q_1) = q_1 \xrightarrow{1\cup 2} q_2 \xrightarrow{0(0\cup 2)^* 1\cup 2} q_1 \qquad q_1 \xrightarrow{0^*(1\cup 2)1^*(0(0\cup 2)^* 1\cup 2)} q_1$

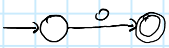
ESERCITAZIONE - DA REGEX A NFA

lunedì 3 aprile 2023 14:40

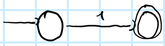
Date le REGEX

- $(01 \cup 100)^*$

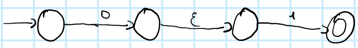
- 0



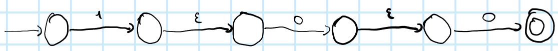
- 1



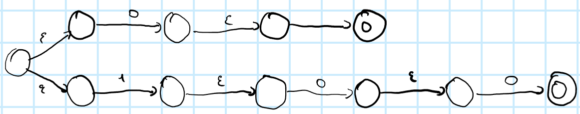
- 01



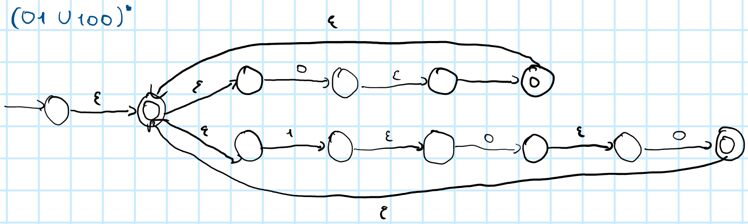
- 100



- $01 \cup 100$

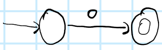


- $(01 \cup 100)^*$

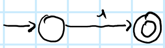


$(0 \cup (11)^*)^* 00$

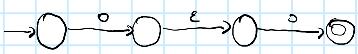
- 0



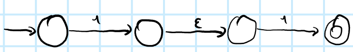
- 1



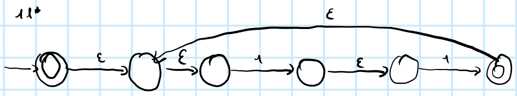
- 00



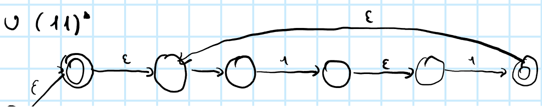
- 11



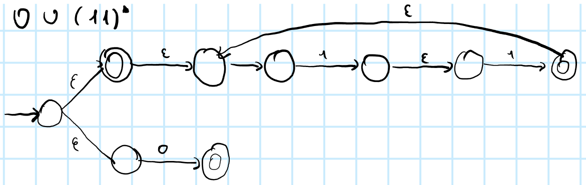
- 11^*



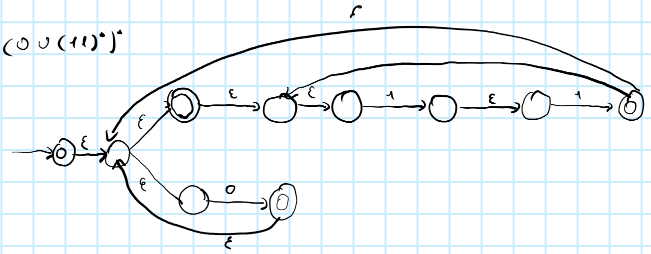
- $0 \cup (11)^*$



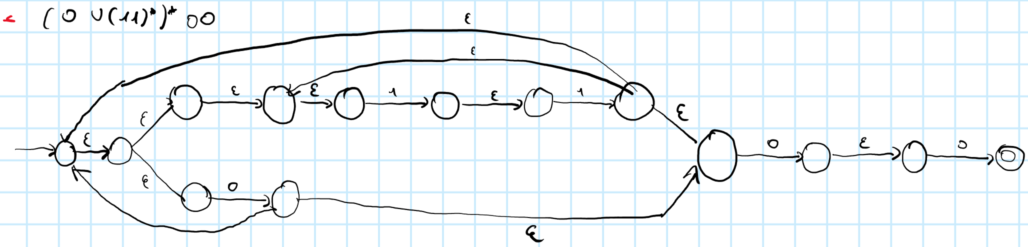
- $0 \cup (11)^*$



- $(0 \cup (11)^*)^*$

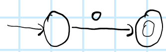


- $(0 \cup (11)^*)^* 00$

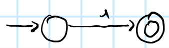


$(0 \cup 1)^* 000 (0 \cup 1)^*$

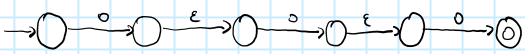
- 0



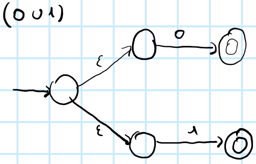
- 1



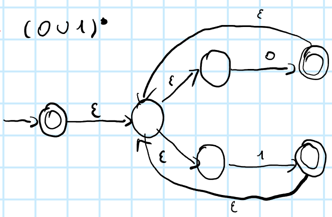
- 000



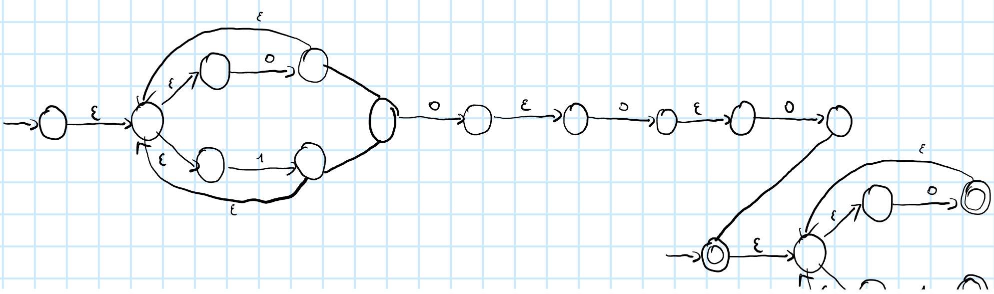
- $(0 \cup 1)$



- $(0 \cup 1)^*$



- $(0 \cup 1)^* 000 (0 \cup 1)^*$

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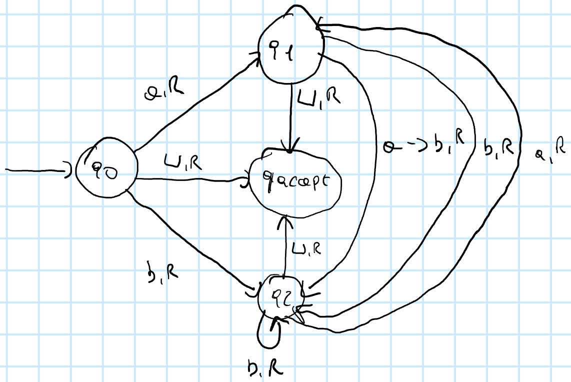
ESERCITAZIONE - MACCHINE DI TURING

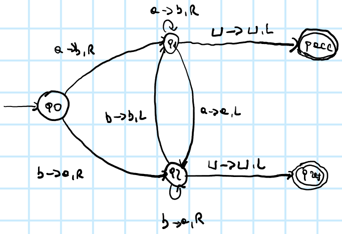
lunedì 3 aprile 2023 14:54



aabbeae

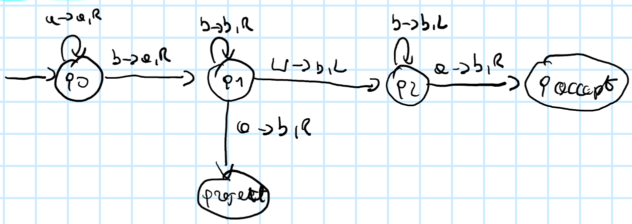
$C_1 = q_0 aabbeaaa$, $C_2 = a q_1 abbaaaa$, $C_3 = ab q_2 bbeaaa$
$C_4 = abb q_2 beaaa$, $C_5 = abbb q_2 eaaa$, $C_6 = abbbe q_1 aaa$
$C_7 = abbbeb q_2 aa$, $C_8 = abbbaba q_1 a$, $C_9 = abbbebab q_2$, $C_{10} = abbbebab\ q_{accept}$

LA STRINGA É ACCETTATA



$(Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$

$Q = \{q_0, q_1, q_2, q_{accept}, q_{reject}\}$
$\Sigma = \{a, b\}$
$\Gamma = \Sigma \cup \{\sqcup\}$
$\delta = \delta(q_0, a) = (q_1, b, R)$
$\delta(q_0, b) = (q_2, a, R)$
$\delta(q_0, \sqcup) = (q_{reject}, \sqcup, R)$
$\delta(q_1, a) = (q_1, b, R)$
$\delta(q_1, b) =$



$(Q, \Sigma, \Gamma, \delta, q_0, q_{accept}, q_{reject})$

$Q = \{q_0, q_1, q_2, q_{accept}, q_{reject}\}$
$\Sigma = \{a, b\}$
$\Gamma = \Sigma \cup \{\sqcup\}$

$\delta = Q \times \Gamma \to Q \times \Gamma \times \{L, R\}$
$\delta(q_0, a) = (q_0, a, R)$
$\delta(q_0, b) = (q_1, a, R)$
$\delta(q_0, \sqcup) = (q_{reject}, \sqcup, R)$
$\delta(q_1, a) = (q_{reject}, b, R)$

$\delta(q_0, b) = (q_1, a, R)$

$\delta(q_0, \sqcup) = (q_{reject}, \sqcup, R)$

$\delta(q_1, a) = (q_{reject}, b, R)$

$\delta(q_1, b) = (q_1, b, R)$

$\delta(q_1, \sqcup) = (q_2, b, L)$

$\delta(q_2, a) = (q_{accept}, b, R)$

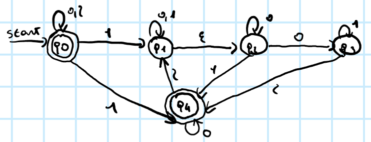
$\delta(q_2, b) = (q_2, b, L)$

$\delta(q_2, \sqcup) = (q_{reject}, \sqcup, R)$

ESERCITAZIONE - DEFINIZIONE DI QUINTUPLA E ALBERO DI COMPUTAZIONE

martedì 4 aprile 2023 09:21

Determinare la quintupla dell'automa qui definito



$M = (Q, \Sigma, \delta, q_0, F)$

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

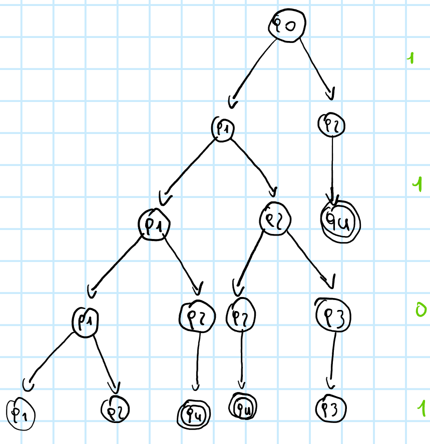
$\Sigma = \{0, 1, 2\}$

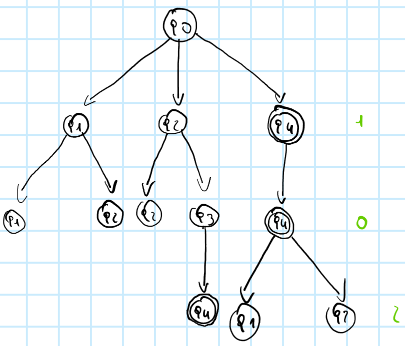
	0	1	2	ε
q_0	$\{q_0\}$	$\{q_1\}$	$\{q_0\}$	$\emptyset$
q_1	$\{q_1\}$	$\{q_1\}$	$\emptyset$	$\{q_2\}$
q_2	$\{q_2, q_3\}$	$\{q_4\}$	$\emptyset$	$\emptyset$
q_3	$\emptyset$	$\{q_3\}$	$\{q_4\}$	$\emptyset$
q_4	$\{q_4\}$	$\emptyset$	$\{q_4\}$	$\emptyset$

q_0 stato iniziale

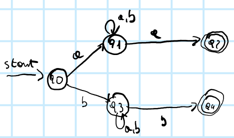
$F = \{q_0, q_4\}$

1101 1021 ε vengono accettate?





Determinare la quintupla del seguente automa

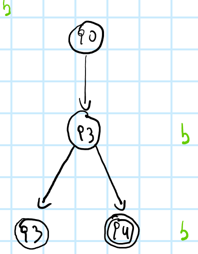


$Q = \{q_0, q_1, q_2, q_3, q_4\}$
$\Sigma = \{a, b\}$
$\delta =$

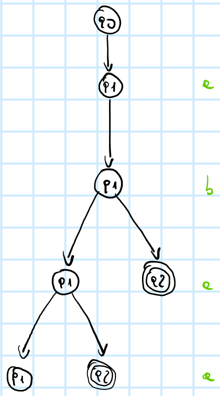
	a	b
q_0	$\{q_1\}$	$\{q_3\}$
q_1	$\{q_1, q_2\}$	$\{q_1\}$
q_2	$\emptyset$	$\emptyset$
q_3	$\{q_3\}$	$\{q_3, q_4\}$
q_4	$\emptyset$	$\emptyset$

q_0 stato iniziale
$F = \{q_2, q_4\}$

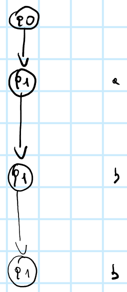
bb

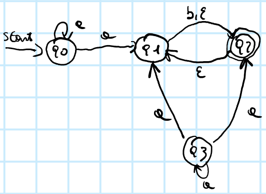


abaa



abb





$M = \{Q, \Sigma, \delta, q_0, F\}$

$Q = \{q_0, q_1, q_2, q_3\}$
$\Sigma = \{a, b\}$
δ :

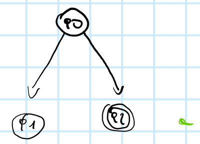
	a	b	ε
q_0	$\{q_0, q_1\}$	$\emptyset$	$\emptyset$
q_1	$\emptyset$	$\{q_2\}$	$\{q_2\}$
q_2	$\{q_3\}$	$\emptyset$	$\{q_1\}$

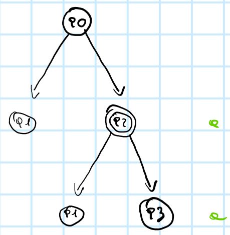
q_0	$\{q_0, q_1\}$	$\emptyset$	$\emptyset$
q_1	$\emptyset$	$\{q_2\}$	$\{q_2\}$
q_2	$\{q_3\}$	$\emptyset$	$\{q_1\}$
q_3	$\{q_1, q_3\}$	$\emptyset$	$\emptyset$

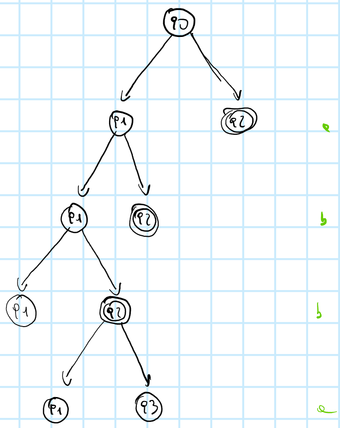
q_0 è stato iniziale

$F = \{q_2\}$

a aa abba

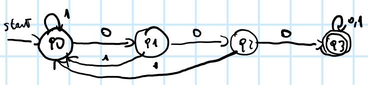


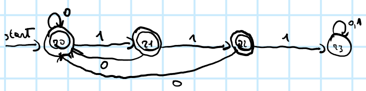




ESERCITAZIONE - INTERSEZIONE

mercoledì 5 aprile 2023 14:36





$Q_3 = [\ (q_0,r_0),\ (q_0,r_1),\ (q_0,r_2),\ (q_0,r_3),\ (q_1,r_0),\ (q_1,r_1),\ (q_1,r_2),\ (q_1,r_3),\ (q_2,r_0),\ (q_2,r_1),\ (q_2,r_2),\ (q_2,r_3),\ (q_3,r_0),\ (q_3,r_1),\ (q_3,r_2),\ (q_3,r_3)$

$\delta_3((q_0,r_0),0) = (\delta_1(q_0,0), (\delta_2(r_0,0)) = (q_1,r_0)$

$\delta_3((q_0,r_0),1) = (\delta_1(q_0,1), (\delta_2(r_0,1)) = (q_0,r_1)$

$\delta_3((q_1,r_0),0) = (\delta_1(q_1,0), (\delta_2(r_0,0)) = (q_2,r_0)$

$\delta_3((q_1,r_0),1) = (\delta_1(q_1,1), (\delta_2(r_0,1)) = (q_0,r_2)$

$\delta_3((q_0,r_1),0) = (\delta_1(q_0,0), (\delta_2(r_1,0)) = (q_1,r_0)$

$\delta_3((q_0,r_1),1) = (\delta_1(q_0,1), (\delta_2(r_1,1)) = (q_0,r_2)$

$\delta_3((q_0,r_2),0) = (\delta_1(q_0,0), \delta_2(r_2,0)) = (q_1 r_0)$

$\delta_3((q_0,r_2),1) = (\delta_1(q_0,1), \delta_2(r_2,1)) = (q_0,r_3)$

$\delta_3((q_0,r_3),0) = (\delta_1(q_0,0), \delta_2(r_3,0)) = (q_1,r_3)$

$\delta_3((q_0,r_3),1) = (\delta_1(q_0,1), \delta_2(r_3,1)) = (q_0 r_3)$

$\delta_3((q_2,r_0),0) = (\delta_1(q_2,0), \delta_2(r_0,0)) = (q_3,r_0)$

$\delta_3((q_2,r_0,1) = (\delta_1(q_2,1), \delta_2(r_0,1)) = (q_0,r_0)$

$\delta_3((q_3,r_0,0) = (\delta_1(q_3,0), \delta_2(r_0,0)) = (q_3,r_0)$

$\delta_3((q_3,r_0,1) = (\delta_1(q_3,1), \delta_2(r_0,1)) = (q_3,r_1)$

$\delta_3((q_3,r_1,0) = (\delta_1(q_3,0), \delta(r_1,0)) = (q_3,r_2)$

$\delta_3((q_3,r_1,1) = (\delta_1(q_3,1), \delta(r_1,1)) = (q_3,r_2)$

$\delta_3((q_1,r_3,0) = (\delta_1(q_1,0), \delta(r_3,0)) = (q_2,r_3)$

$\delta_3((q_1,r_3,1) = (\delta_1(q_1,1), \delta(r_3,1)) = (q_0,r_3)$

$\delta_3((q_3,r_2,0) = (\delta_1(q_3,0), \delta_2(r_2,0)) = (q_3,r_0)$

$\delta_3((q_3,r_2,1) = (\delta_1(q_3,1), \delta_2(r_2,1)) = (q_3,r_3)$

$\delta_3((q_1,r_1,0) = (\delta_1(q_1,0), \delta_2(r_1,0)) = (q_2,r_2)$

$\delta_3((q_1,r_1,1) = (\delta_1(q_1,1), \delta_2(r_1,1)) = \{q_0,r_0)$

$\delta_3((q_0,r_3,0) = (\delta_1(q_0,0), \delta_2(r_3,0)) = (q_1,r_3)$

$\delta_3((q_0,r_3,1) = (\delta_1(q_0,1), \delta_2(r_3,1)) = (q_0,r_3)$

$\delta_3((q_3,r_3,0) = (\delta_1(q_3,0), \delta_2(r_3,0)) = (q_3,r_3)$

$\delta_3((q_3,r_2,1) = (\delta_1(q_3,1), \delta_2(r_3,0)) = (q_3,r_3)$

$\delta_3((q_2,r_3,0) = (\delta_1(q_2,0), \delta_2(r_3,0)) = (q_3,r_3)$

$\delta_3((q_2,r_3,1) = (\delta_1(q_2,1), \delta_2(r_3,1)) = (q_0,r_3)$

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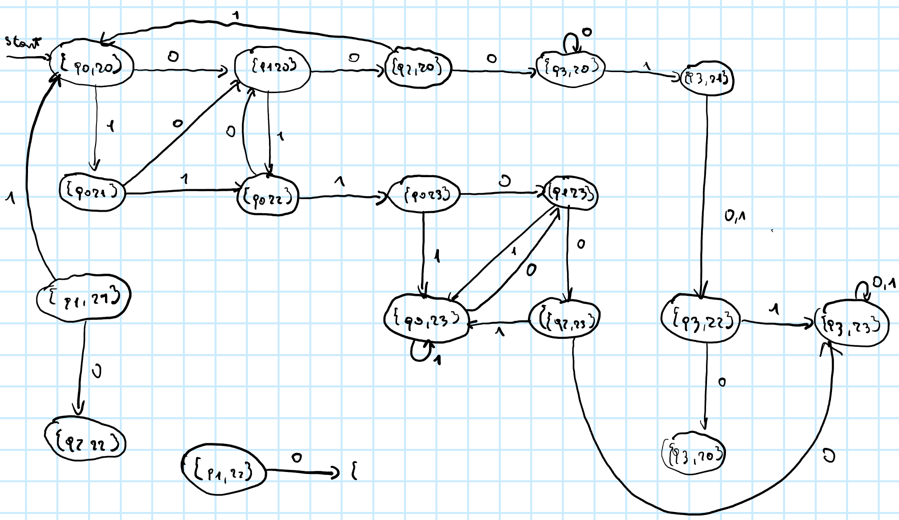
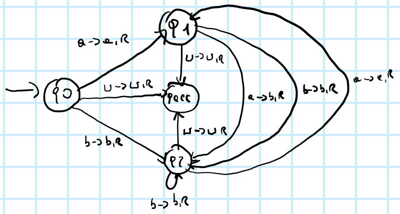


ESEMPIO - CONFIGURAZIONE DI UNA MDT

martedì 18 aprile 2023 15:08



Fornire la sequenza di configurazioni per la seguente stringa: aabbaaaa

- q0 aabbaaaa
- a q1 abbaaaa
- ab q2 bbaaaa
- abb q2 baaaa
- abbb q2 aaaa
- abbba q1 aaa
- abbbab q2 aa
- abbbaba q1 a
- abbbabab q2
- abbbabab q2
- abbbabab qaccept

RIDUZIONE 3-SAT < INDIPENDENT-SET

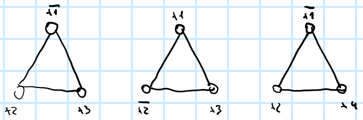
lunedì 12 giugno 2023 11:11

Date un'istanza Φ di 3-SAT, costruiamo un'istanza (V, E) di INDIPENDENT-SET, tale che G ha un insieme indipendente di al più k, se e solo se Φ è soddisfacibile.

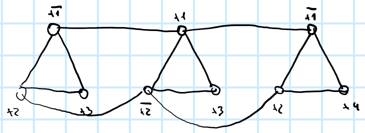
Ci basiamo sul fatto che in 3-SAT abbiamo delle variabili che possono essere vere o false, e anche in INDIPENDENT-SET, facciamo una scelta se includere o no un nodo nell'insieme indipendente

- $\Phi = (\bar{x}_1 \vee x_2 \vee x_3) \wedge (x_1 \vee \bar{x}_2 \vee x_3) \wedge (\bar{x}_1 \vee x_2 \vee x_4)$

Per ogni clausola creiamo un triangolo e colleghiamo i vertici



Prendiamo un solo vertice e colleghiamo ogni letterale al suo negato.



Per soddisfare le clausole, settiamo k al numero di clausole.

RIDUZIONE 3-SAT < SUBSET-SUM

lunedì 12 giugno 2023 12:07

$\Phi = (\overline{x_1} \vee x_2 \vee \overline{x_3}) \wedge (x_1 \vee x_2 \vee x_3) \wedge (x_1 \vee \overline{x_2} \vee x_3) \wedge (\overline{x_1} \vee \overline{x_2} \vee \overline{x_3})$ $6+8=14$

$2m+2k$

	x_1	x_2	x_3	c_1	c_2	c_3	c_4
x_1	1	0	0	0	1	1	0
$\overline{x_1}$	1	0	0	1	0	0	1
x_2	0	1	0	1	1	0	0
$\overline{x_2}$	0	1	0	0	0	1	1
x_3	0	0	1	0	1	1	0
$\overline{x_3}$	0	0	1	1	0	0	1
	0	0	0	1	0	0	0
	0	0	0	2	0	0	0
	0	0	0	0	1	0	0
	0	0	0	0	2	0	0
	0	0	0	0	0	1	0
	0	0	0	0	0	2	0
	0	0	0	0	0	0	1
	0	0	0	0	0	0	2
	1	1	1	4	4	4	

x_1 = vero

x_2 = falso

x_3 = vero