CURS #12

UNDE SUNTEM TRANZITII FAZA ÎN 3-SAT

Parametru $c \geq 0$

$\#var = n$

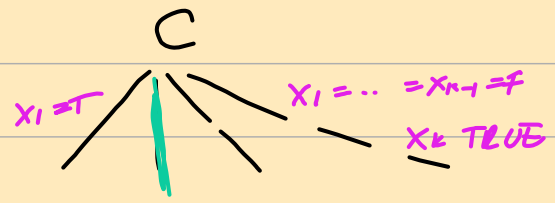
$\#clauze = c \cdot n$

DPLL {Davis-Putnam-Loveland-Longman} Backtracking + unit clause prop.

Alg MONIEN-SPECKENMEYER (variant of DPLL)

Alg clauză = C de lungime minimă

$C = x_1 \vee \dots \vee x_k$



Dacă există A este autark $\Rightarrow$ setez var. conform lui A

CONFLICT-DRIVEN CLAUSE LEARNING (CDCL)

IDEE DE BAZĂ $\phi \rightarrow \phi \wedge C_1 \rightarrow \phi \wedge C_1 \wedge C_2$

2. BACKJUMPING

backtracking mai multe variabile

SIMULTAN

+C clauză nouă

care îmi explică contradicția

CDCL

while (TRUE)

1. decid să dau o valoare unei var. nealocate.
2. efectuez propagare unitară.
3. când ajung la CONFLICT (□ → clauză negată)

Exp	x	x = TRUE
	$\bar{x}$	□

??

analizez motivul pt CONFLICT

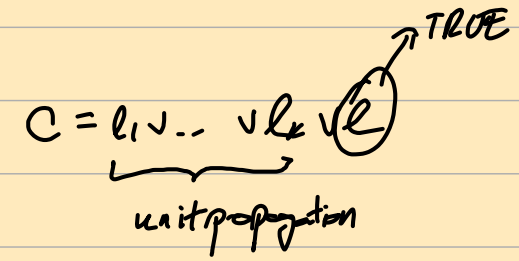
învăț clauză nouă

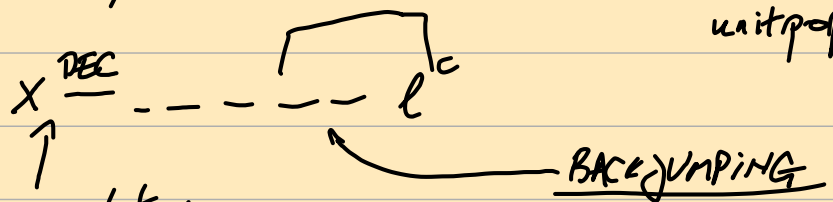
backjump

dacă SAT ⇒ STOP

altfel aleg var nouă (nivel nou)

Log (Trail)





am setat x ca urmare a unei decizii

EXEMPLU $\bar{x}_1 \vee \bar{x}_2$ $\bar{x}_3 \vee \bar{x}_4$ $\bar{x}_5 \vee x_6 \vee \bar{x}_7$ $\bar{x}_8 \vee \bar{x}_9$

$\bar{x}_1 \vee x_3$ $x_2 \vee x_4 \vee x_5$ $x_2 \vee x_7 \vee x_8$ $\bar{x}_8 \vee x_{10}$

$x_9 \vee \bar{x}_{10} \vee x_{11}$ $\bar{x}_{10} \vee \bar{x}_{12}$ $\bar{x}_{11} \vee x_{12}$

$x_1 = T$

$x_2 = F$ (u.p)

$x_3 = T$ (u.p)

$x_4 = F$ (u.p)

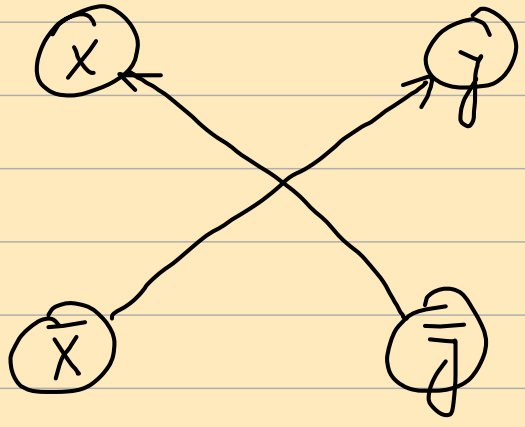
$x_5 = T$

x_1 DEC $\neg(\bar{x}_1 \vee \bar{x}_2)$ x_3 $\bar{x}_1 \vee x_3$

$\bar{x}_4$ $\bar{x}_5 \vee \bar{x}_4$ x_5 $x_2 \vee x_4 \vee x_5$

2-SAT (seminar)

FORMULA GRAPH $\phi = \{x \vee y\}$



$x \vee y \equiv$

$\bar{x} \rightarrow y \equiv$

$\bar{y} \rightarrow x$

IMPLICATION GRAPH - DAG

$V = \{ l \mid l \in \Pi \} \cup \{ 1 \}$

1-UIP

conflict vertex

pp Clausa C este falsificata de π

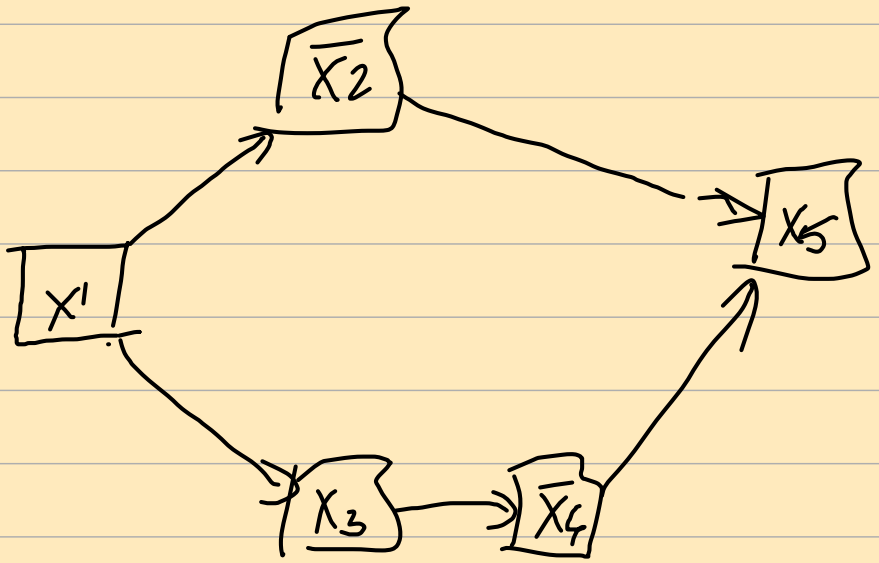
$r = l_1 \vee l_2 \vee \dots \vee l_k \vee l$

$\bar{l}_1, \dots \bar{l}_k \in V$

$\boxed{\bar{l}_i \to l}$ muchii

$C = w_1 \vee \dots \vee w_r$ $\boxed{\bar{w}_i \to \bot}$ muchii

Exp



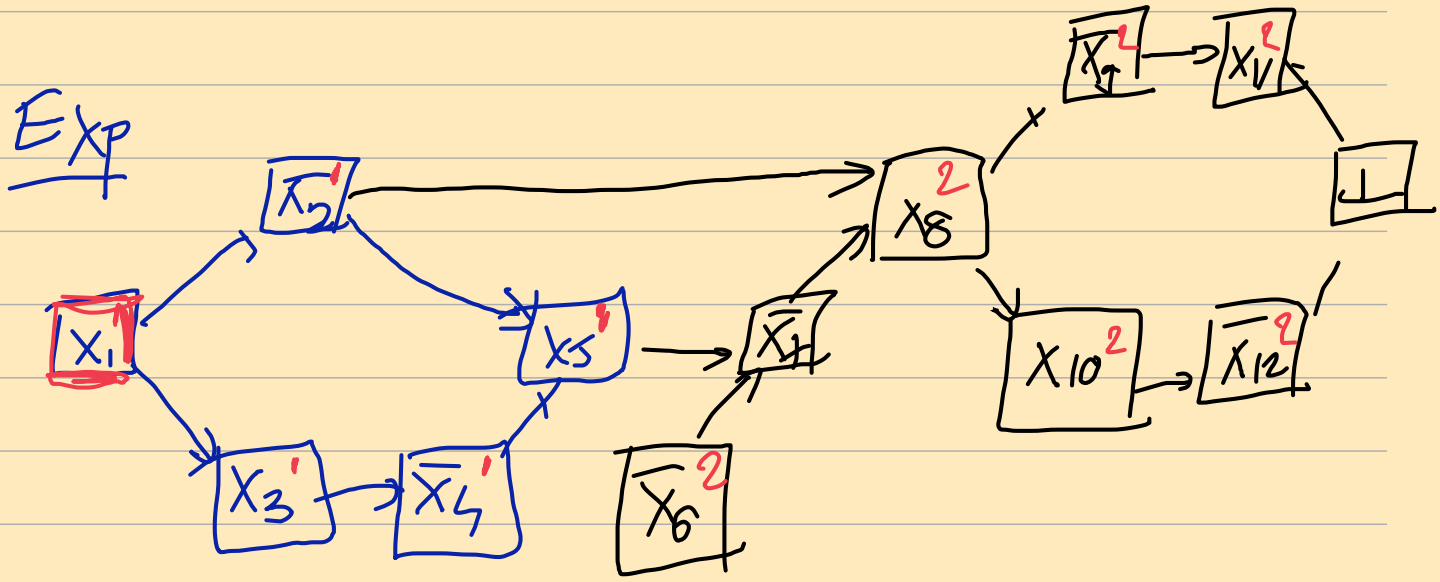
CONFLICT CUT $G=(V,E) \xrightarrow{\pi}$ falsifica o clauza (C)

$W = (A,B)$ partitie a (G, V)

$(A \cup B = V, \ A \cap B = \phi)$

- toate nodurile decizie sunt în A

- $\bot \in B$



(x_6 = FALSE decizie)

rest al propagare.

$A = \{x_1, \bar{x}_6\}$

$A = \{x_1, \bar{x}_6, \bar{x}_2, x_3, \bar{x}_4, x_5\}$

$A = \{ - - - - \quad \bar{x}_7, x_8^1$

LEARNED CLAUSE

$G = (V, E)$

$V = A \cup B, \quad A \cap B = \emptyset$

$R = \{ \ell \in A \mid \exists \ell' \in B \quad \ell \to \ell' \}$

$C_R = \bigvee_{\ell \in L} \bar{\ell}$