

Survey Propagation (Maneva et al.)

Date

No.

Problem Statement and Configurations

Given a SAT problem, convert it into a bipartite graph where

V : set of variables $|V| = n$, $V = \{i, j, k, \dots\}$

C : set of clauses $|C| = m$, $C = \{a, b, c, \dots\}$

The clause indexed by $a \in C$ is specified by

$(V(a), J_a)$: $V(a)$ set of variables associated with a

$J_a = (J_{a,i} \mid i \in V(a))$

$J_{a,i} = \begin{cases} 0 & \text{if the literal is } i \\ 1 & \text{if the literal is negation of } i \end{cases}$

Corollary: a is satisfied if and only if $\sum_{i \in V(a)} J_{a,i} \neq |V(a)|$

$$C(i) = \{a \mid a \in C, i \in V(a)\}$$

$$C^+(i) = \{a \mid a \in C(i) \wedge J_{a,i} = 0\}$$

$$C^-(i) = \{a \mid a \in C(i) \wedge J_{a,i} = 1\}$$

$$C_a^s(i) = \{b \mid b \in C(i) \setminus \{a\}, J_{a,i} = J_{b,i}\}$$

$$C_a^u(i) = \{b \mid b \in C(i) \setminus \{a\}, J_{a,i} \neq J_{b,i}\}$$