Date :
MON TUE WED THU FRI SAT SUN

* CNF function form : $(a_1 \vee a_2) \wedge (a_3 \vee a_4)$

$\Downarrow$ $\wedge$ $\Downarrow$

C_1 $\wedge$ C_2

* Encoding variables :

1) P_{ij} => j^{th} clause contains x_i

2) n_{ij} => j^{th} clause contains $\bar{x_i}$

3) C_1 => Boolean value of clause 1 i.e $C_1 \in B$ ... ~~where~~

4) C_2 => Boolean value of clause 2 i.e $C_2 \in B$

... where $B = \{0, 1\}$

* Description :

- $I \in B^n$, $O : B^n \to B$
- $V_1 = \{ e \mid e \in I, O(e) = 1 \}$
- $V_0 = \{ e \mid e \in I, O(e) = 0 \}$
- $ON(V_1) = \{ i \mid v_i = 1 \}$
- $OFF(V_1) = \{ i \mid v_i = 0 \}$
- $ON(V_0) = \{ i \mid v_i = 1 \}$
- $OFF(V_0) = \{ i \mid v_i = 0 \}$
- 'n' : number of input variables (in code, $n = 6$) & number of clauses = 2.

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Constraint Clauses :

$$\bigwedge_{\substack{j=1,\\ v \in V_1}}^{2} \left(\bigvee_{i \in ON(v)} p_{ij} \right) \vee \left(\bigvee_{i \in OFF(v)} n_{ij} \right) \quad \bigwedge \quad \rightarrow (1)$$

$$\left(\overline{C_1} \vee \overline{C_2} \right) \bigwedge \quad \longrightarrow (2)$$

$$\bigwedge_{\substack{j=1\\ v \notin V_0}}^{2} \left(\overline{C_j} \wedge \left(\left\{ \bigvee_{i \in OFF(v)} p_{ij} \right\} \vee \left\{ \bigvee_{i \in ON(v)} n_{ij} \right\} \right) \right) \vee \left(C_j \wedge \left(\left\{ \bigvee_{i \in ON(v)} p_{ij} \right\} \vee \left\{ \bigvee_{i \in OFF(v)} n_{ij} \right\} \right) \right) \quad - (3) \quad \bigwedge$$

$$\bigwedge_{j=1}^{2} \left(\sum_{i=0}^{n-1} p_{ij} + \sum_{i=0}^{n-1} n_{ij} \leq 2 \right) \quad \bigwedge \quad - (4)$$

Pseudo Boolean / Cardinality constraint

$$\bigwedge_{i=0}^{n-1} \bigwedge_{j=1}^{2} \left(\overline{p_{ij}} \vee \overline{n_{ij}} \right) \quad \text{---} (5)$$