Input: Sample $S = \{(x_1, y_1), \ldots, (x_n, y_n)\}$, where $x_i \in X, y_i \in Y : \{-1, +1\}$; A set of base conditions $\Theta$ (A base condition is a boolean predicate over instances).

Initialize $w_1(i) = \frac{1}{m}, \frac{1}{l}$ for $y = -1, 1$ respectively, where $m$ and $l$ are the number of negatives and positives respectively

Initialize the Alternating Decision Tree:
$\mathcal{R}_1 = \{r_1: \text{(if } T \text{ then (if } T \text{ then (} \frac{1}{2}\ln\left(\frac{W_+(T)}{W_-(T)}\right) \text{ else } 0 \text{) else } 0)\}\}$

Initialize the set of preconditions: $P_1 = \{T\}$ (A precondition is a conjunction of base conditions and negations of base conditions)

For each $t = 1, \ldots, T$

1. Choose $C_1 \in P_t$ and $c_2 \in \Theta$, which minimize $Z_t(C_1, c_2)$ according to Equation:

$$Z_t(C_1, c_2) = 2(\sqrt{W_+(C_1 \land c_2)W_-(C_1 \land c_2)}) +$$
$$+ \sqrt{W_+(C_1 \land \neg c_2)W_-(C_1 \land \neg c_2)}) +$$
$$+ W(-C_1)$$

where $W_+(C)$ denotes the sum of the weights of the positive examples that satisfy condition $C$; and $W_-(C)$ denotes the sum of the weights of the negative examples that satisfy condition $C$

2. $\mathcal{R}_{t+1} = \mathcal{R}_t \cup \{r_{t+1}: \text{(if } C_1 \text{ then (if } c_2 \text{ then (} \frac{1}{2}\ln\left(\frac{W_+(C_1 \land c_2)}{W_-(C_1 \land c_2)}\right) \text{ else } 0 \text{) else } 0)\}\}$

3. $P_{t+1} = P_t \cup \{C_1 \land c_2, C_1 \land \neg c_2\}$

4. Update weights:
$$w_{t+1}(i) = w_t(i)e^{-y_tr_t(x_i)}$$

Output: Alternating Decision Tree : $\mathcal{R}_{T+1}$