**Input:** Sample $S = \{(x_1, y_1), ..., (x_n, y_n)\}$, where $x_i \in X, y_i \in Y : \{-1, +1\}$

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.

For each $t = 1, ..., T$

1. Train the base learner using distribution $W_t$
2. Get Weak hypothesis $h_t : X \rightarrow \{-1, +1\}$ with error $\epsilon_t = Pr_{i \sim W_t}[h_t(x_i) \neq y_i]$
3. Choose $\alpha_t = \frac{1}{2}ln(\frac{1-\epsilon_t}{\epsilon_t})$
4. Update:

$$W_{t+1}(i) = \frac{W_t(i)}{Z_t} \times \begin{cases} e^{-\alpha_t} & \text{if } h_t(x_i) = y_i \\ e^{\alpha_t} & \text{if } h_t(x_i) \neq y_i \end{cases}$$

i.e. $W_{t+1}(i) = \frac{W_t(i)e^{-\alpha_t y_i h_t(x_i)}}{Z_t}$

where $Z_t$ is a normalization factor

**Output:** Final hypothesis

$$H(x) = \sum_{t=1}^{T} \alpha_t h_t(x)$$

Figure 6: The boosting algorithm: AdaBoost