I. AdaBoost.M1

Algorithm 1.

1. Initialize the observation weights $w_i = \frac{1}{N}$, $i = 1, 2, \dots N$

2. From $m = 1$ to M (nums of classifier):

   a) Fit a classifier $G_m(x)$ to the training dataset using w_i

   b) Compute the resulting weighted error rate

$$error_m = \frac{\sum_{i=1}^{N} w_i \, I(y_i \neq G_m(x_i))}{\sum_{i=1}^{N} w_i}$$

   c) Compute the weight α_m to classifier $G_m(x)$

$$\alpha_m = \log\left(\frac{1 - error_m}{error_m}\right)$$

   d) Update the weight of each observations

$$w_i = w_i \cdot \exp[\alpha_m \cdot I(y_i \neq G_m(x_i))] \quad i = 1, 2, \dots, N$$

3. Output $G(x) = \text{sign}\left[\sum_{m=1}^{M} \alpha_m G_m(x)\right]$