

# AdaBoost

[with Freund]

- constructing  $D_t$ :
  - $D_1(i) = 1/m$
  - given  $D_t$  and  $h_t$ :

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

where  $Z_t$  = normalization factor

$$\alpha_t = \frac{1}{2} \ln \left( \frac{1 - \epsilon_t}{\epsilon_t} \right) > 0$$

- final classifier:
  - $H_{\text{final}}(x) = \text{sign} \left( \sum_t \alpha_t h_t(x) \right)$