

Algorithm 32 **ADABOOST**($\mathcal{W}, \mathcal{D}, K$)

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1:  $\mathbf{d}^{(0)} \leftarrow \langle \frac{1}{N}, \frac{1}{N}, \dots, \frac{1}{N} \rangle$ 
2: for  $k = 1 \dots K$  do
3:    $f^{(k)} \leftarrow \mathcal{W}(\mathcal{D}, \mathbf{d}^{(k-1)})$ 
4:    $\hat{y}_n \leftarrow f^{(k)}(\mathbf{x}_n), \forall n$ 
5:    $\hat{\epsilon}^{(k)} \leftarrow \sum_n d_n^{(k-1)} [y_n \neq \hat{y}_n]$ 
6:    $\alpha^{(k)} \leftarrow \frac{1}{2} \log \left( \frac{1 - \hat{\epsilon}^{(k)}}{\hat{\epsilon}^{(k)}} \right)$ 
7:    $d_n^{(k)} \leftarrow \frac{1}{Z} d_n^{(k-1)} \exp[-\alpha^{(k)} y_n \hat{y}_n], \forall n$ 
8: end for
9: return  $f(\hat{\mathbf{x}}) = \text{sgn} [\sum_k \alpha^{(k)} f^{(k)}(\hat{\mathbf{x}})]$ 

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1. The algorithm for Adaboost is given above. For each line number 1-9 (excluding 8), explain in English what is happening. Clearly indicate each step and your explanation with a number. (10 points)