

1. Explain each line of the following Adaboost algorithm in English. That is, explain what is happening to someone who is unfamiliar with Adaboost. Don't simply state "this line assigns the value X to the variable Y." Keep your explanations concise. 1-2 sentences should work for each. (10 points)

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

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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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