Homework-8 Solutions

Question 1

Initialization: $p_i = 1/1000$

Iteration 1:

$\epsilon_1 = 200 \times 1/1000 = 0.2$

$\alpha_1 = 0.5 \ln 0.8/0.2 = 0.693$

$q_{\text{right}} = 0.5, \quad q_{\text{wrong}} = 2$

new p_i: 0.5/1000 for 800 examples, 2/1000 for 200 examples

$Z_1 = 0.4 + 0.4 = 0.8$

normalized p_i: 0.625/1000 for 800 examples, 2.5/1000 for 200 examples

Iteration 2:

$\epsilon_2 = 200 \times 0.625/1000 = 0.125$

$\alpha_2 = 0.973$

$q_{\text{right}} = 0.38, \quad q_{\text{wrong}} = 2.65$

new p_i: 0.238/1000 for 600 examples, 1.66/1000 for 200 examples, 0.95/1000 for 200 examples

$Z_2 = 0.142 + 0.322 + 0.19 = 0.654$

normalized p_i: 0.364/1000 for 600 examples, 2.538/1000 for 200 examples, 1.45/1000 for 200 examples

Iteration 3:

$\epsilon_3 = 100 \times 0.364/1000 = 0.0364$

$\alpha_3 = 1.64$

1 What would be the weight of Classifier A?

Answer: $\alpha_1 = 0.693$

2 What would be the weight of Classifier B?

Answer: $\alpha_2 = 0.973$

3 What would be the weight of Classifier C?

Answer: $\alpha_3 = 1.64$

4 What would be the answer produced by the combined classifier if according to Classifier A the answer is POSITIVE, according to Classifier B it is POSITIVE, and according to Classifier C it is NEGATIVE?

Answer: $0.693 + 0.973 - 1.64 > 0 \quad \Rightarrow$ POSITIVE.

5 What would be the answer produced by the combined classifier if according to Classifier A the answer is POSITIVE, according to Classifier B it is NEGATIVE, and according to Classifier C it is POSITIVE?

Answer: $0.693 - 0.973 + 1.64 > 0 \quad \Rightarrow$ POSITIVE.

6 What would be the answer produced by the combined classifier if according to Classifier A the answer is NEGATIVE, according to Classifier B it is POSITIVE, and according to Classifier C it is POSITIVE?

Answer: $-0.693 + 0.973 + 1.64 > 0 \quad \Rightarrow$ POSITIVE.