Appendix

Appendix A

Dissemination of Research Results


Appendix B

Error Bounds for the Ensemble

Using the square loss function $l^*(z, y) = (z - y)^2$ and the exponential weighting update function, bounds of an ensemble are given as:

$$\sum_{i=1}^{I} l^*(w_i^S \Pi(C_i^S) + w_i^T \Pi(C_i^T), \Pi(y_i)) \leq 2ln(2) \tag{1}$$

$$+ \min\{\sum_{i=1}^{I} l^*((\Pi(C_i^S), \Pi(y_i)), \sum_{i=1}^{I} l^*((\Pi(C_i^T), \Pi(y_i)))\}$$

The above equation is derived by following the proof in [164]. Using this, the error bounds of an ensemble are derived as follows: The error at the $i^{th}$ step is represented as $|w_i^S \Pi(C_i^S) + w_i^T \Pi(C_i^T) - \Pi(y_i)| \geq \frac{1}{2}$. Therefore, we have

$$\sum_{i=1}^{I} l^*(w_i^S \Pi(C_i^S) + w_i^T \Pi(C_i^T), \Pi(y_i)) \tag{2}$$

$$= \sum_{i=1}^{I} (w_i^S \Pi(C_i^S) + w_i^T \Pi(C_i^T), \Pi(y_i))^2 \geq \frac{1}{4} M$$

Combining Eqs. 1 and 2, we have

$$\frac{1}{4} M \leq \min\{\sum C^S, \sum C^T\} + 2ln(2) \tag{3}$$

where $\sum C^S = \sum_{i=1}^{I} l^*(\Pi(C_i^S), \Pi(y_i))$ and $\sum C^T = \sum_{i=1}^{I} l^*(\Pi(C_i^T), \Pi(y_i))$