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The object of this study is to construct error correcting codes for Error Correcting Output Coding (ECOC). ECOC is one of Multiple Classifier Systems (Fig.1), which prepare a large number of binary classifiers and then construct a classifier by combining the base classifiers.

In K-class pattern classification problems, it is general to use the One-Per-Class (OPC) code like Fig. 2-(a). The OPC classifier has K binary classifiers f_k , one for each class. On the other hand, the ECOC classifier prepares M binary classifiers f_m over the number of classes K and trains the base classifiers so as to have further coded output like Fig.2-(b).

ECOC can choose the right class by appropriately decoding the outputs of base classifiers even if the output of a base classifier is inverted. We can therefore expect that the error probability of the ECOC classifier reduces with an increase of the number of base classifiers. In this study, we focus on ECOC combination strategy based on Weighted Least Squares (WLS-ECOC) and propose a method for constructing error correct codes for WLS-ECOC.

There are several previous works on designing the error correcting codes, for example, exhaustive codes, column selection from exhaustive codes, BCH codes and random codes. These codes are constructed based on Hamming distance between codewords. However, it is not clear the relation between the Hamming distance and the classification ability of ECOC. We therefore focus on the estimation error of the a posteriori probabilities, which is one of the important criteria in the pattern classification problems, and propose a method for constructing error correcting codes based on the estimation error.

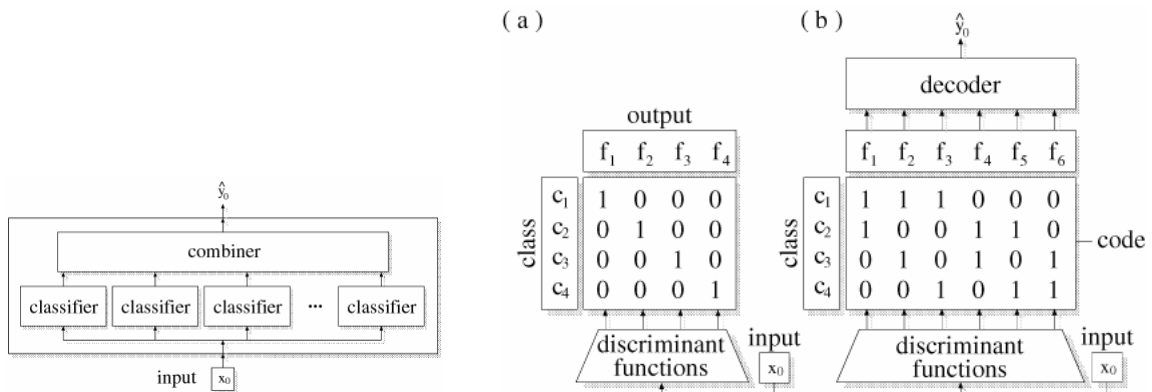


Fig.1 Multiple Classifier Systems (MCSs) Fig.2 Error Correcting Output Coding (ECOC)