ABSTRACT

Error correcting output codes (ECOC) represent a successful extension of binary classifiers to address the multiclass problem. In this paper, we propose a novel technique called ECOCONE (Optimal Node Embedding) to improve an initial ECOC configuration defining a strategy to create new dichotomies and improve optimally the performance. The process of searching for new dichotomies is guided by the confusion matrices over two exclusive training subsets. A weighted methodology is proposed to take into account the different relevance between dichotomies. We validate our extension technique on well-known UCI databases. The results show significant improvement to the traditional coding techniques with far few extra cost.

Keywords. Error Correcting Output Codes, Multiclass classification

1.ECOC

2.ECOC-ONE

3.RESULTS

4.REAL APPLICATIONS

TRAFFIC SIGN RECOGNITION

ROBOTICS

CONCLUSIONS

In most of the ECOC coding strategies, the ECOC matrix is pre-designed, using the same dichotomies in any type of problem. We introduced a new coding and decoding strategy called ECOC-ONE. The ECOC-ONE strategy can be seen as a general extension for any initial coding matrix. The procedure shares classifiers among classes in the ECOC-ONE matrix, and selects the best partitions weighted by their relevance. In this way, it reduces the overall error for a given problem. Moreover, using the validation subset the performance is increased and overfitting is avoided. We show that this technique improves in most cases the generalization performance of any initial code with few extra cost better than other distance maximization extensions. Besides, ECOC-ONE can generate an initial small code by itself. As a result, a compact - small number of classifiers – multiclass recognition technique with improved accuracy is presented with very promising results.