

Reduced Multi-class Contour Preserving Classification

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Abstract

This research presents the augmentation of the original contour preserving classification technique to support multi-class data and to reduce the number of synthesized vectors, called multi-class outpost vectors (MCOVs). The technique has been proven to function on both synthetic-problem data sets and real-world data sets correctly. The technique also includes three methods to reduce the number of MCOVs by using minimum vector distance selection between fundamental multi-class outpost vectors and additional multi-class outpost vectors to select only MCOVs located at the decision boundary between consecutive classes of data. The three MCOV reduction methods include the FF-AA reduction method, the FA-AF reduction method, and the FAF-AFA reduction method. An evaluation has been conducted to show the reduction capability, the contour preservation capability, and the levels of classification accuracy of the three MCOV reduction methods on both non-overlapping and highly overlapping synthetic-problem data sets and highly overlapping real-world data sets. For non-overlapping problems, the experimental results present that the FA-AF reduction method can partially reduce the number of MCOVs while preserving the contour of the problem most accurately and obtaining similar levels of classification accuracy as when the whole set of MCOVs is used. For highly overlapping problems, the experimental results present that the FF-AA reduction method can partially reduce the number of MCOVs while preserving the contour of the problem most accurately and obtaining similar levels of classification accuracy as when the whole set of MCOVs is used.