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Supervised image classification by MLP and RBF neural networks with and without an exhaustively defined set of classes

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Abstract

The absence of assumptions about the dataset to be classified is one of the major attractions of neural networks for supervised image classification applications. Classification by a neural network does, however, make assumptions about the classes. One key assumption typically made is that the set of classes has been defined exhaustively. If this assumption is unsatisfied, cases of an untrained class will be present and commissioned into the set of trained classes to the detriment of classification accuracy. This was observed in land cover classifications derived with multi-layer perceptron (MLP) and radial basis function (RBF) neural networks in which the presence of an untrained class resulted in a ~12.5% decrease in the accuracy of crop classifications derived from airborne thematic mapper data. However, since the

RBF network partitions feature space locally rather than globally as with the MLP, it was possible to reduce the commission of atypical cases into the set of trained classes through the setting of post-classification thresholds on the RBF network's outputs. As a result it was possible to identify and exclude some cases of untrained classes from a classification with a RBF network which resulted in an increase in classification accuracy.

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