Neural Net and Traditional Classifiers

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Abstract:

Abstract. Previous work on nets with continuous-valued inputs led to generative procedures to construct convex decision regions with two-layer perceptrons

(one hidden layer) and arbitrary decision regions with three-layer perceptrons (two hidden layers). Here we demonstrate that two-layer perceptron classifiers

trained with back propagation can form both convex and disjoint decision regions. Such classifiers are robust, train rapidly, and provide

good performance with simple decision regions. When complex decision regions are required, however, convergence time can be excessively long and

performance is often no better than that of k-nearest neighbor classifiers. Three neural net classifiers are presented that provide more

rapid training under such situations. Two use fixed weights in the first one or two layers and are similar to

classifiers that estimate probability density functions using histograms. A third "feature map classifier" uses both unsupervised and supervised training. It

provides good performance with little supervised training in situations such as speech recognition where much unlabeled training data is available.

The architecture of this classifier can be used to implement a neural net k-nearest neighbor classifier.