

Crime Category Prediction of Cities Using an Ensemble of Various Classifiers

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k-Nearest Neighbors

- > parameter search on a leave-one-out cross validation
- > k=30 best (accuracy)
- > distance measure = euclidean distance
- > no distance weighting => better results

Naïve Bayes

Another approach is the Naïve Bayes classifier. Despite some attributes obviously not being independent, it was still employed because it proved to be useful in other areas as well.

Decision Tree

- > prunes J48-decision tree
- > confidence factor = $c = 0.045$
- > found by utilizing WEKAs capabilities of linear parameter search

Neural Network

- > multilayer perceptron
- > 13 input neurons (features)
- > hidden layer of 17 neurons
- > output layer with three neurons (classes)
- > learning rate: $\alpha = 0.1$
- > momentum: $m = 0.1$ (backpropagation algorithm)
- > linear search for parameters: hidden neurons, learning rate and momentum

Ensemble

In hope for enhanced results by combining the strenghts of the different classifiers, all models were combined into an ensemble. The vote of the whole ensemble was found by conducting a majority voting.

Results

> 10-fold cross validation

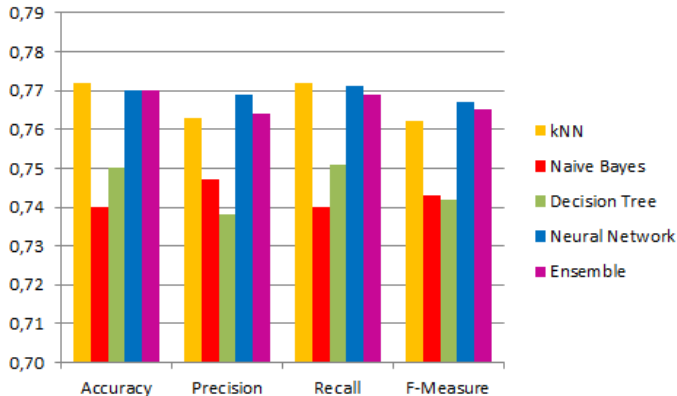


Figure: Evaluation metrics of the different classifiers

Table: Confusion matrix of the ensemble

classified →	Low	Medium	High	Total
Low	1125	126	8	1259
Medium	160	305	57	522
High	15	95	103	213
Total	1300	526	168	1994

Recall

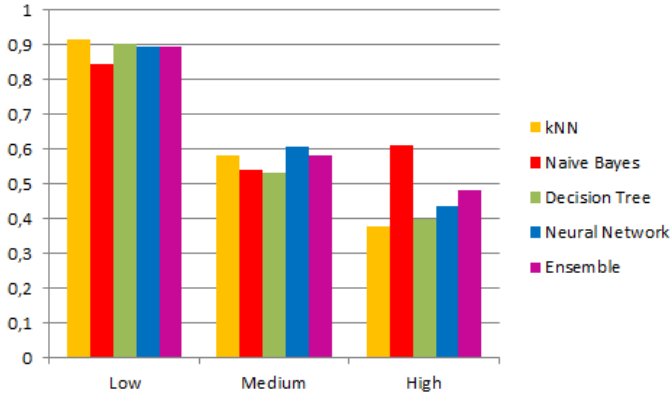


Figure: Recall of the different classifiers

