

ENTOOL

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What is ENTOOL?

ENTOOL is a *Matlab* toolbox for ensemble regression modelling.

Objectives

- Extending the ensemble learning approach [1] to several types of models
- Object-oriented implementation yields a transparent mixture of different models and allows the user the addition of his own model classes

Implementation

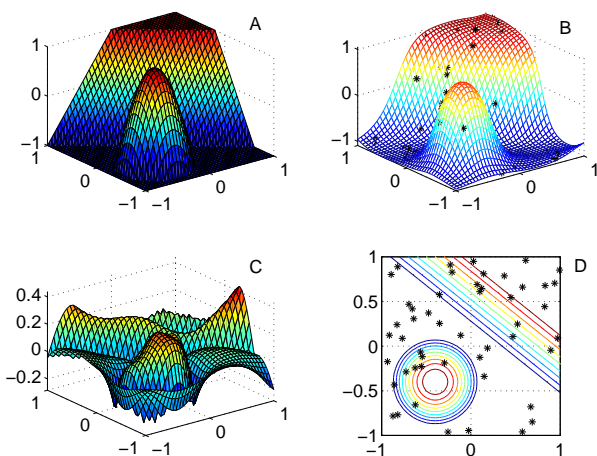
The package is written partly in *Matlab* and partly in C++.

Methods

The toolbox is equipped with several model classes for out-of-box usage:

- Radial basis functions (RBF)
- Linear regression
- Polynomial regression
- K-nearest-neighbour models with adaptive metric
- Multilayer perceptron (MLP)

An Example



The figure shows the ramp-hill function (A), learned with 50 randomly thrown data-points (B). The total errors of the ensemble are shown in (C). The location of the training set regarding the ramp-hill function can be seen in (D). The ensemble model consists of several MLPs, a RBF- and a k-nearest-neighbour model. The model selection was done automatically by cross validation.

Generalisation

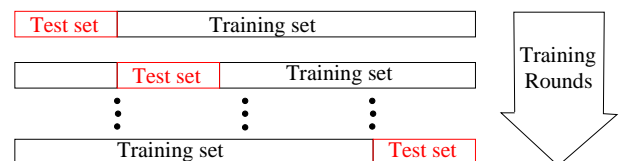
In order to achieve a high generalisation of the ensemble, the residua of the single ensemble-members should be de-correlated. This could be done by

- Using different types of models
- Varying the model parameters, i.e. the number of nearest-neighbours, the degree of the polynomials, the topologies of the MLPs
- Cross validation

Ensemble Training

We modified the cross validation for ensemble learning [2] for handling several model classes:

- The data is divided in two sets
- Different models are trained on the first set
- The models are compared on the unseen test data
- The best performers are taken out and become ensemble members
- The data is divided again in a way that the new test set has minimal overlap with the former ones
- The procedure stops if the ensemble has the desired size



How to obtain ENTOOL ?

ENTOOL will be soon available on the Internet.

References

- [1] Peronne, Cooper, When networks disagree: Ensemble methods for neural networks, Neural Networks for Speech and Image Processing, Chapman Hall (1993)
- [2] Krogh, Vedelsby, Neural Network Ensembles, Cross Validation and Active Learning, Advances in Neural Information Processing Systems 7, MIT Press (1995)

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