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 residual 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


Acknowledgements

The work was done within the Research Training Network COSYC of SENS No. HPRN-CT-2000-00158 within in 5th EU Framework Program of the European Community.