Assignment 3: Neural Networks

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November 24, 2015

1 Implementation

In our second assignment, we apply neural networks to the emotion recognition problem. We use the Neural Network Toolbox provided by MATLAB to train and compare the performance of different neural networks on the dataset at our disposal, in order to find the best training algorithm along with the best parameter configuration.
We compare four different training algorithm:

- Standard gradient descent backpropagation (`traingd` in MATLAB);
- Gradient descent with adaptive learning rate (`traingda`);
- Gradient descent with momentum (`traingdm`)
- Resilient backpropagation (`trainrp`).

In this section we describe our implementation of:

- selection of the best set of parameters for each algorithm;
- evaluation of NN's performance on unseen data.

1.1 Parameter selection

In the first part, we use cross- validation to select the best performing algorithm on the dataset and the best parameter configuration for it. Cross-validation is performed by splitting the dataset into 10 folds and using 9 folds for training and 1 for validation; iteratively, each fold is in turn used for validation, and ultimately the algorithm and parameter set that yield the best average performance over the folds is chosen. For splitting, we use the same function as in the previous exercise, which performs *stratified* cross-validation: each fold contains approximately the same proportion of examples in every class as the whole dataset.

1.2 Performance evaluation

2 Performance results

3 Questions