January-May 2014 Semester
CS6011: Kernel Methods for Pattern Analysis
Programming Assignment II

Date: February 25, 2014
Deadline for submission of report: **4PM, Tuesday, March 18, 2014**

Classification tasks

Datasets:

Dataset 1: 2-dimensional input data:
(a) Linearly separable classes, (b) Nonlinearly separable classes, (c) Overlapping classes

Dataset 2: Image data

Models:

1. Bayes classifier (Gaussian model or Gaussian mixture model) for Datasets 1(a), 1(b), 1(c) and 2
2. Perceptron for Dataset 1(a)
3. MLFFNN for Datasets 1(a), 1(b), 1(c) and 2

Presentation of Results:

1. Decision region plot for Datasets 1(a), 1(b) and 1(c)
2. Confusion matrix and average classification accuracy
3. Comparison of performance of different models for each dataset
4. Plots of outputs each of the hidden nodes and output nodes in MLFFNN for Dataset 1(b) after the model is trained.

Regression tasks

Datasets

Dataset 1: 1-dimensional (Univariate) input data
Dataset 2: 2-dimensional (Bivariate) input data
Dataset 3: Multivariate input data

Models:

1. MLFFNN model for Datasets 1, 2 and 3
2. Generalized RBF model for Datasets 1, 2 and 3

Presentation of Results:

1. Plots of the values of mean squared error (MSE) on training data, validation data and test data, for different model complexities and for different values of regularization parameter (in RBF model only). (For Datasets 1, 2 and 3)
2. Plots of model output and target output for training data, validation data and test data. (For Datasets 1 and 2)
3. Scatter plot with target output on *x*-axis and model output on *y*-axis, for training data, validation data and test data. (For Datasets 1, 2 and 3)
4. Plots of outputs each of the hidden nodes and output nodes in MLFFNN after different number of epochs during training. (For Dataset 2)

Selection of model complexity and regularization parameter is to be done using the cross-validation method.

Report by a team should also include the observations about the results of studies