January-May 2016 Semester
CS6011: Kernel Methods for Pattern Analysis
Programming Assignment 2

Date: March 08, 2016
Deadline for submission of report on Tasks 1 and 2: **4PM, Tuesday, March 22, 2016**
Deadline for submission of report on Tasks 3, 4 and 5: **4PM, Thursday, March 31, 2016**

Datasets:

Dataset 1: 2-dimensional input data: (a) Linearly separable classes, (b) Nonlinearly separable classes, (c) Overlapping classes
Dataset 2: Color image data
Dataset 3: Black-and-white image data

Task 1: Classification using SVMs

Data: Datasets 1(a), 1(b) and 1(c)
Models: C-SVM and ν-SVM
Kernels: Polynomial kernel and Gaussian kernel
Model selection: Cross-validation method
Presentation of Results: Decision region plots and Confusion matrices

Task 2: Dimension reduction using PCA, Autoencoder and Stacked Autoencoder

Data: Feature vector representations (without and with dimension reduction) of images in Dataset 2
Classification model: ν-SVM with Gaussian kernel
No. of levels of autoencoders in Stacked autoencoder: 3
Selection of reduced dimension in Autoencoder and Stacked Autoencoder: Cross-validation method
Presentation of results: Confusion matrices

Task3: Classification using Deep Convolutional Neural Network (DCNN)

Data: Images in Dataset 2
Structure of DCNN: 3 levels of Convolution Layer followed by Pooling Layer, 2 fully connected hidden layers, Output layer
Model selection: Cross-validation method
Presentation of results: Confusion matrices

Task 4: Classification using DCNN features and SVM

Data: DCNN features based representations for images in Dataset 2
Model: ν-SVM with Gaussian kernel
Model selection: Cross-validation method
Presentation of results: Confusion matrices

Task5: Classification using Deep Boltzmann Machine (DBM)

Data: Images in Dataset 3
No. of Restricted Boltzmann Machines (RBMs): 3
Model selection: Cross-validation method
Presentation of results: Confusion matrices

A single report by a team should also include the details of the models used and the observations about the results of studies.