Activity Recognition using Neural Networks and SVMs

Deadline: Saturday 25th November 11:59PM

In this assignment you will build two classifiers that determine the physical activity of a human based on the readings of multiple smartphone sensors.

To train and test your classifiers, you will use the Human Activity Recognition dataset collected by Genova University and available via the University of California Irvine Machine learning repository. A video showing the data collection experiments is linked from the webpage and can also be found here. You should use the processed features, rather than the raw inertial readings.

In this assignment you are asked to:

1- Build and train a neural network classifier for this dataset. Specify the **optimal** classifier architecture that achieves the highest performance. An optimal architecture is the least computationally expensive that achieve the highest performance. 2%

2- Show the validation curve for your neural network classifier. 1%

3- Build and train a multiclass SVM classifier for this dataset. Comment on your choice of classifier type in terms of performance and computational cost. 2%

4- Show the validation curve for your SVM classifier. 1%

5- Comment on and **justify** the difference in performance between the two classifiers based on your understanding of the mathematical properties of the error surface optimized by each classifier. 1%

6- Repeat exercises 1 and 3 above, after preprocessing the dataset using the PCA technique. Vary the number of principal components to [5, 50, 200, 500]. Comment on and **justify** the relationship between the number of principal components and the observed performance for both the neural network and the SVM classifiers. 3%