**INTRODUCTION TO STATISTICAL LEARNING**

**Human Activity Recognition using Smart Phones**

Vineeth Reddy Kottam

ID: 16261474

**Problem description:**

**Human Activity Recognition (HAR)** aims to identify the actions carried out by a person given a set of observations of him/herself and the surrounding environment. Recognition can be accomplished by exploiting the information retrieved from various sources such as environmental or body-worn sensors. Some approaches have adapted dedicated motion sensors in different body parts such as the waist, wrist, chest and thighs achieving good classification performance. These sensors are usually uncomfortable for the common user and do not provide a long-term solution for activity monitoring (e.g. sensor repositioning after dressing).

Smartphones are bringing up new research opportunities for human-centered applications where the user is a rich source of context information and the phone is the firsthand sensing tool. Latest devices come with embedded built-in sensors such as microphones, dual cameras, accelerometers, gyroscopes, etc. The use of smartphones with inertial sensors is an alternative solution for HAR. These mass-marketed devices provide a flexible, affordable and self-contained solution to automatically and unobtrusively monitor Activities of Daily Living (ADL) while also providing telephony services. Consequently, in the last few years, some works aiming to understand human behavior using smartphones have been proposed: for instance in, one of the first approaches to exploit an Android smartphone for HAR employing its embedded triaxial accelerometers; additional results have also been presented in. Improvements are still expected in topics such as in multi-sensor fusion for better HAR classification, standardizing performance evaluation metrics, and providing public data for evaluation.

**Dataset description:**

A group of 30 volunteers with ages ranging from 19 to 48 years were selected for this task. Each person was instructed to follow a protocol of activities while wearing a waist-mounted Samsung Galaxy S II smartphone. The six selected ADL were standing, sitting, laying down, walking, and walking downstairs and upstairs. Each subject performed the protocol twice: on the first trial the smartphone was fixed on the left side of the belt and on the second it was placed by the user himself as preferred. There is also a separation of 5 seconds between each task where individuals are told to rest, this facilitated repeatability (every activity is at least tried twice) and ground trough generation through the visual interface. The tasks were performed in laboratory conditions, but volunteers were asked to perform freely the sequence of activities for a more naturalistic dataset.

**Project proceedings:**

The project is a supervised learning task to classify a user activity into anyone of the six classes. There are many supervised learning tasks for classification like Logistic Regression, Classification trees, K nearest neighbor algorithm, Support Vector Machine, Ensemble learning, etc. to model this task.