**Daily Activity Pattern detection using Smartphone App**

Description of my work:

Objective: Analysis of regularity patterns of daily activities and classification of users into highly-routine, piece wise-routine and routine less.

The raw data consisted of a one to one mapping of activity against each timestamp in a particular day. My first task was to parse this raw data file and capture all the activities occurring within a single minute, then to assign the most frequent activity (having high confidence value) as the most dominant activity within that minute. A very big challenge of this project was that the dataset was obtained from real time and hence was incomplete and full of noise. I levelled several intermediate data files both thorugh code and manually to eradicate noise as much as possible. Doing this resulted in obtaining better results in later stages as explained below. However, we required a more intelligent and scientific way of noise cancellation from the data. This task was carried out by my

project partner Shreyasi Pathak. She was responsible for developing LDA and Probability based systems for noise cancellation.

After this, my next task was to form the daily matrices for all the users for each day.

Once this was done I formulated the fuse matrices by combining several possible combinations of daily matrices like week wise, only weekdays, only weekends and a single specific day like all Mondays. The daily matrices were mathematically combined on basis of mean(average) and entropy. The fuse matrices having the entropy representation was obviously a better choice for plotting and to identify patterns in the user's lifestyle.

My final task was to graphically plot the different fuse matrices and to observe from the plots as to whether actually any pattern was coming or not. We initially planned to classify users into three categories (highly routine, piece wise routine, routine less).

Before noise cancellation several plots were made but almost nothing could be inferred from it because of noise, making multiple activities to occur at the same time. Also, Still was the most dominant activity and it would almost dominate from 0 to 24 hours (the time range of the plot).

However, after noise cancellation the plots obtained conveyed better information. Multiple activities were not occurring together and related activities like OnFoot and Walking were merged into either OnFoot or Walking to show that the person was obviously on not Still.

The output was very positive and several different kinds of daily patterns were observed for many users.

Even plots for daily matrices were also made to see the activity pattern of a user in a particular day.

All this was noted down.

Future Work: Development of an alert generation system to remind user of which activity he is most probable to perform at that time.