**CS590BD Big Data Analytics and Apps**

**First Increment Report – Group2**

* **Project Goal and Objectives**
* **Motivation:**

With the growth of technology and modernization in the world data is available from many devices and handling the data is really becoming a big challenge and actions and gestures performed. Consider a case where the movement of a person is random in the space in all the directions and various actions and gestures performed by them. It is very difficult to analyze the data and classify it according to the requirements. So, to reduce the complexities with such a scenarios we are developing an application based on the sensor tag that can detect the motion and analyze accordingly. Further it can specify the additional features like the acceleration, temperature, humidity and the location details such as latitude and longitude.

* **Significance:**

Our application is basically a mobile app which can be accessed by smart phones. We are using the most significant devices that are designed for the development of the smart phone applications. Devices such as the sensor tags and the chronos watch are wireless and control the movement over the applications in the mobiles. With the usage of this advanced equipment’s we design/develop the applications at a faster phase.

* **Objectives:**

The application is basically designed to analyze the data recorded from the activities and perform the data analytics over the collected data. Later we find pattern matching among the movements, directions and classify the data. First using the sensor tag and the mobile application, data is collected and stored in a log file. It is stored in HBase as a data repository. The stored file is in text format and then analyzed in the back end using machine learning techniques such as K-Means clustering and HMM model classification. Later after the completion of the data analytics using the available algorithms, the result files after classification is parsed and send to the restful service. The data hosted is retrieved back to the Mobile application to the user. We store the data in HBase as it supports any type of raw data and store it in column oriented approach.

* **System Features:**

Tools: R, Hadoop, K-Means, Android Development Kit, Eclipse Kepler.

Operating System: Android

Development Operating System: Windows 7

Programming Language: Java 7.0

Database: HBase

* **Activity Recognition Scenario and Data Collection**
* **Devices/Sensors:**

## Sensors: TI Sensor Tag - CC2541DK-SENSOR

## It is the first development kit designed for the smart phone application developers. It has total of 6 sensors which can sense Temperature, Humidity, Pressure, Accelerometer, Gyroscope, and Magnetometer. With the available sensors we can collect any data and build any applications related to health, education, fitness etc.. based on the information available from the sensors. Due to the wide variety of the data collection facility from the sensors it can be implemented in various applications in our daily life.

**Devices: Android devices**

* Bluetooth 4.0 compatible android device
* Android 4.3 or above OS
* GPS

**TI chronos Watch – EZ430-Chronos**

It is a highly developed wireless system that is used to design some smart applications using watches so that we can control the motion and can control the application based on the watch movement and its directions.

* **Data Collection:**

Data is collected using the sensor device from the Mobile application and is stored as a data repository in a log file. Data of various types can be collected as the device is equipped with total of 6 sensors. We are collecting the accelerometer data and gyroscope data primarily and besides this we collect temperature, humidity and other related data. This data is collected in various log files and stored in the data repository.

* **Motion/Activity Model:**

The application we are using traverse in 4 directions in the space. The motion is analyzed based on the direction of traversal such as left, right, rotate, punch and down. Motion and activities based on the traversal is later analyzed. The entire motion and activities are controlled using the sensor tag available. We also require chronos watch in case of measuring the data related to other sensors.

* **Analytical Tasks:**

The data stored in the repository is analyzed using analytical tasks like K-Means, and HMM classification algorithms. These analytical tasks generate an output file and this is hosted over a rest web service and retrieved back to the application user. The data obtained is tab separated. Based on the data obtained we form clusters along the directions of traversal.

* **Design of Mobile Client**
* **Features, Styles, Technologies, GUI :**

The following diagram shows a detailed description of the entire features design and styles used in our application in the hierarchical order.



* **Related Work**

We are using the open source android applications jump-run as a reference for building an android application to collect our training data.

* **Project Planning with Scrumdo:**

All the task planning according to the iterations are maintained in scrumdo and task allocation is shared equally among the team members.

<https://www.scrumdo.com/organization/umkc94/dashboard>

**Project Planning:**

We follow agile methodologies and progress in iterations and submit the code in Github.

**First Increment Tasks:**

1. Design and analysis on the architecture specifications

2. Analysis on open source Android projects.

3. Study of sensors and motion recognition services.

4. Study of project development tools and technologies.

**Second Increment:**

1. Collection of data using sensor tag from the application in the log file.

2. Creation and storing the file in the HBase.

3. Testing the data and the application based on sensor control.

4. Analyzing related algorithms to perform data analytics.

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1. Application code for reference

<https://github.com/semenoh/Tetris>