

SensorWrite

Increment 2

Group 7: James Clark, Anthony Sommer, Saitejasree Ramala, and James Wehmueller

CS 590BD: Big Data Analytics

Dr. Yugyung Lee

June 30, 2014

University of Missouri - Kansas City

Activity Recognition Scenario and Data Collection

Devices

TI CC2541 SensorTag

- Accelerometer
- Gyroscope
- SimpleKeys

Android

- Model number Nexus 5
- Android version 4.4.3
- Bluetooth v4.0 with A2DP

Data Collection

It will be necessary to “teach” our application by doing a number of inputs ourselves. We will provide a training data collection interface in our app and a data collection progress summary reporting feature.

Motion/Activity Model

We will normalize the data in 3D space so that it doesn’t matter how the device is oriented. This will involve taking the orientation data to figure out how the device has changed since it was initiated, and modify the acceleration data accordingly.

Analytical Tasks

We will use machine learning algorithms to teach our application which motions correspond to which visual data item such as a letter or number.

Design of Mobile Client

Features, Styles, Technologies, GUI

Features

- Data training interface
- Progress summary reporting
- Machine learning platform
- Application testing interface

Technologies

- TI CC2541 Sensor Tag
- Nexus 5 Android Mobile

GUI

Data Training



Design and Implementation of Big Data Analytics

Motion/Activity models

The app launches and the TI Sensortag connects and begins recording accelerometer data. When the sensor is turned off, data is attempted transfer to HBase via Glassfish web service.

Data model

As seen in Hue, our accelerometer data model is as follows:

Table	a0_accelerometer
Row	letters
Column Families	A, B, C, D, E
Qualifiers	A1, A2, B1, C1, etc...

row_key, row_key_prefix* + scan_length, row_key [family:col1, family2:col2, family3:]			
letters			
A: A2	A: A1	B: B1	C: C1
Mon Jun 30 20:17:39 CDT 2014 0.3125 -0.515625 -0.234375Mon Jun 30 2 0:17:39 CDT 2014 -1.26 5625 0.59375 -1.015625Mon Jun 30 20:17:40 CDT 2014 1...	Mon Jun 30 02:09:46 CDT 2014 0.390625 -0.67 1875 -0.578125Mon Jun 30 0 2:09:46 CDT 2014 0.140 625 -0.53125 -0.76 5625Mon Jun 30 02:09:46 CDT 2 014...	Mon Jun 30 20:30:19 CDT 2014 0.828125 0.312 5 0.609375Mon Jun 30 20 :30:19 CDT 2014 -0.765625 -0.71875 0.687 5Mon Jun 30 20:30:19 CDT 2014 -0.62...	Mon Jun 30 20:28:18 CDT 2014 0.203125 -0.78 125 -0.859375Mon Jun 30 2 0:28:18 CDT 2014 0.656 25 -0.328125 -0.73 4375Mon Jun 30 20:28:18 CDT 2 014 ...

Figure 1: HBase table storing accelerometer data

Data Filtering

We will read and write raw accelerometer data in chunks. Data processing can occur in web services, hadoop, or in app. The purpose of HBase is to simply store data in logical sections.

Machine Learning

RHadoop? We have not implemented machine learning at this time.

Evaluation model

See relevant GUI section above for screenshots of the evaluation platform.

Related Work

Projects done by others (include the URLs in Bibliography)

iOS

[The official TI SensorTag](#)

[MyWeatherCenter](#)

[Byteworks SensorTag](#)

[Weight Training-Genie](#)

[Gammapoint Weather Run](#)

Android

[Bluetooth SensorTag](#)

[SenseView Sensors](#)

[BLE SensorTag](#)

[TI SensorTag THR](#)

[SensorTag BLE App with Code](#)

[BLE Device Monitor](#)

Bibliography

The official TI SensorTag

<http://itunes.apple.com/app/ti-ble-sensortag/id552918064?l=nb&mt=8>

MyWeatherCenter

<https://itunes.apple.com/en/app/my-weather-center/id824900305?ls=1&mt=8>

Byteworks SensorTag

<https://itunes.apple.com/us/app/sensortag/id579408063?mt=8>

Weight Training-Genie

<https://itunes.apple.com/us/app/weight-training-genie/id650541393?mt=8>

Gammapoint Weather Run

<https://itunes.apple.com/us/app/weather-run-bike-walk-hike/id599397919?mt=8>

Bluetooth SensorTag

<https://play.google.com/store/apps/details?id=com.ti.ble.sensortag>

SenseView Sensors

<https://play.google.com/store/apps/details?id=si.mobili.senseview>

BLE SensorTag

<https://play.google.com/store/apps/details?id=sample.ble.sensortag>

TI SensorTag THR

<https://play.google.com/store/apps/details?id=ti.android.ble.sensortagTHR>

SensorTag BLE App with Code

<https://play.google.com/store/apps/details?id=com.togosoft.sensortag2>

BLE Device Monitor

<https://play.google.com/store/apps/details?id=ti.android.ble.devicemonitor>