Actitracker
A Smartphone-based Activity Recognition System

Paul McHugh, Tony Pulickal & Dr. Gary Weiss

Richard Dunks, Shaun Gallagher, Peter-John Gentles, Andrew Grosner, Jeffrey Lockhart, Arnold Mendez, Gregory Rivas, Isaac Ronan, Jessica Timko

Dept.of Computer & Info. Science, Fordham University

https://actitracker.com | www.wisdmproject.com

Client

• Publicly available on Google Play ™

• Built in training modes (full training and custom)

• Non-intrusive background service that collects and transmits acceleromter data

Actitracker transmits accelerometer data which records the phone's degree of motion in the X, Y, and Z directions which are depicted here

Future Work

• Improve models by implementing sensor fusion techniques

• Improve impersonal models using transfer learnig

• Generate new features to better describe the data

• Move processing and visualization functionality from server to client

• Social media integration

Abstract

The Wireless Sensor Data Mining (WISDM) Lab has spent the past several years conducting research in activity recognition. We have previously demonstrated that data mining methods can be used to build predictive models that can identify physical activities (e.g., walking, sitting, etc.) based on the smartphone's accelerometer sensor. This project utilizes that research to construct an automated, smartphone-based activity recognition system, called Actitracker, capable of supporting thousands of simultaneous users.

Our Actitracker system is currently available for download and the "app" can be downloaded on Android smartphones for free from the Google Play™ store. Users can optionally use self-training mode to provide our system with samples of labeled activity data. If this data is provided, the system generates a personalized activity recognition model; otherwise, a pre-built, impersonal model is used. If our app is running, the accelerometer data from the smartphone is continuously sent to our server which then maps this data to the corresponding activities. This activity information is stored on our server and users are able to generate activity reports via a web-based interface. Our system will allow users to obtain an accurate account of their daily activities and can be used to encourage, and verify, behavioral changes. Our system will also provide activity information from a potentially large population of users, which is useful from a public health perspective.

Server

• Java-based service for receiving and processing accelerometer data

• Supports over 1000 simultaneous users

• Using data mining techniques, the server generates activity prediction models
  - If training data exists, generates personal model
      98.7% predictive accuracy
  - Otherwise creates impersonal model
      75.9% predictive accuracy

• MySQL Database holds anonymized data including demographic information as well as activity prediction results
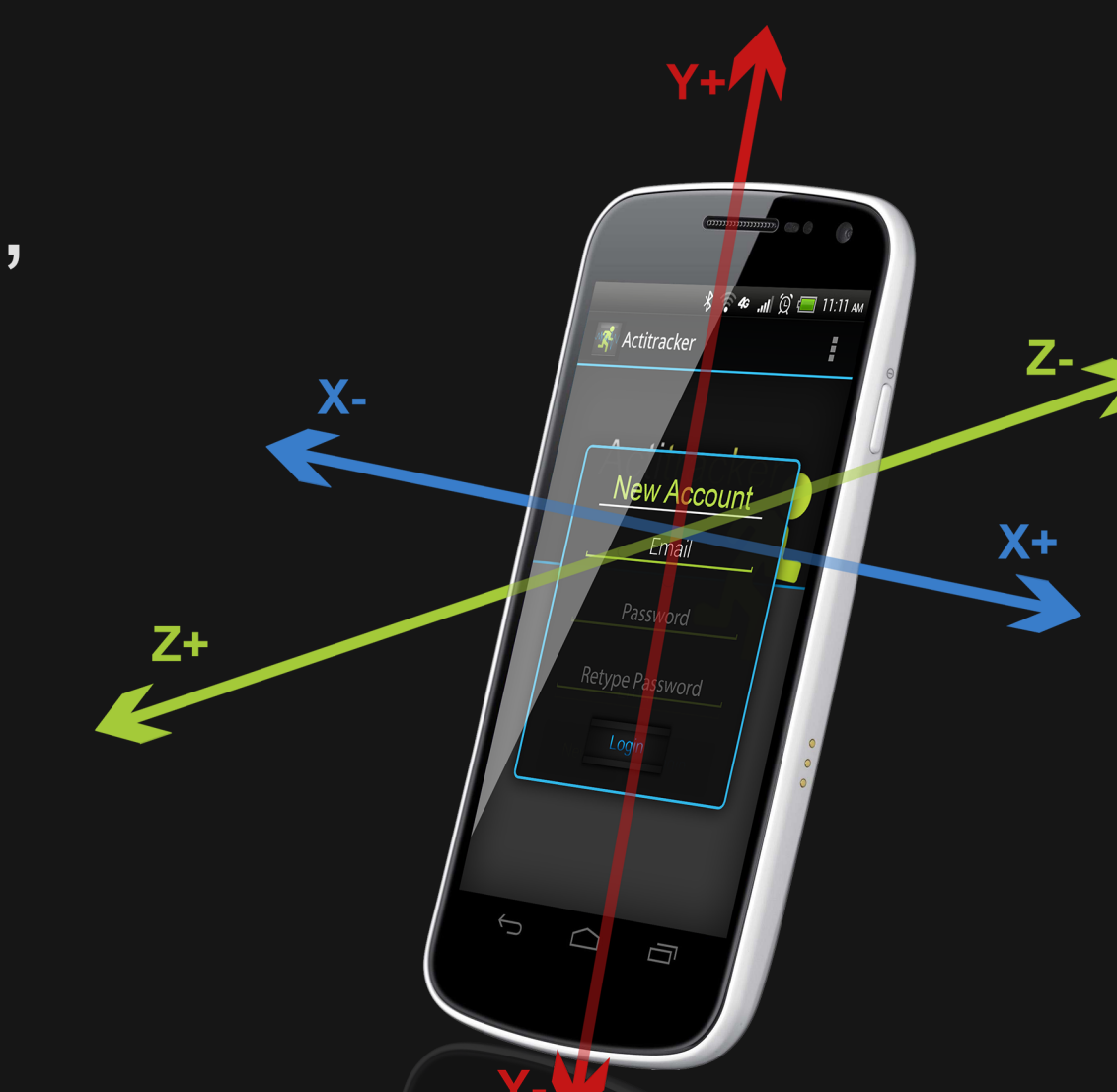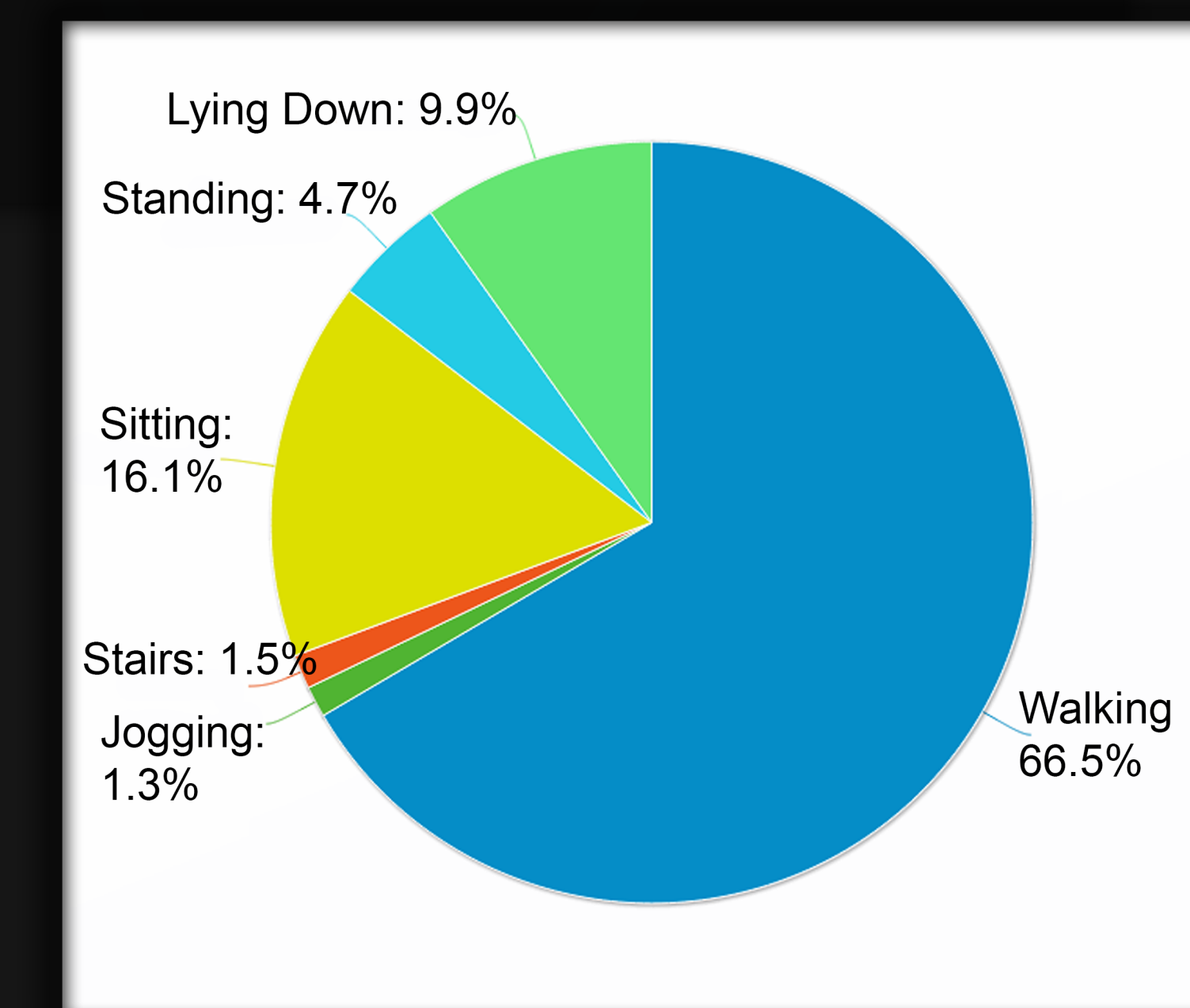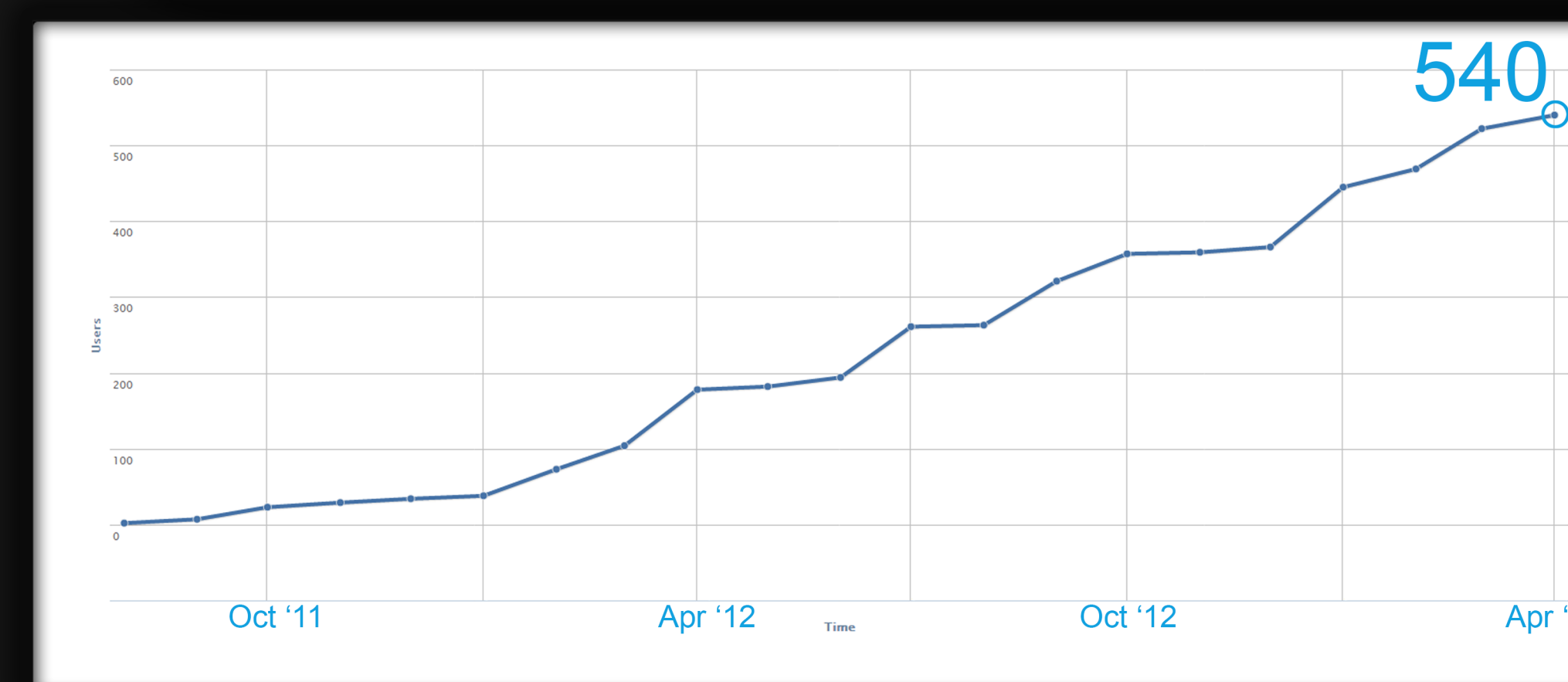
Web Dashboard

SSL SECURITY

• Secure user authentication (SSL)

• Global statistics describing total population

• Graphical representation of user's activity and biometric data

• Users can view their progress over different periods of time
  - { 24 hrs, 1 wk, 1 mo, 6 mo, 1 yr, all data }

Walking

Standing

Stair Climbing

Comparison of generated features for different activities.

540

Total Number of Users

Oct '11   Apr '12   Oct '12   Apr '13

Lying Down: 9.9%
Standing: 4.7%
Sitting: 16.1%
Stairs: 1.5%
Jogging: 1.3%
Walking 66.5%

Activity Distribution
User #1193

Actitracker

It's all about YOU

Welcome

News

Activity Reports