

Initial Plan: Activity Recognition on Body data

Author: Timothy Bird

Supervisor: Frank C Langbein

Moderator: Matthia Treder

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Module Title: One Semester Individual project

Credits: 40

1. Project Description

Data is the new oil. The human body radiates its own data but a lot of it disappears. My project aims to pick up that data to recognise activity of the body. The project will be successful if I can recognize certain types of activity, allowing the source of the data to be able to benefit from this data, giving new knowledge and insight into their lives. The Initial activities I will start to look for are walking, running, going up/down stairs and falling. The project will use a system of wearable sensors and computers to collect the data.

Computers are getting smaller and sensors are getting cheaper. One of the biggest hallmarks of this is the smartphone, a handheld computer with sensors, such as the camera. Next was the tech watch, such as a the iWatch or Fitbit. These pieces of hardware could become more sensor focused as they are in a fixed position next to the body rather than moving from pocket to hand. With the focus on sensors, these pieces of tech can provide useful insights for humans. Big questions or ideas that these technologies introduced are: Why is it that the patient tells the GP that they need an appointment? Why do humans go under damaging physical pressure until their biology sensors tell them to stop?

My aim is to explore a multitude of these sensors in order to see if I can find some new insight. After collecting data by wearing a prototype sensor system, I need a program that can categorise a new stream of data to an activity. There are several ways in which I can attempt to create this program. I can go the machine learning route, via using training data and Machine learning API. A more simpler route is a rule-based system, looking out for distinctive pattern. One thing I must note is that my readings will be one Dimensional signals, which might prove some difficulty in this process. However if i'm able to achieve this, the program can't display this activity. This activity is useless if it shows the data but does not store it. If I am running, I do not need my phone telling me that I'm running. But if I fell and was alone in a room, I would like my phone to notify the person in the next room. This adds complexity to my idea as the app needs to communicate the data it has recognised. This also raised privacy concerns as very personal data (data of the body) is being sent to other devices, which means other humans. Therefore, I will need to make sure the data is secure as my one of my aims was to bring the personal data back to the ownership of the origin of data.

2. Project Aims and Objectives

- Create the prototype sensor system that needs to be wearable
- Record data
- Categorise data
- Program can recognise data
- Write mobile app as interface (Secondary)
- Easy export data (Secondary)
- Make sure data is secure (Secondary)

3. Workplan

Building the Sensor System will be two weeks as, delivery of sensors may take up time.

Week 1

- Write Initial Plan

Week 2

- Research
 - Choose What Sensors I needs
 - How many Sensors I needs
 - How the sensors Will tie up to the Wearable computer (probably Raspberry pi)
- Send out ethic review

Week 3

- Build Sensor System
 - Obtain Sensors and correct Computer

Week 4

- Build Sensor System
 - Have System being able to record data

Week 5

- Collect Data
 - Being to obtain data
 - Choosing when how data is required

Week 6

- Collect Data
 - Finish obtain data

Week 7

- Categorise Data
 - Search and compare best types of categorise Data

Week 8

- Categorise Data

Week 9

- Categorise/ Evaluation the Category methods, Choose the best one.

Week 10

- Free week to catch up if behind or Start the Front End Writing

Week 11

- Write Front end
Easter Break(3 weeks)

- Report Writing

Week 12

- Report Finalizing

4.Ethics Consideration

In the aim of collecting data, It will involve participants wearing the sensor system. The project will require ethical approval. The data recorded by the participants belongs to them and thus they hold the right to take out data from the project.

5.Risk Plan

This table lays out the risks that could happen in this project

#	Risk	Risk Level	Likelihood of event	Solution
1	Illness	Low	Somewhat Likely	The work plan I have created means I have time to make up.
2	Can't obtain Data	High	Somewhat Likely	Need to reevaluate which sensors I use to record and which activities I try to record
3	Loss of program	High	Unlikely	Make sure to have back ups, both on local machines and on cloud servers
4	Data can't be categorised	Medium	Somewhat Likely	Need to record more data so that categories will appear. (might need to change sensors)
5	Sensors don't pick up data, or as I expected	Medium	Unlikely	Through resersach in this few weeks should give me alternate sensors to use

6	Computer's available do not have the computational power to train the program	High	Unlikely	There is a range of different techniques for activity recognition that uses different levels of computational power.
7	Participant pulls their data from the project	Medium	Somewhat Likely	The terms of agreement should decrease the chance of this happening, and which such a large pool of data, if one source disappears, I still should have enough

Risk Matrix

	Likelihood of Occurrence		
Scale of Impact	High	Medium	Low
Likely			
Somewhat Likely	2	4,7	1
Unlikely	3,6	5	