

Midterm and Final Project Proposal: Detecting Sex Based on Gait Data

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Background

The past decade and a half has seen an enormous growth in the number of smartphone owners in the world¹. As of 2018, 77% of people in the United States had a smartphone². Each smartphone has a wealth of sensors collecting data ranging from altitude and heading of the smartphone user to the acceleration of the phone as it is used.

Most phones spend the majority of their time in a pocket or purse as their owner goes about their daily life. During this time, the phone is making measurements about its acceleration in the x, y and z directions. This data has been used by researchers to extract the gait of the smartphone user. Gait has long been known to be an identifying characteristic of an individual, (citation needed), and there are opportunities to leverage this accelerometer data to identify smartphone users³.

In our project we seek to use gait data to determine whether the smartphone user is male or female. We will be working with the company UnifyID's data set to create a system that identifies whether a person is male or female to improve the company's ability to positively identify people.

Objectives

Midterm:

- Meet with the UnifyID team to learn state of the art practices for processing and training on gait data, and discuss models or frameworks to use.
- Set up an environment for training and evaluating a model to classify a given gait as coming from a male or female.
- Begin visualizing and experimenting with data.

Final:

- Use supervised learning to create a classifier that can predict the sex of the person associated with a given gait with an accuracy greater than 60%, where an 80% or greater accuracy would be considered a great success.

¹ "Number of smartphone users worldwide"

<https://www.statista.com/statistics/330695/number-of-smartphone-users-worldwide/>. Accessed 17 Feb. 2019.

² "Mobile Fact Sheet - Pew Internet." 5 Feb. 2018, <http://www.pewinternet.org/fact-sheet/mobile/>. Accessed 17 Feb. 2019.

³ R. Ferrero, F. Gandino, M. Rebaudengo, A. Velasco, and I. Benkhelifa, "On Gait Recognition with Smartphone Accelerometer," Accessed 17 Feb. 2019