Zach Fontenot

Machine Learning

Dr. Kawsar

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Activity Classification Model: Phase 1 Report

1. Introduction

This document is meant to provide details on development of the Activity Classification Model. The Model is designed to predict the activity a user is preforming by data obtained by pressure sensors in the user’s shoes. This pressure data is sent to the user’s smart phone and processed to predict activities in real time. The underlying application allows for users to import almost any type of data and create a model that can predict new data points. Testing of the generated model is also supported.

1. Platform and Libraries

The Python language was chosen for this project based on the wide availability of freely importable libraries. These libraries help to simplify the calculations required in generating the model from test data and improve performance. The libraries used are as follows:

* Numpy – a library utilized to ease vector arithmetic.
* Scipy – a library that allows for the minimization of pre-defined functions.

1. Data Preprocessing

In order to create an accurate model, input data was chucked and processed into intervals. Intervals contain a user-defined amount of data e.g. a two second window of pressure data. After intervals were created, the IQR rule was applied to pressure data to eliminate outliers.

1. Feature Generation

Feature generation utilized the Math and Statistics libraries, which are built into the python installation. These features accounted for the shape and spread of the pressure data for each interval. Additional features were generated on accelerometer data and clusters of sensors. These clusters of sensors allowed for the conglomeration of data into heel, sole, and ball pressures.

1. Model Generation

Model generation is the next goal for the application. With data compiled, a cost function shall be written and Scipy’s minimization function shall be implemented. Data processing is still ongoing during model generation, as the initial accuracy will likely be poor.