

# Walking-Pattern-Recognition with Science Journal

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## ABSTRACT

The aim of this project is to build a model capable of classifying who is walking based on accelerometer data. As we know, we all have a specific way of walking as everybody has different particularities, so in this project we look for this details in order to create a model that can figure out who walks. As so, since in the group we are just two people, the model will be able to classify which from which one of us is the walking data fed.

## DATA COLLECTION

Science Journal is a very useful app which enables to record data through the phone. In our case, we made use of the X,Y and Z accelerometers. The process for gathering the data consisted in a 20 minute walk with the phone on the pocket, without stopping. As so, we obtained roughly 25.000 csv file rows of raw data from the three accelerometers plus the timestamps.

## DATA PREPROCESSING

Steps performed to clean the data and make it available for use:

- Remove NaN.
- Upsampling data, given that we had different sampling rates.
- Creation of a new column combining data from the three accelerometers
- Rotation of the data. This step is been performed in order to normalize the data so that all data has the same axis.
- Splitting data into bins.

## FEATURE EXTRACTION

The feature extraction for gait analysis is performed first by extracting statistics from each bin and build a feature statistic dataset composed b the mean the standard deviation and the root mean sqaure of the XYZ combined data. Fast Fourier Transform is applied to each bin as well to get the first 3 dominant frequencies as well as the energy given Parseval equation.

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Finally, we make use of the library `sensormotion`. This Python package allows the user to extract human motion data, such as gait/walking dynamics, directly from accelerometer signals. In our case, it is used in order to retrieve peak times and values from a filtered acceleration signal.

## **MODELS**

The following algorithms were used, all with different parameters.

-SVM

-KNN

-Random Forest

## **CONCLUSION**

Although the project was limited by only being two people in the group, it's been shown that the steps taken to build the model work well and all of the models provide very good results.