User Authentication Based on Gait Analysis

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The purpose of this project is to increase user security by adding gait analysis to the iPhone security system. Present biometric authentication relies on a fingerprint, but this is not foolproof. A better technique would authenticate based on something that cannot be readily replicated, like how someone walks. This project demonstrates the viability of authentication using a person's gait. Human experimentation was required to gather sufficient training and test data for the creation of a working algorithm. Subjects walked for five minutes. By measuring user induced accelerations using an iPhone’s internal sensor suite, I tried to authenticate my own gait versus other subjects. Collected data was inputted into R (a programming language for statistical analysis), where multiple machine learning techniques were applied to the time series in an attempt to create the most accurate algorithm possible. Feature vectors included moments and Fourier transform. kNN and decision trees were examples of tested algorithms. I checked hundreds of combinations of different feature vectors, algorithms, and splits between test/training data. Within R, the accuracy was up to 96%. The final algorithm was then programmed into an iPhone app to be tested in the real world.

Awards Won:

Fourth Award of $500

European Organization for Nuclear Research-CERN: Second Award of $1,500