Tennis gets smart:
Machine Learning Based Tennis Personal Coach

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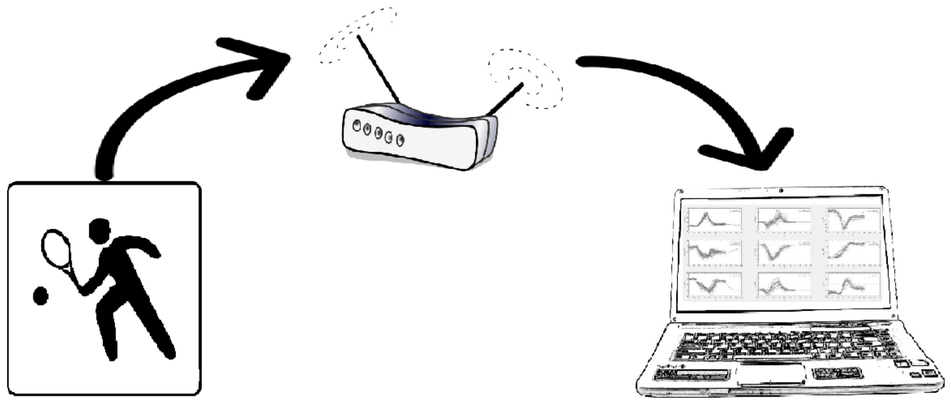
Introduction

Tennis is a fun game to play, however quiete difficult to get better at it: a Tennis club membership is usually the only option for ambitious players who want to level up their game. This comes with a big cost and time commitment.

Fortunately, a smart racket may replace the effort of a personal trainer at the club as well was the pricey bill that follows.
The project is an alternative of a personal coach while training, where it guides the player via live feedback of his tennis hit moves as well as his statistics in order to develop a proper technique.

Hardware Setup



Client Side

- 9-axix MPU-9150™ [Gyroscope / Compass / Accelerometer]
- Intel Edison module Broadcasts senor data

Server Side

- Live data plotting
- On-the-fly classification of data to detect swings
- Display game statistics

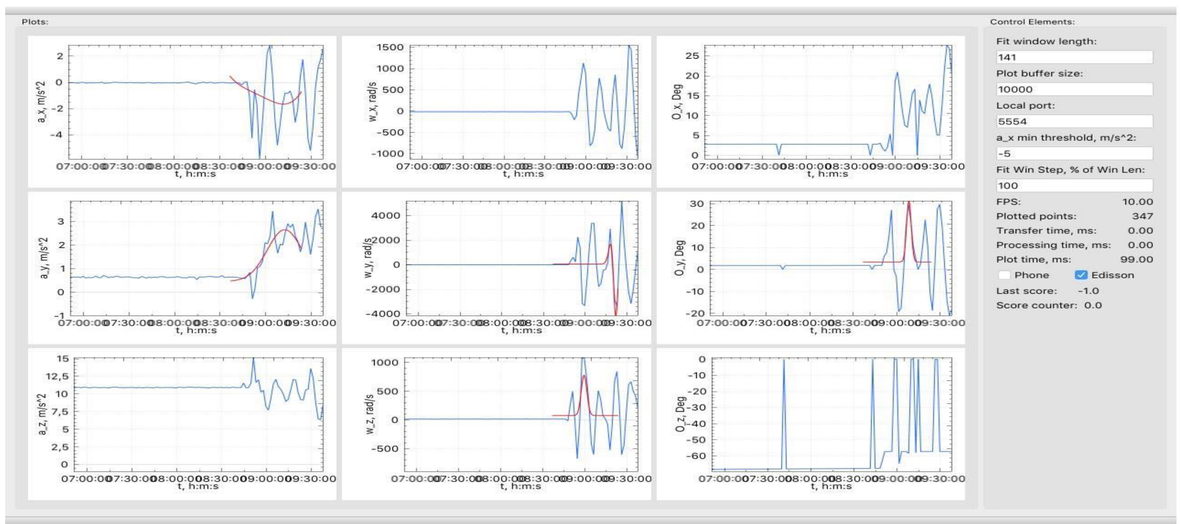
Theory & Methods

Sensor data streams were recorded while performing 93 tennis swings. 5 out of 9 sensor data were modeled using 1st and 2nd gaussian distributions. The models have served as a training set for a classifier using the Linear Discriminant Analysis (LDA) algorithm.

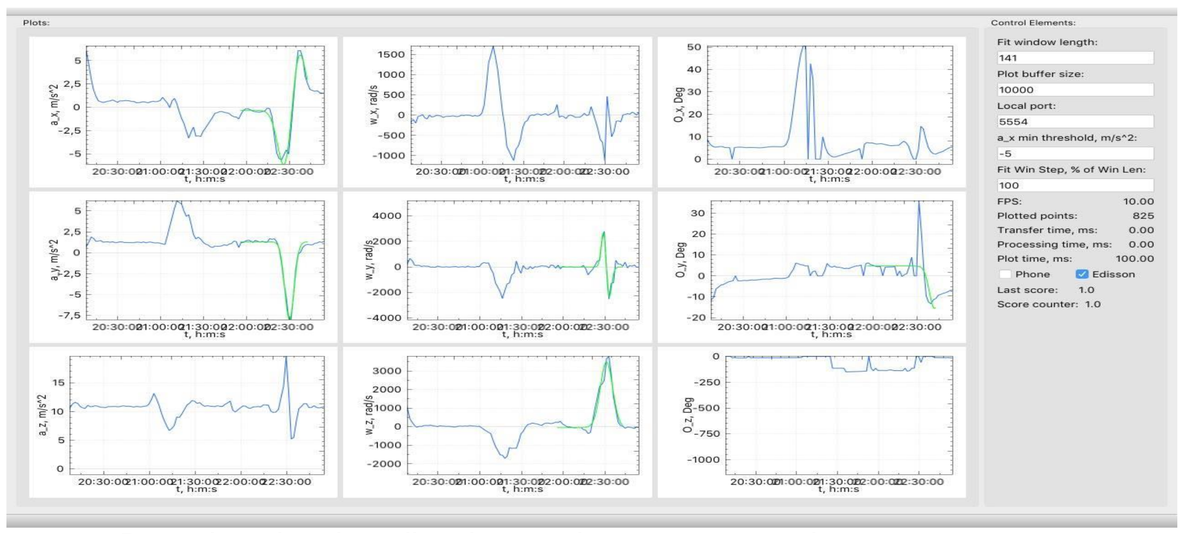
Once the classifier is defined, the player may play and track his movements through the 9 sensors‘ data feed plotted live. The classifier predicts on the fly whether a swing has taken place or not.

Results

Server side application receiving data, plotting them and predicting swings based on the training set already provided:



Data plotted and predicted correctly as a wrong swing move



Data plotted and predicted correctly as a correct swing move

Conclusions