Virtual Coach - Intermediate Report

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Goal

To leverage the health information captured in wearable devices, stitch that with weather data, derive custom metrics based on heart rate, elevation gain, speed and predict the heart rate of the user in the near future. This can help the user to stay within the optimum heart rate range.

Data Description

- Activity Data - User's heart rate, elevation, latitude longitude captured every second during an activity
- Weather Data - Day level humidity, temperature and precipitation level
- Custom metrics - Consuming the raw activity data and computing custom metrics to understand the user behavior

Proposed Analysis

- Define custom metrics across different time ranges, such as hear rate in the past 30 seconds, heart rate in the past 60 seconds etc.
- Study the trend of heart rate and see if these metrics explain the phenomenon of explaining heart rate in the near future
- Study the heart rate fluctuation patterns, are the users switching between heart rate zones?
- What is the typical duration a user stays in a particular heart rate zone?

Milestones achieved so far

- We have built helper functions to compute the elevation, heart rate and speed metrics
- We have created an outlier and exception handling module to impute/replace/remove outliers and missing data in the dataset
- We have fitted linear models to explain the heart rate of a user after 4 minutes from now, based on the current metrics.

What is yet to be done?

- Analyze the heart rate trend, and compute the minimum time taken to bring a user from the dangerous zone 5 to optimum zone 4
- Leverage the above computed time to predict the chances of the user to exceed the optimum zone
- Visualize the user heart rate patterns in matplotlib
- Build advanced ML models to predict the heart rate better

References - https://github.com/vimalkumar2992/virtual_coach