

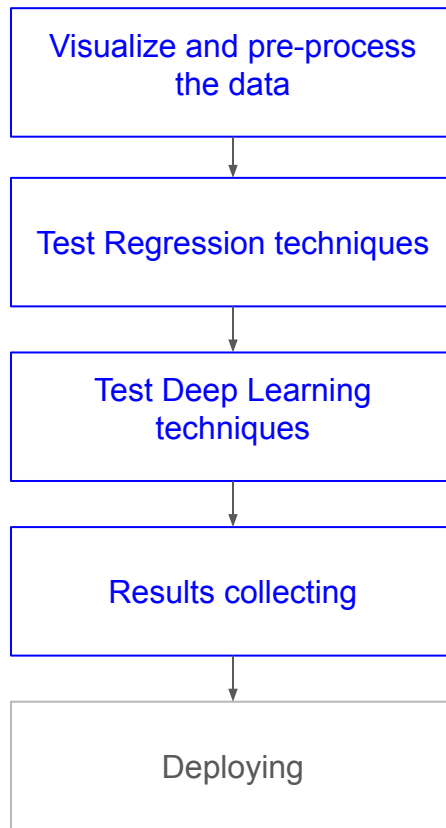


Allan Rivalles

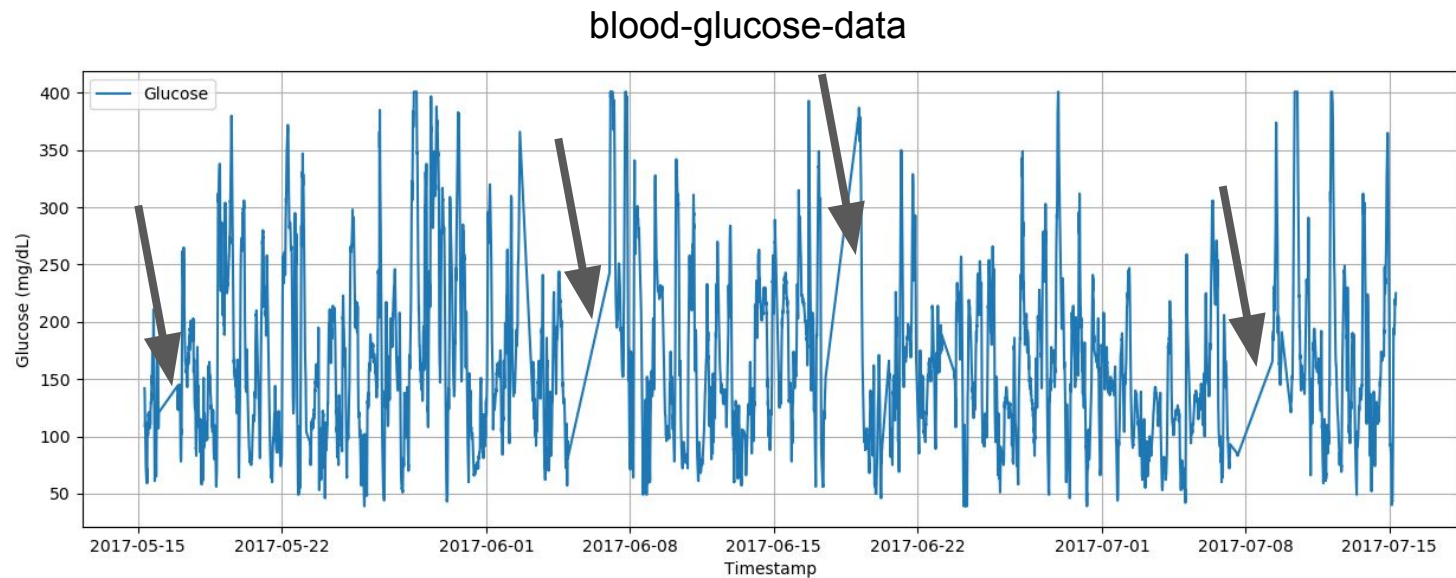
# The Challenge

- Create a computational model to forecast the 60 minutes ahead glucose of a person; given his/her glucose, activity and heart rate past data.

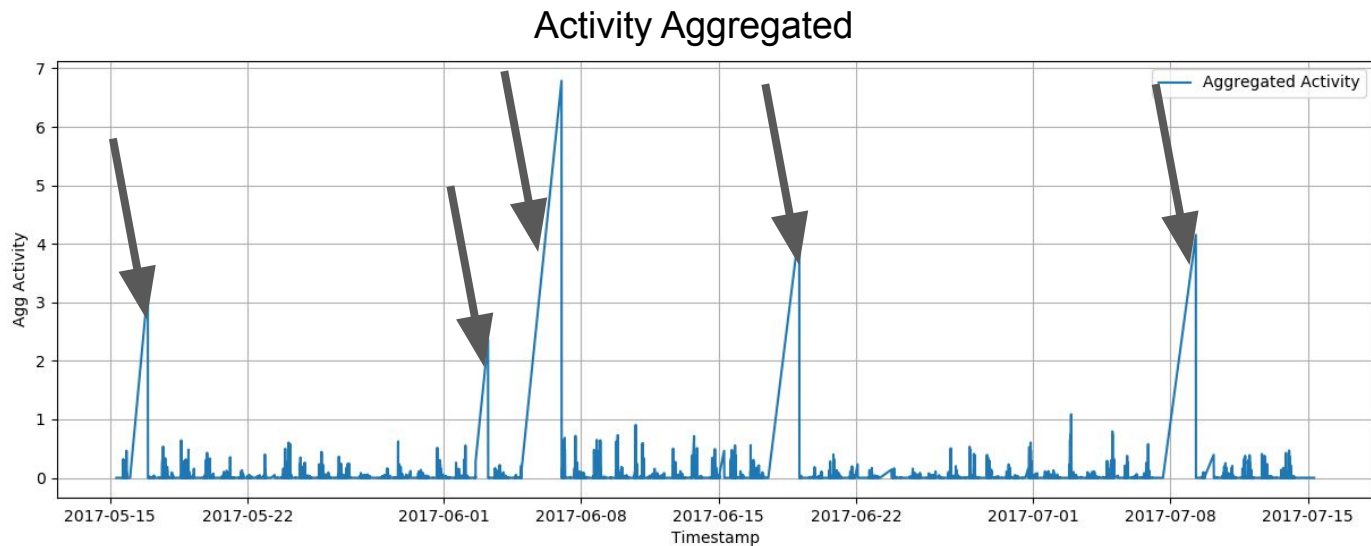
# The Strategy



# Visualize and Pre-process



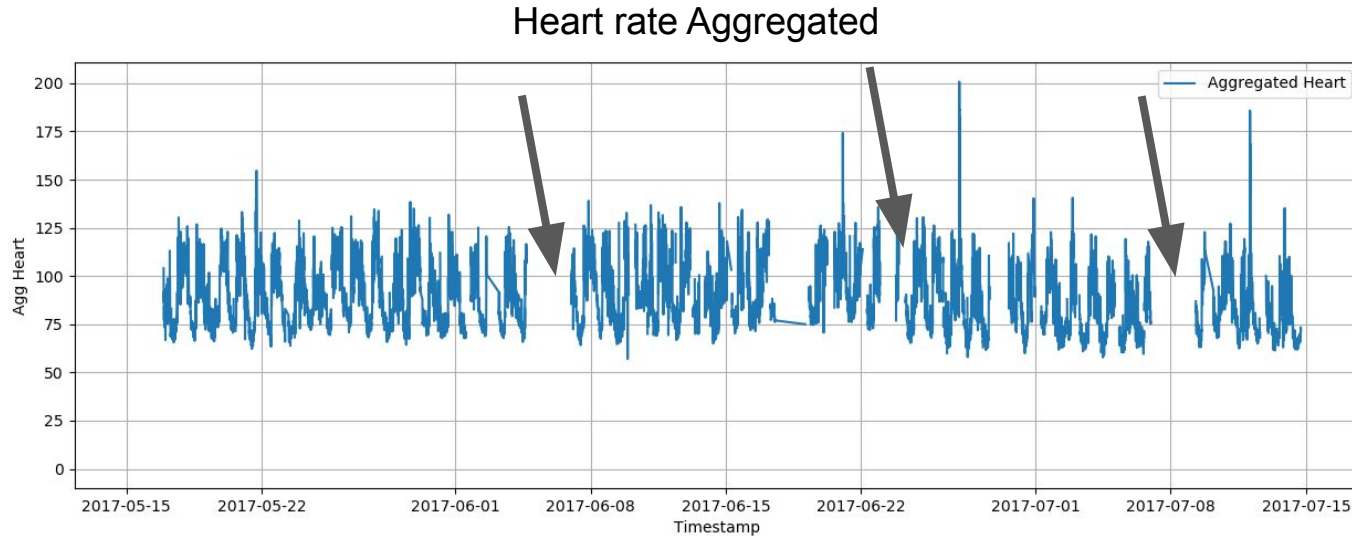
# Visualize and Pre-process



(Glucose) timestamp A, (Glucose) timestamp B

$\text{sum}(\text{Activity} > A \text{ and } \text{Activity} \leq B)$

# Visualize and Pre-process

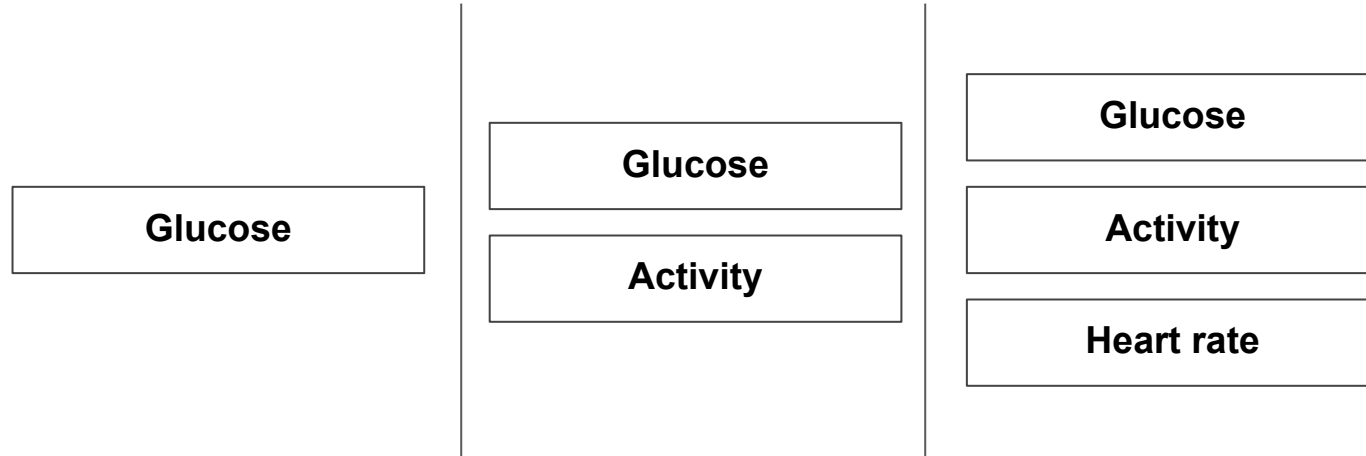


(Glucose) timestamp A, (Glucose) timestamp B

Average(Activity > A and Activity <= B)

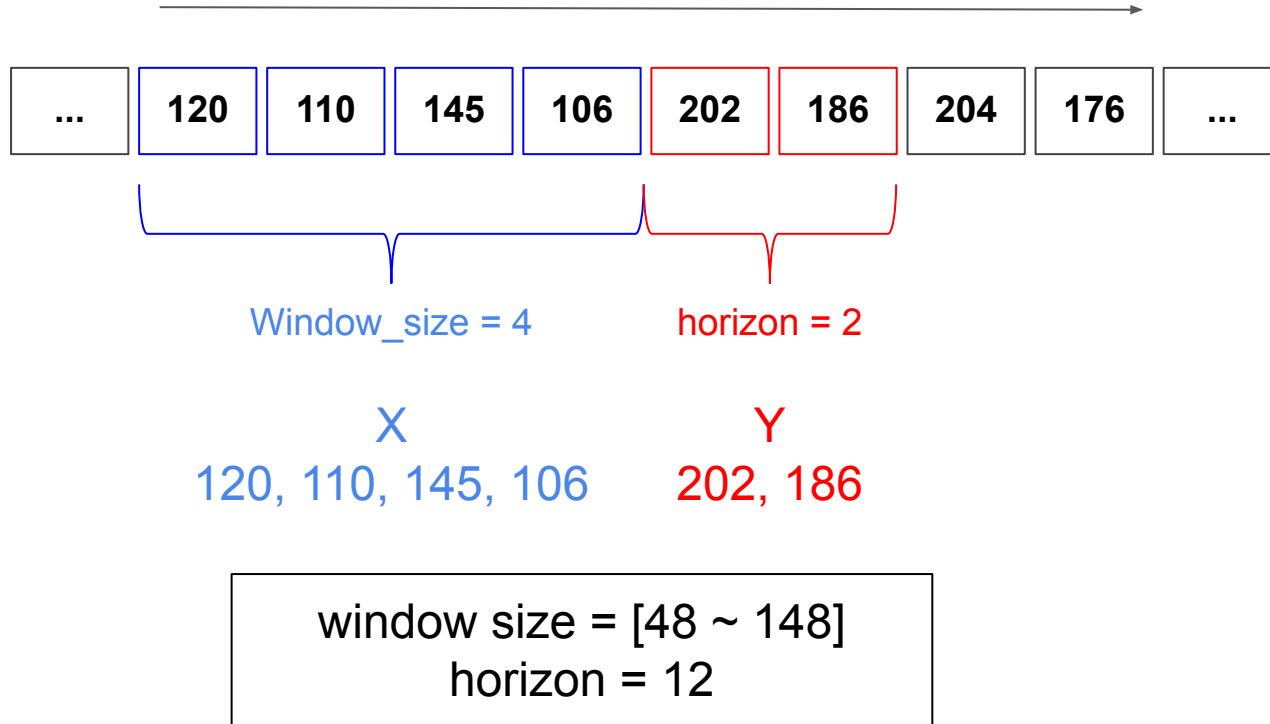
# Visualize and Pre-process

## Feature Selection



# Visualize and Pre-process

## Sliding Process





# Tested techniques

## Regression Techniques

**Linear Regression**

**MLP Regression**

**Decision Tree Regressor**

## Deep Learning

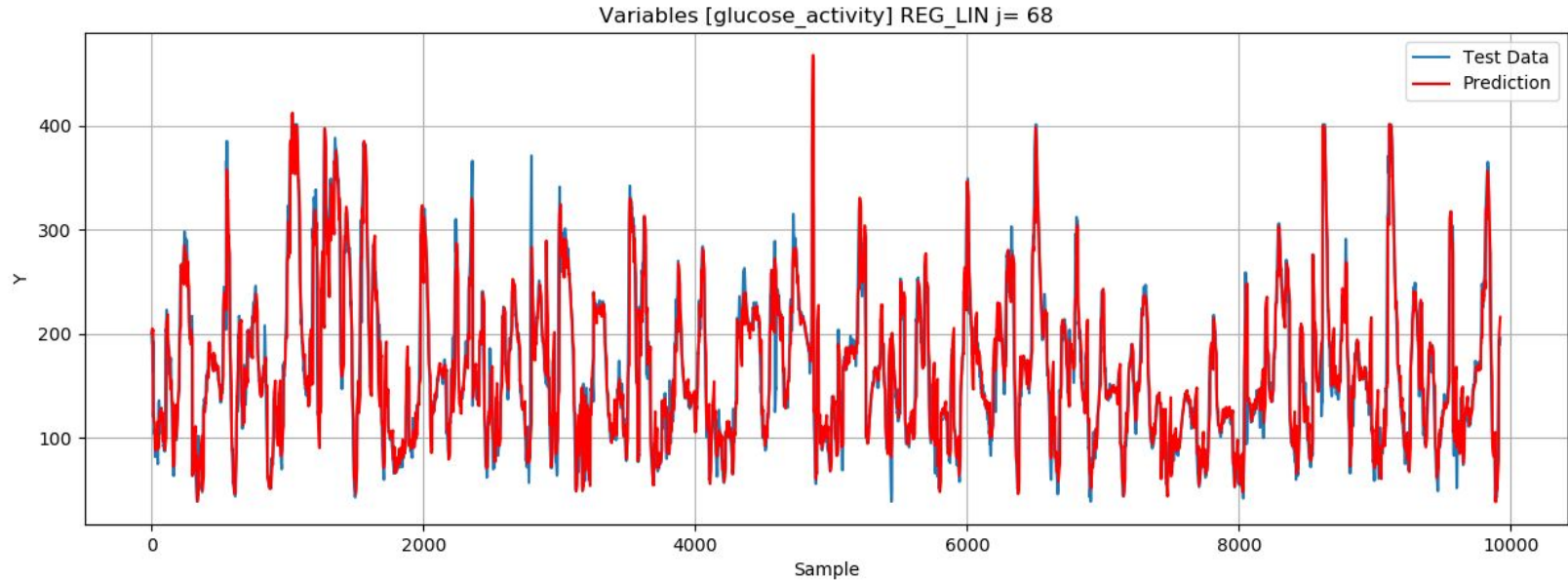
**LSTM**

## Results

	RMSE	FEATURES	WINDOW SIZE	CLARKE A + B
REG_LIN	26,26073	Glucose_activity	68	97,21
MLPRegression	27,4935	Glucose_only	64	96,85
LSTM	28,05102	glucose_activity	60	96,14
DecisionTreeRegressor	35,80938	Glucose_only	52	96,13

# Results

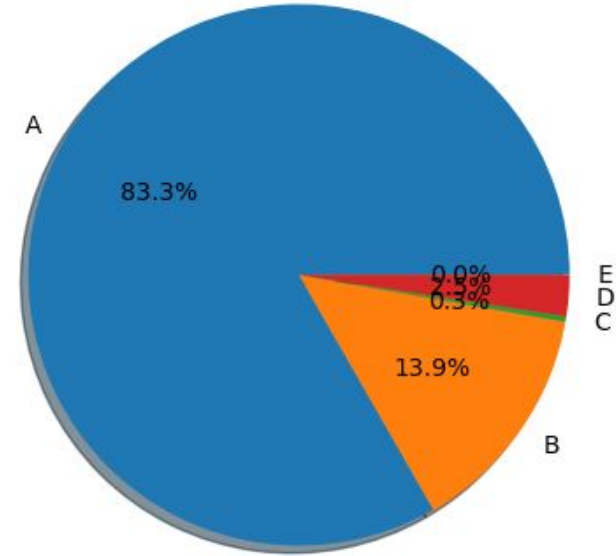
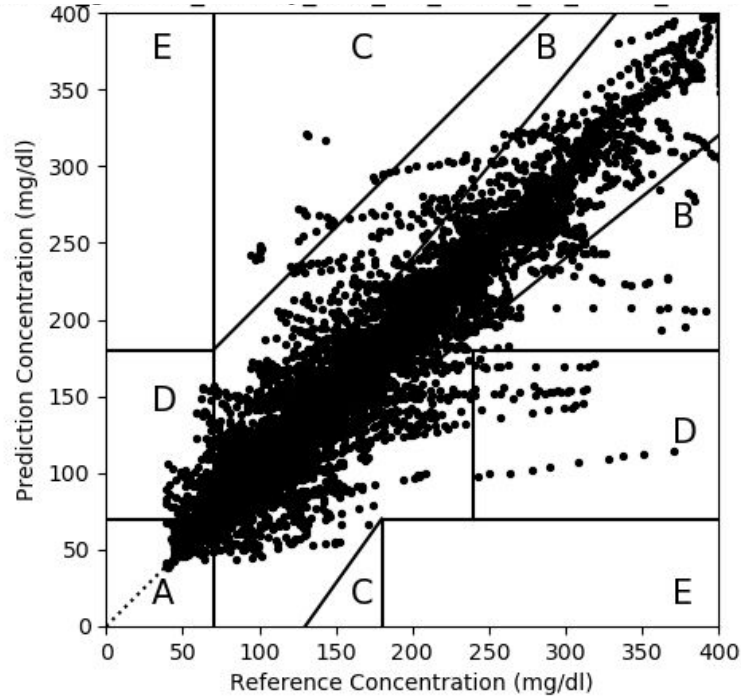
## Linear Regression



Root Mean Square Error: 26,26

# Results

## Linear Regression



$$A + B = 97,2 \%$$

# Demonstration

Script 1 (Pre-processing)

## ***“1 - Data Exploration and Pre-processing - VanHackaton - Bioconscious.py”***

- Reads the ‘.csv’ data and writes the slided files from different window\_sizes through pickle

Script 2 (Test Regression Techniques)

## ***“2 - Testing Forecasting Techniques - VanHackaton - Bionconscious.py”***

- Reads the ‘.pkl’ data from script 1 and writes the results from the techniques as ‘results.csv’ file

Script 3 (Test Deep Learning)

## ***“3 - Testing DeepLearning Forecasting Techniques - VanHackaton - Bionconscious.py”***

- Reads the ‘.pkl’ data from script 1 and writes the results from the techniques as ‘results\_deep\_learning.csv’ file

## To do

- Approach the missing data in Glucose, Activity and Heart data
- Explore hyperparameters of the techniques
- Perform Statistical hypothesis tests
- Test less training data
- Test other DL techniques (GRU, Echo State Networks)
- To validate in other users data

**Questions?**



# Idea

- Given the forecasted glucose rate and its relationship with the physical activity.
- To recommend physical activities as a suggestion to the user, in order to control the peaks in a preventive way.