



# ActivPal Week 10

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WHAT HAVE WE DONE  
PREVIOUS WEEK?



WHAT ARE OUR GOALS  
FOR THE NEW SPRINT?

# What have we done in the previous week?

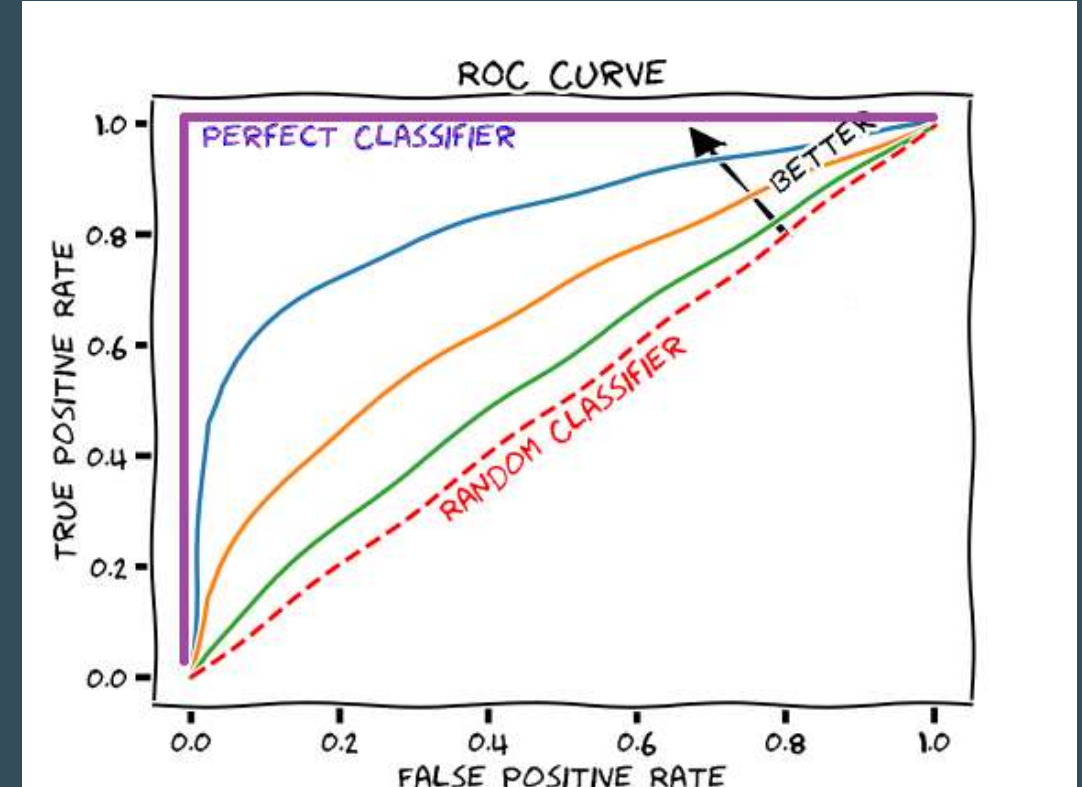
- Data cleaning
- Representativeness between training/validation and test sets
- Predicted the MET value using different models
- Compared these models to pick the best

# Cleaning data

- In consultation with Annemieke, removed respondent 'BMR015' based on age (70+)
- After further analysis of respondents, removed 'BMR032' and 'BMR043' for the same reason
- Dataset exists of 23 respondents after cleaning

# Representative training/ validation and test split

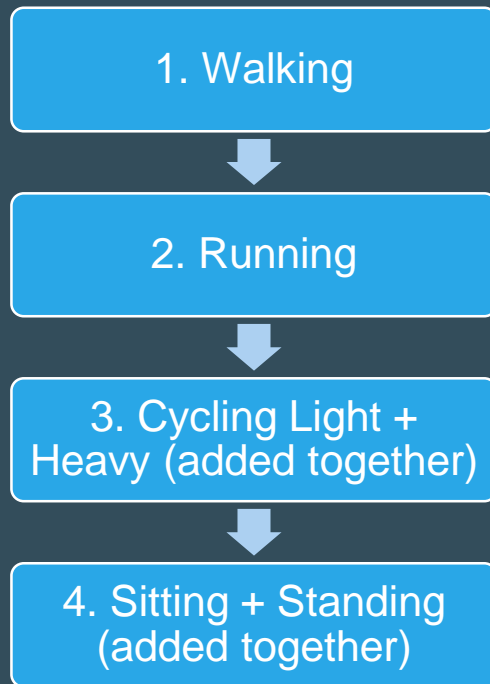
- Test respondents set size: 3
- Training/validation respondents set size: 20
  - Training: 80%
  - Validation: 20%
- Used Random Forest to assure representativeness between training and test set.
  - The model should not be able to make distinction between training/validation respondents and test respondents
  - So ROC should be as close as possible to 0.5



Src: <https://glassboxmedicine.com/>

# Predicting MET values

PREDICT MET VALUES FOR DIFFERENT ACTIVITIES



OUR APPROACH

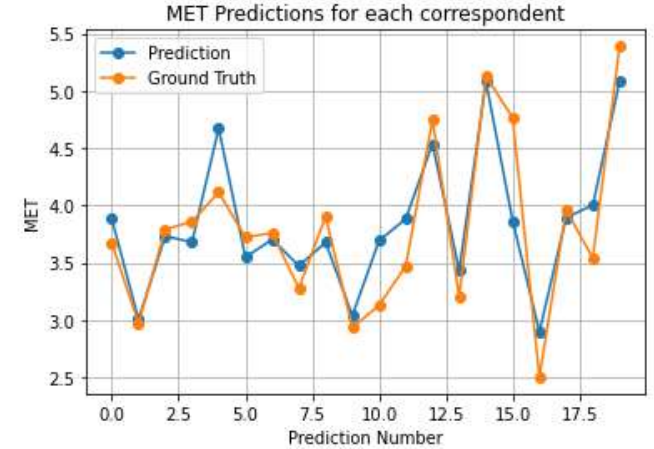
- - Random Forest Regression Model
- - Used data from 23 respondents
- - 3 used for testing
- - 20 used for Train (80%) / Valid (20%)
- - RFE Function that selects best features
- - The issue? Small dataset since every respondent has only 5 rows of data

# Predicting Walking MET value

The 5 Features for this model

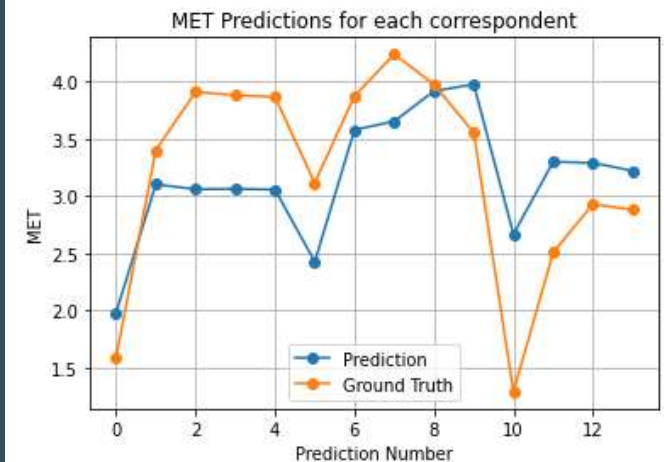
- - Sum of magnitude of acceleration
- - Weight in kilograms
- - Length in centimetres
- - Age Category
- - Meets Balance Guidelines

## Applying Train + Valid Users



R<sup>2</sup> score: 0.7758131136601785  
Mean absolute error: 0.27 MET  
Accuracy: 92.73 %.

## Applying Test Users



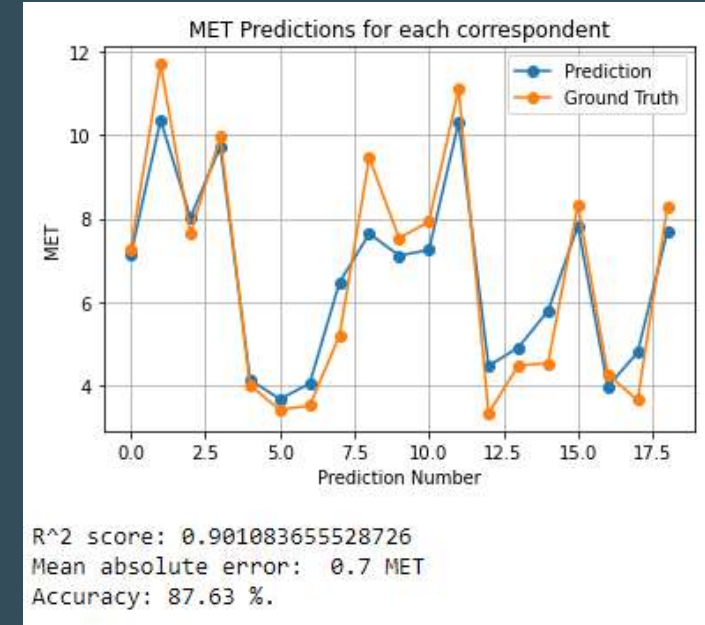
R<sup>2</sup> score: 0.4217384048976238  
Mean absolute error: 0.58 MET

# Predicting Running MET value

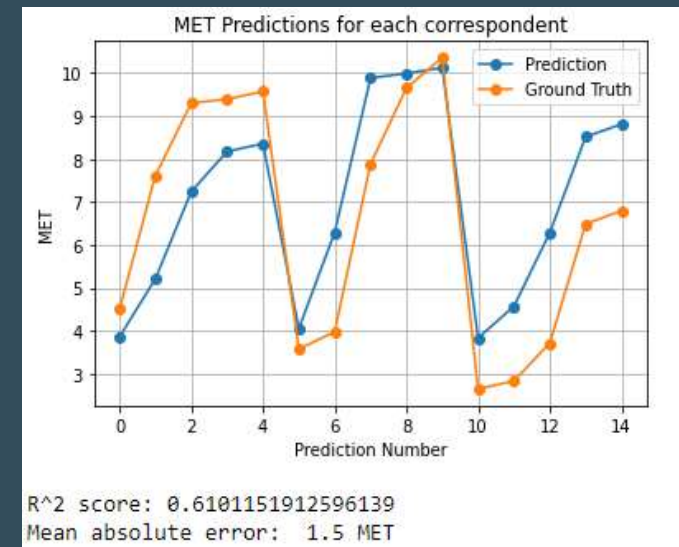
The 5 Features for this model

- - Sum of magnitude of acceleration
- - Weight in kilograms
- - Length in centimetres
- - Age Category
- - **Speed**

## Applying Train + Valid Users



## Applying Test Users



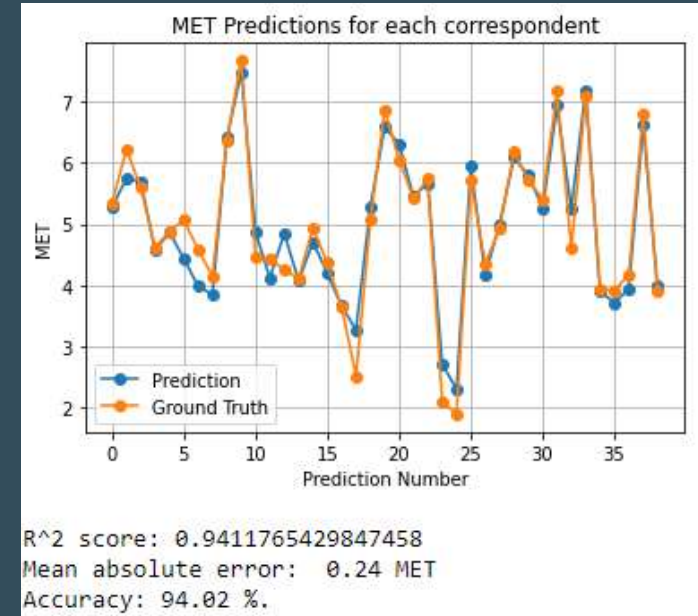


# Predicting Cycling MET value

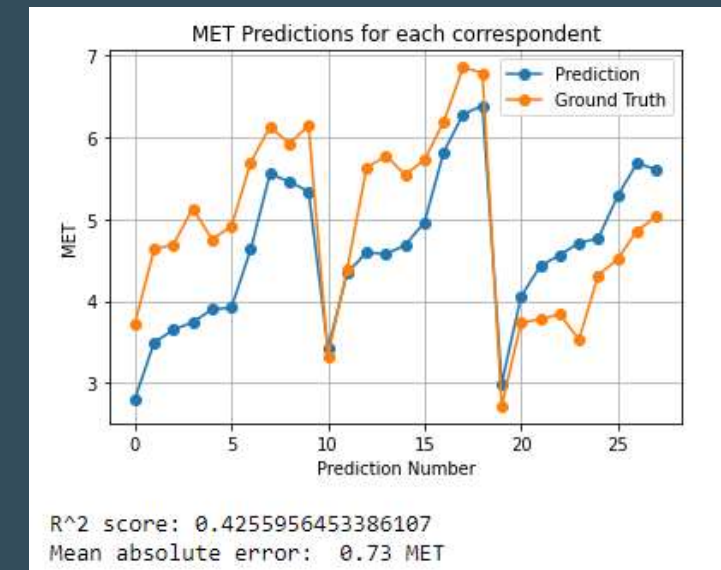
The 6 Features for this model

- SUM OF MAGNITUDE OF ACCELERATION
- WEIGHT IN KILOGRAMS
- LENGTH IN CENTIMETRES
- BMI (CALCULATED FROM WEIGHT AND LENGTH)
- SPEED
- MEETS BALANCE GUIDELINES

## Applying Train + Valid Users



## Applying Test Users

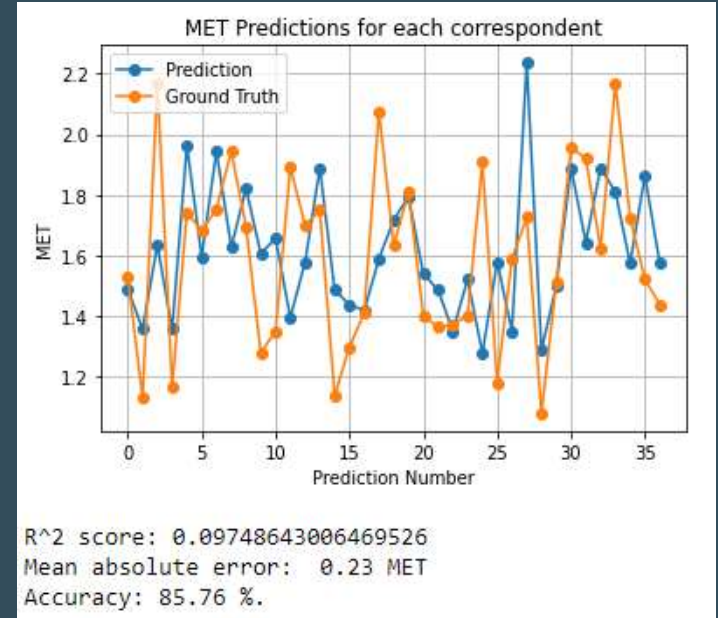


# Predicting Sitting + Standing MET value

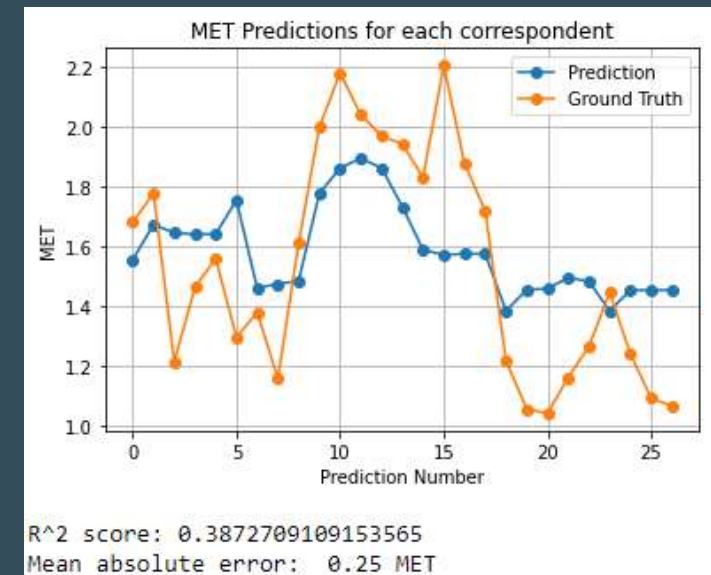
The 5 Features for this model

- SUM OF MAGNITUDE OF ACCELERATION
- WEIGHT IN KILOGRAMS
- LENGTH IN CENTIMETRES
- AGE CATEGORY
- ESTIMATED LEVEL

## Applying Train + Valid Users



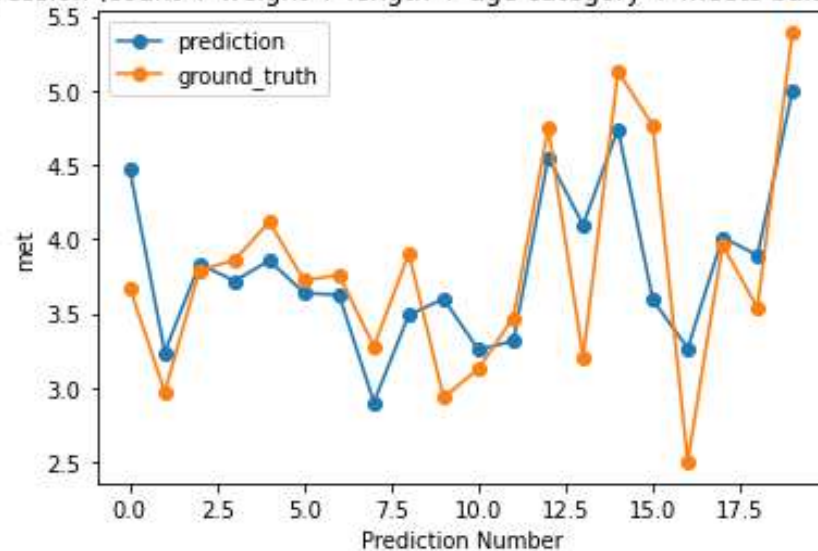
## Applying Test Users



# Predicting MET walking – Multivariate Linear Regression

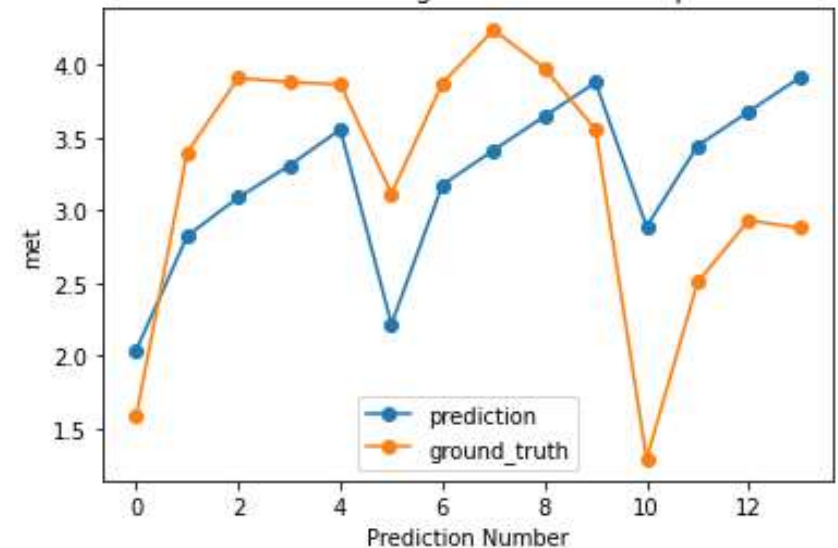
mean squared error = 0.2414637142149028  
r squared = 0.6412909673633584

Multivariate regression (count + weight + length + age category + meets balance guidelines + speed)



mean squared error = 0.6343506298414107  
r squared = 0.16438004180188526

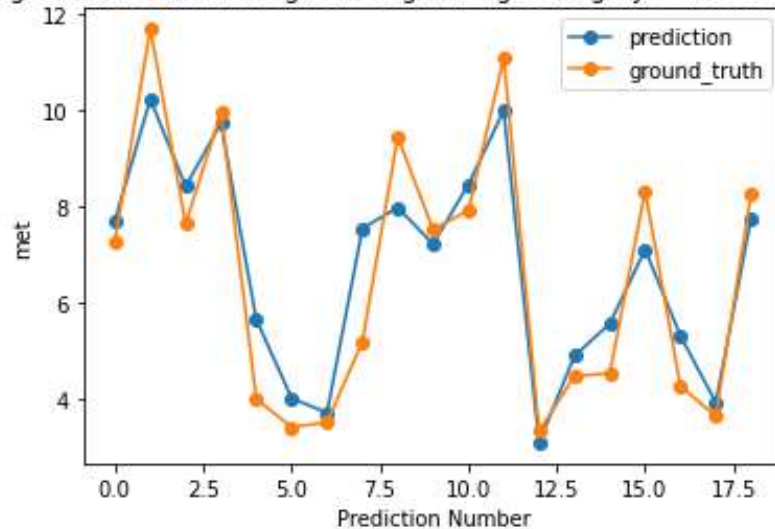
Multivariate linear regression on test respondents



# Predicting MET running – Multivariate Linear Regression

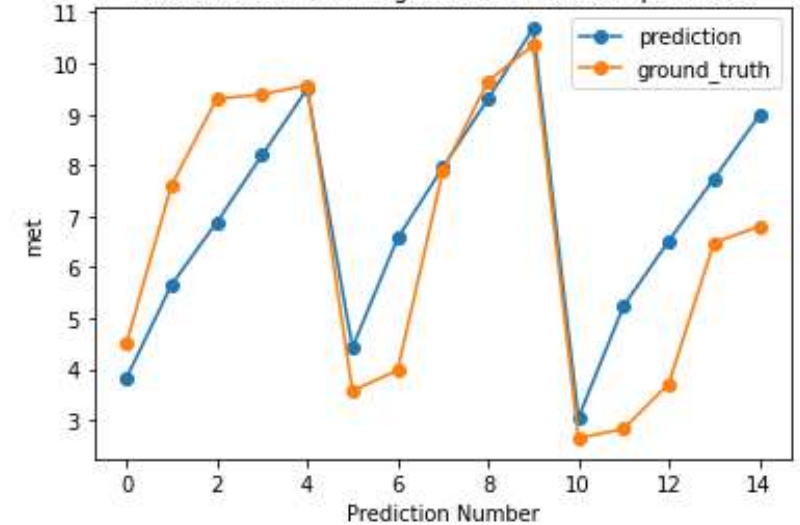
mean squared error = 1.0346172651452363  
r squared = 0.7297953859532382

Multivariate linear regression (count + weight + length + age category + meets balance guidelines + speed)



mean squared error = 2.624703985402816  
r squared = 0.6374654696855826

Multivariate linear regression on test respondents



# What are our goals for the new sprint?

- Begin to write the paper
- Validate correctness of our models with teachers and CBS

A person wearing a dark suit and a light-colored shirt is holding a white rectangular sign with both hands. The sign has the word "QUESTIONS?" written on it in a bold, dark blue, sans-serif font. The background is a solid dark teal color.

**QUESTIONS?**