



# ActivPal External Presentation #3

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Adnan Akbas

Ali Safdari

Mark Boon

Matthew Turkenberg

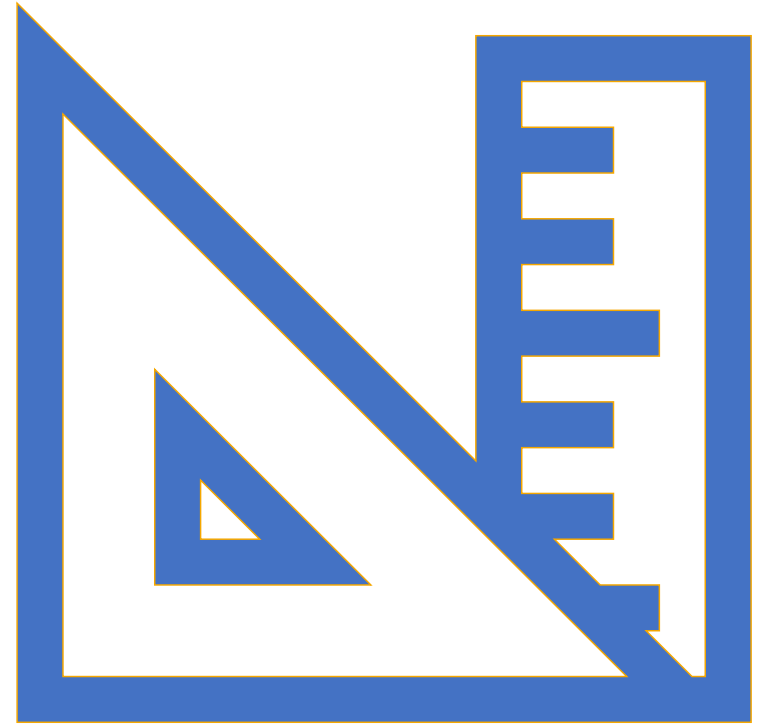
Colin Werkhoven



# Topics

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- Our progress
- Problems
- Next steps
- Questions



# What have we been working on

- Activity recognition
- MET prediction models
  - Walking
  - Running
  - Cycling
  - Standing
  - Sitting
- Synchronizing models
- Improving dataset
- Application that implements our models

# Activity recognition

## Model and dataset configurations

- Random Forest Model
- Segment time in 9.4S
- Features of all axis
  - Standard deviation
  - mean

## Scores

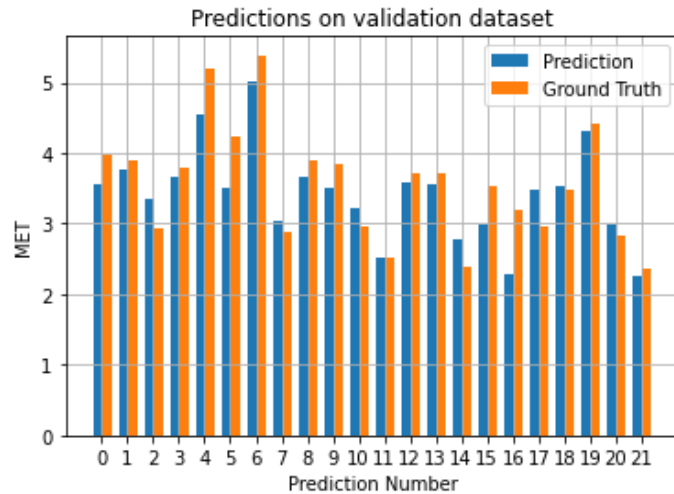
dataset type	Accuracy	Precision	Recall
Validation	98.46%	98.70%	98.59%
Test	98.46%	98.63%	98.46%

## K-fold cross validation score

Accuracy	Precision	Recall
96% (+/- 3%)	97% (+/- 2%)	96% (+/- 3%)

# MET prediction - walking

## Random Forest Results

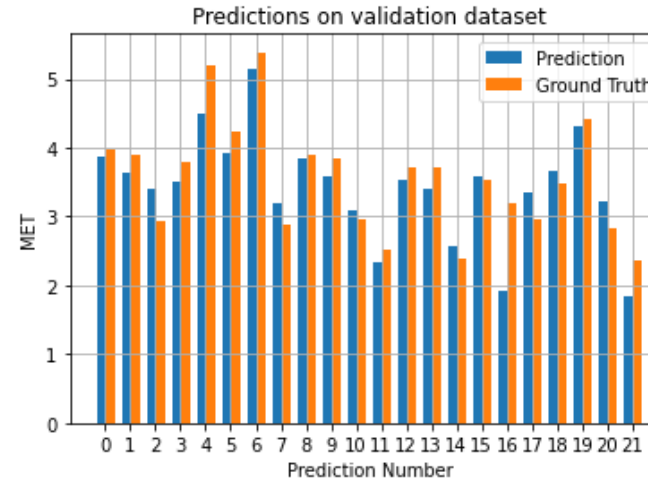


### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- meets\_balance\_guidelines
- mean\_speed

R2 Score: 0.7543008354314606  
Mean Squared Error: 0.3937928212223972

## XGBoost Results



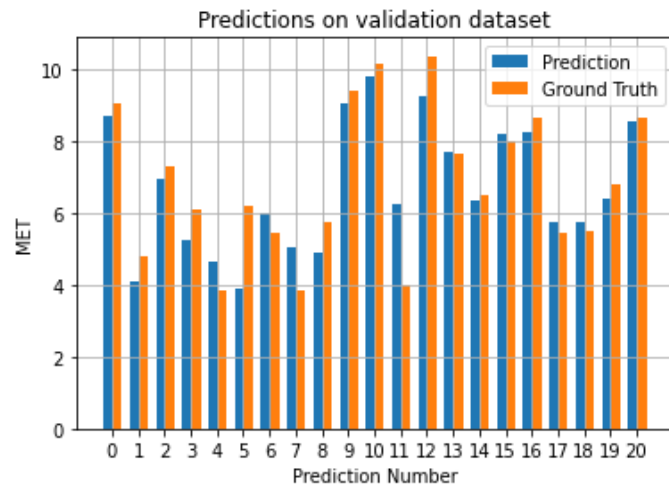
### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- meets\_balance\_guidelines
- mean\_speed

R2 Score: 0.7350981667031118  
Mean Squared Error: 0.40889183352854425

# MET prediction - running

## Random Forest Results

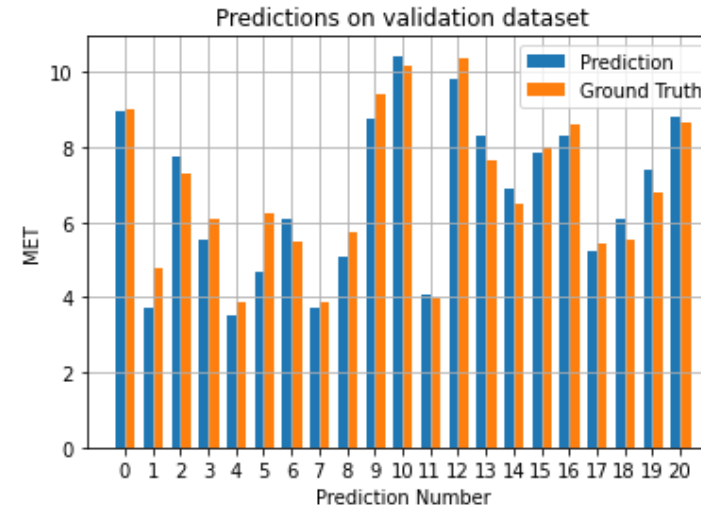


### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- estimated\_level
- mean\_speed

R2 Score: 0.7882770675946017  
Mean Squared Error: 0.9056281308509639

## XGBoost Results



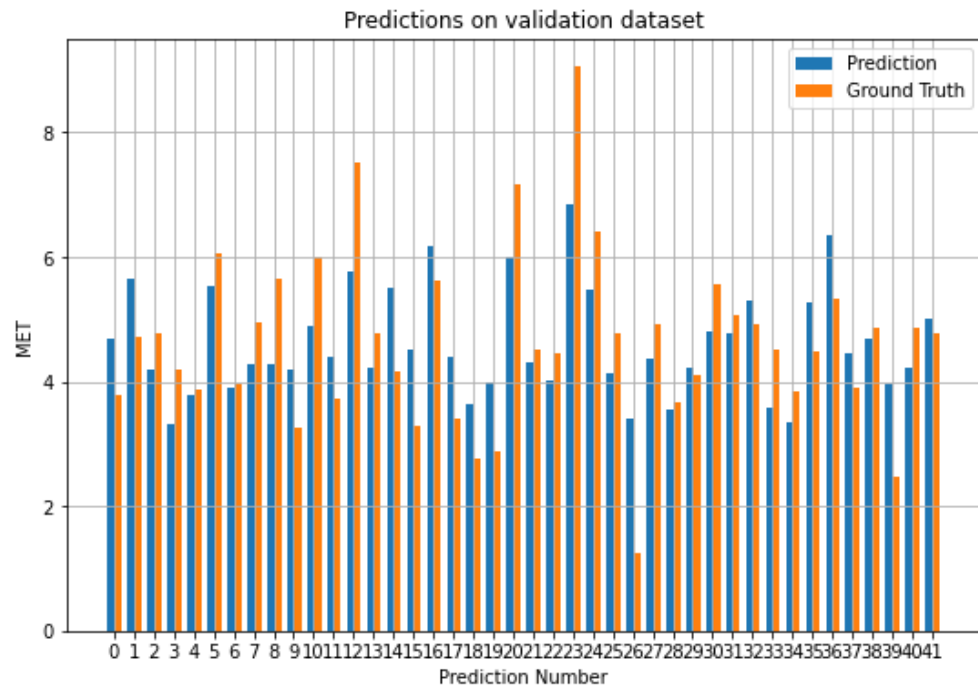
### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- is\_sporter
- mean\_speed

R2 Score: 0.9109705050868462  
Mean Squared Error: 0.5872633643040999

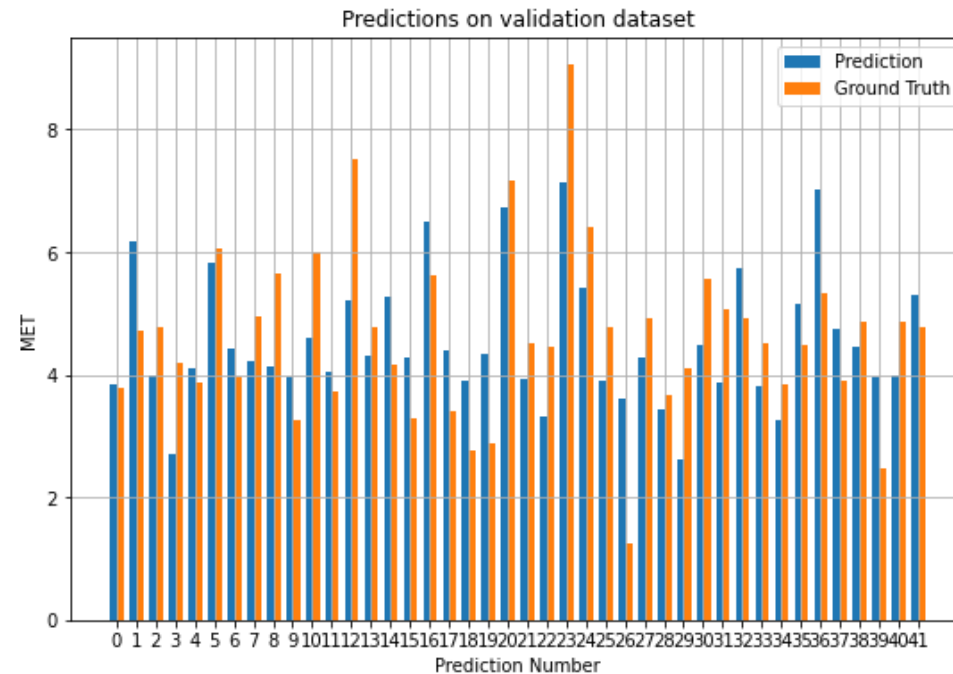
# MET prediction - cycling (light + heavy)

## Random Forest Results



R2 Score: 0.5266932329173457  
Mean Squared Error: 0.9415929952899956

## XGBoost Results



R2 Score: 0.3576245403010052  
Mean Squared Error: 1.0969487380798402

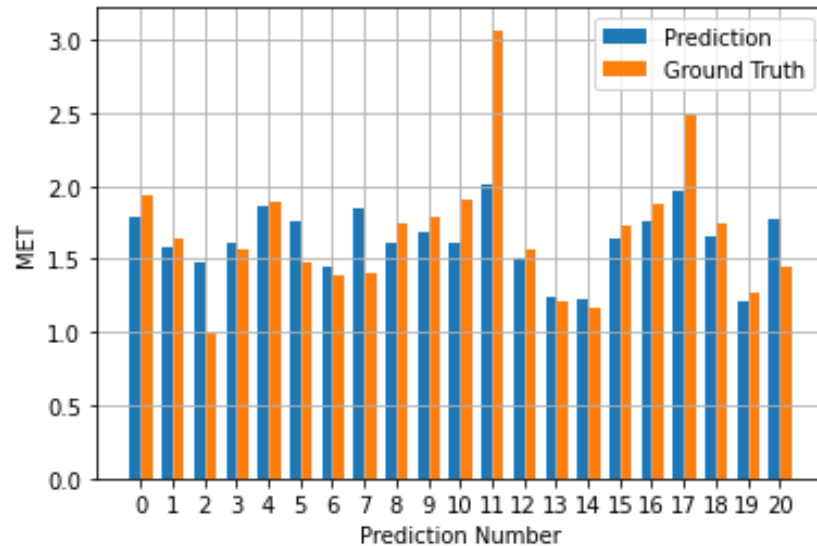
### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- meets balance guidelines
- mean\_speed

# MET prediction - standing

## Random Forest Results

Predictions on validation dataset

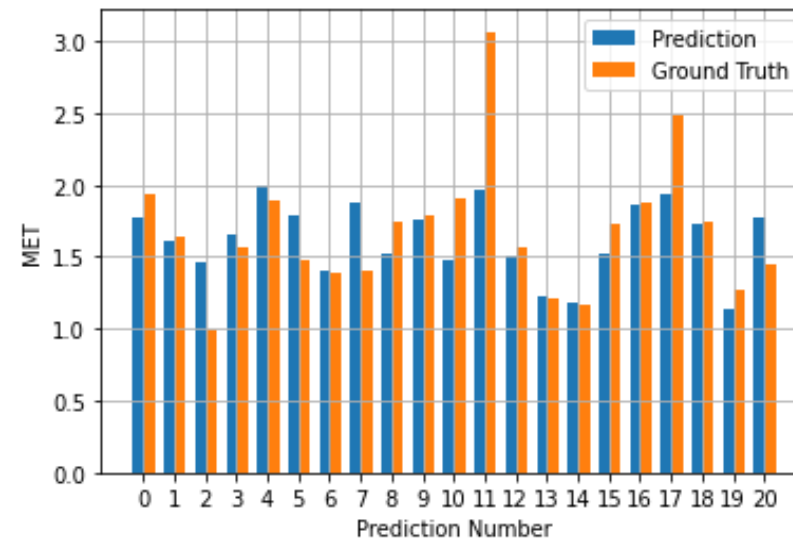


### 7 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- meets balance guidelines
- gender
- mean\_speed

## XGBoost Results

Predictions on validation dataset



### 6 features used:

- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- meets activity guidelines
- mean\_speed

R2 Score: 0.4799613242295476  
Mean Squared Error: 0.3240706791000897

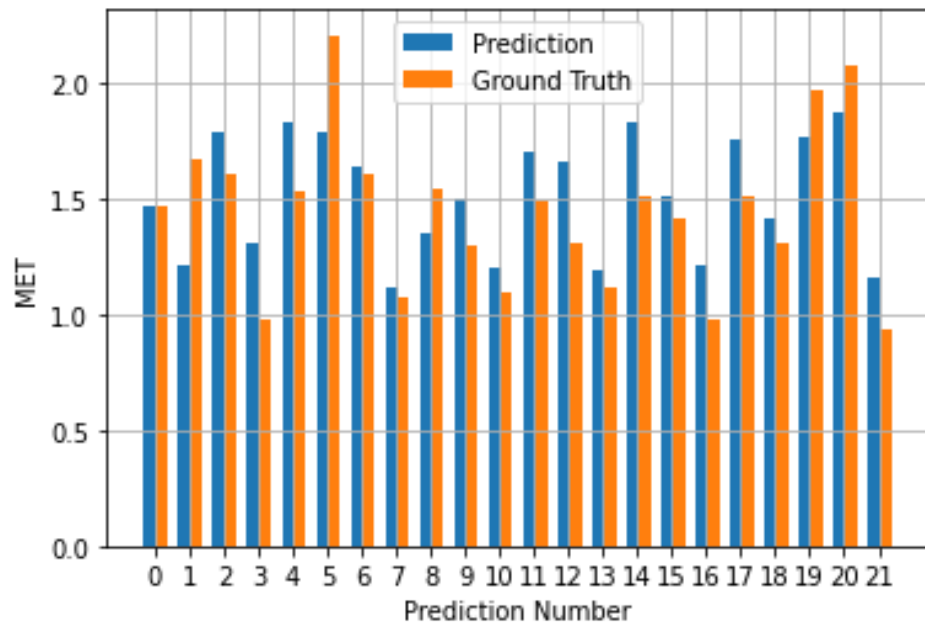
R2 Score: 0.40412086966475813  
Mean Squared Error: 0.34689736817510897



# MET prediction - sitting

## Random Forest Results

Predictions on validation dataset

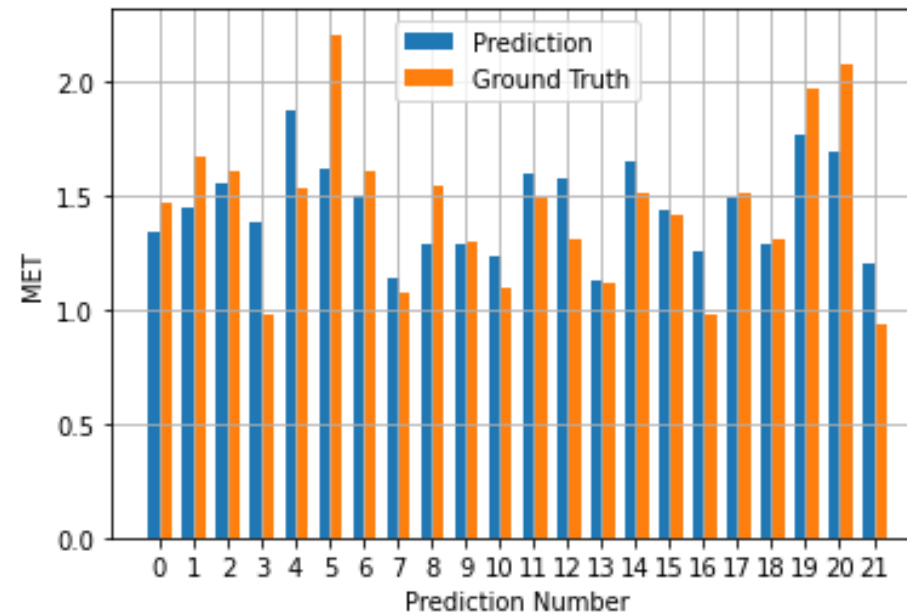


R2 Score: 0.4968670411242766

Mean Squared Error: 0.23890652388300682

## XGBoost Results

Predictions on validation dataset



R2 Score: 0.5098750604253595

Mean Squared Error: 0.23579795068550574

### 6 features used:

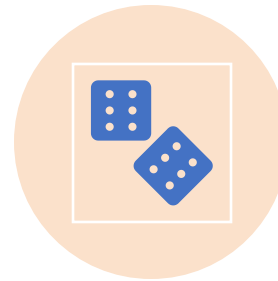
- sum\_mag\_acc
- weight\_kg
- length\_cm
- age\_category
- is\_sporter
- mean\_speed

# Application

## Functionalities



Recognizing activities



Predicting MET-values



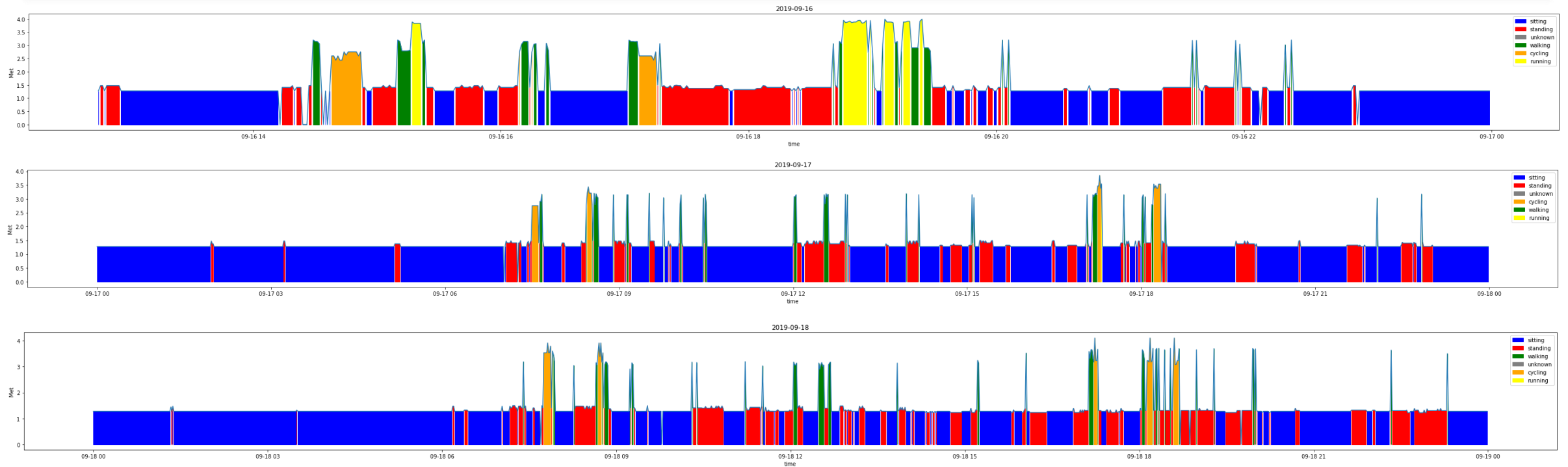
Plotting week data



Calculating if user has  
done it's 150 min  
moderate activity

# Application – plot week data

- Each color represents a activity



## Application – recommended moderate activity

- User has done its recommended amount 150 minutes of moderate activity
- Moderate activity is all activity with MET-value equal to or higher than 3 until 6. The application also takes met value higher than 3 in to account in its calculation



# Problems

- Application is slow
- Speed calculation bug in the application



# Next steps

- Try to fix the speed calculation bug in the application
- Find similar papers for inspiration for our own paper
- Write the general layout of the paper
- Think of a good way to visualize our findings in the paper



# Questions?

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