



# Challenge #7

## Cross-Country Battery Model



Sports Data Analytics  
Topic Leaders



Lucerne University of  
Applied Sciences and Arts

**HOCHSCHULE  
LUZERN**



How much energy is left?



# Variable Exploration

#7

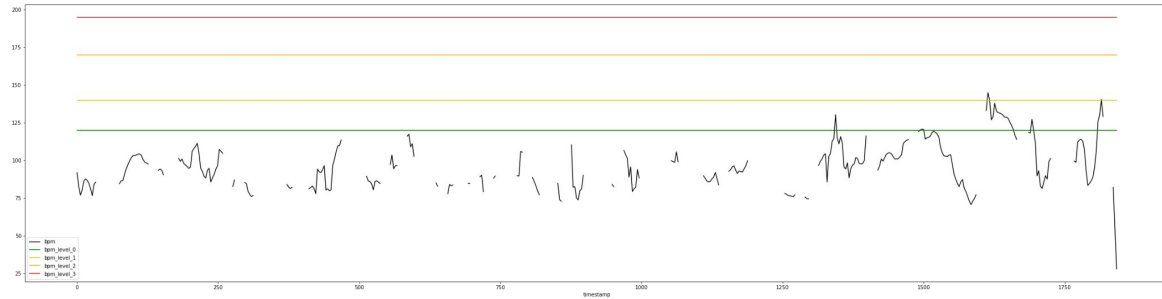
- Energy Level Predictors
  - HRV
  - BPM
  - Workout Intensity (Speed, Altitude Change, Distance)

# Inconsistent datasets

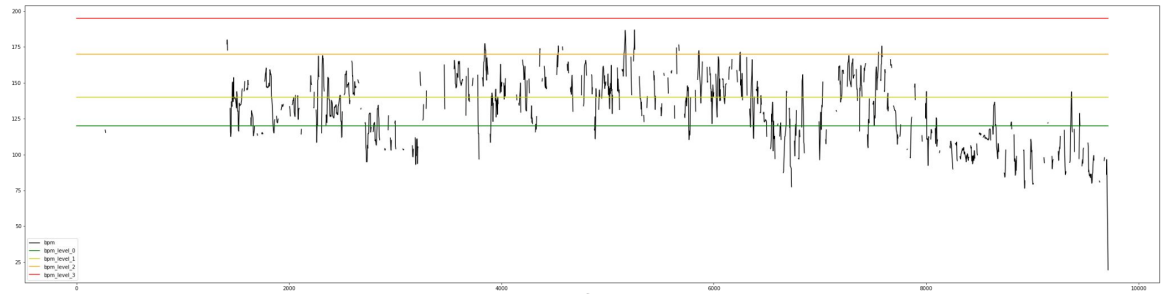
#7

- Dropouts and outliers with GPS, Altitude, Timestamps and BPM
  - Potential Fixes: Trajectory Outlier Detection

BPM  
Training  
Session 01



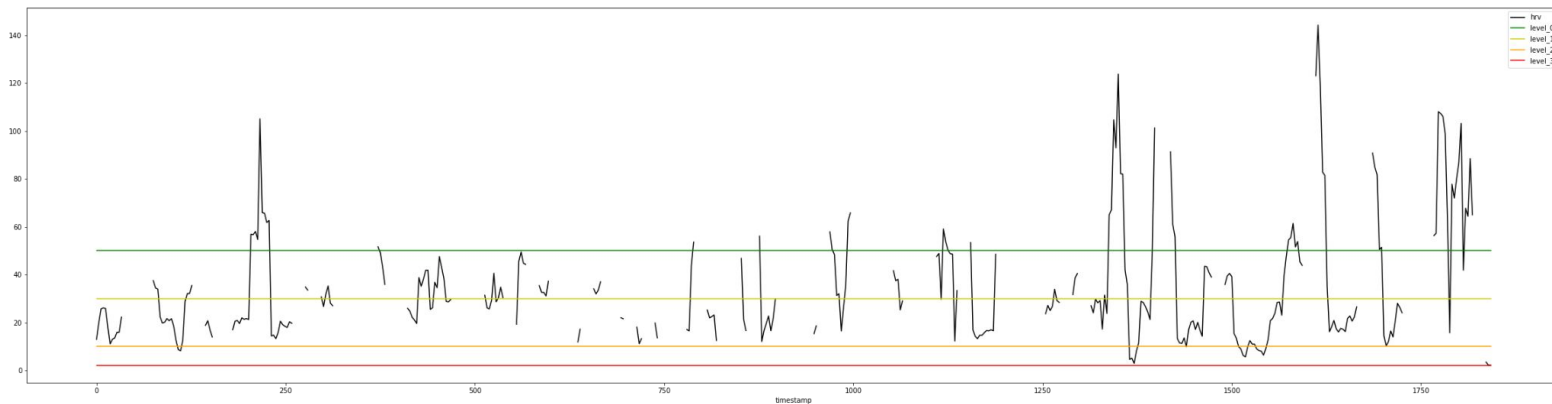
BPM  
Training  
Session 02



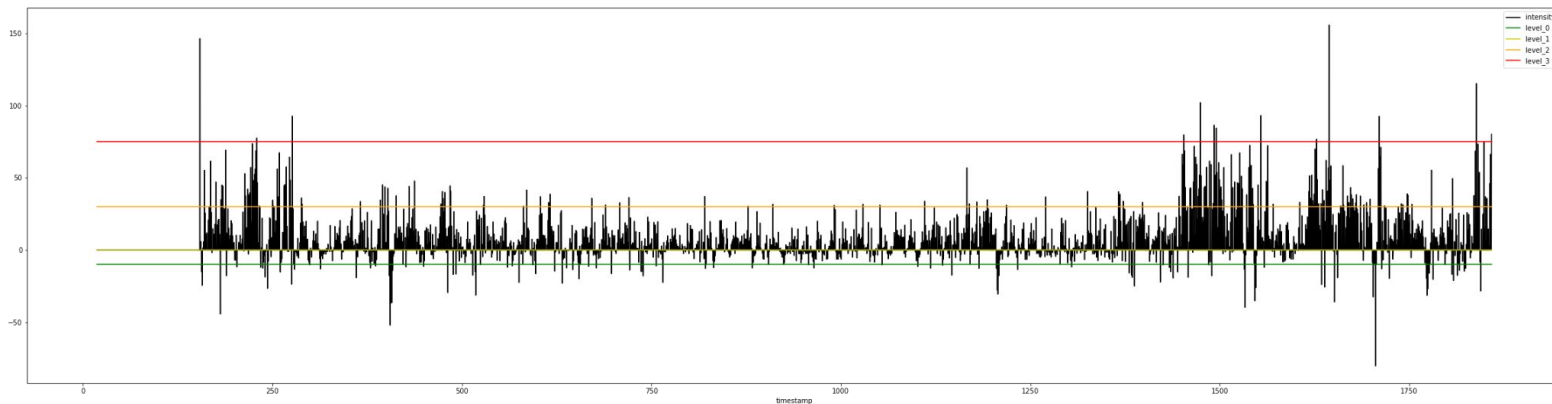
# Energy Levels

#7

HRV  
Training  
Session 01

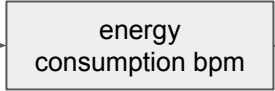
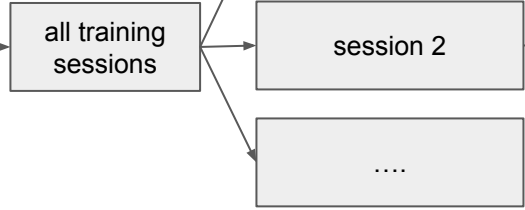


Intensity  
Training  
Session 01



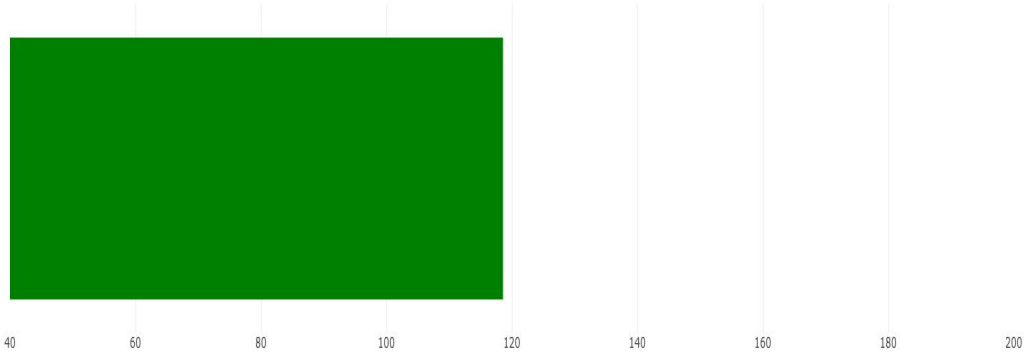
# Battery State

#7



python kafka package

Cross-Country Battery Model



energy use	Score	BPM
no energy used	0	<120
low energy use	1	120-140
middle energy use	2	140-170
high energy use	3	>170

# Further Steps

#7

- Resolve bug for visualization
- Better data quality → better measurements by the device, or ML solution
- Questionnaire how hard the training was, i.e. proper threshold