

# Electric motors data analysis

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# Dataset

- ▶ Measurements of torque and current from electric motors
- ▶ Time-series data with frequency 20KHz
- ▶ Data taken from 5 distinct motors in AC and DC modes
- ▶ Each data sample is one recorded operation
- ▶ Operations are recorded while motor is working properly, then a fault is induced and the same operations are recorded again
- ▶ In total 1066 AC samples, 924 DC samples

## Data Example

Torque	Current
16.693	0.023
16.739	0.019
16.823	0.010
16.810	0.007
16.823	-0.002
16.849	-0.010
16.992	-0.018
17.108	-0.033
17.290	-0.035
17.297	-0.052

# Main Goals

3 main goals:

- ▶ Motor Classification  
Can we identify a motor by a recorded operation?
- ▶ Fault Classification  
Can we group faults?
- ▶ Fault Prediction  
Can we predict the state of motor by a recorded operation?

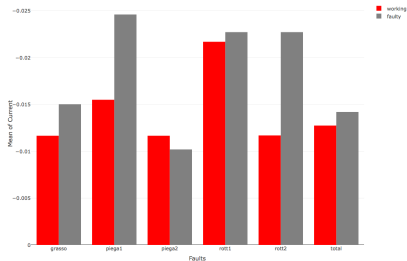
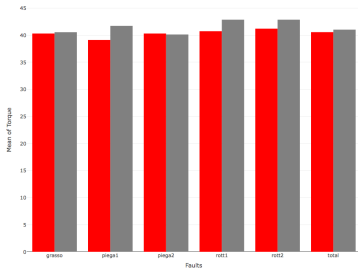
# First Steps

- ▶ Loading data
  - ▶ *Problem* — data samples have different length
  - ▶ *Solution* — cut all samples to the length of minimal one
- ▶ Before PCA
  - ▶ *Problem* — underdetermined data —  $\approx 1k$  statistical units with  $\approx 100k$  variables
  - ▶ *Solution* — downsample data, take every 100th measurement
- ▶ PCA
- ▶ Data exploration
  - ▶ For example, do faulty and working operations have the same or different mean, distribution etc

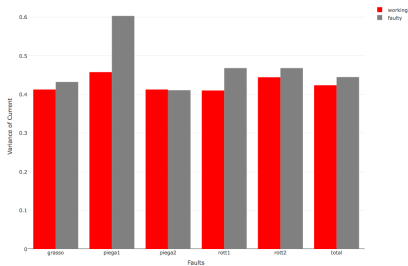
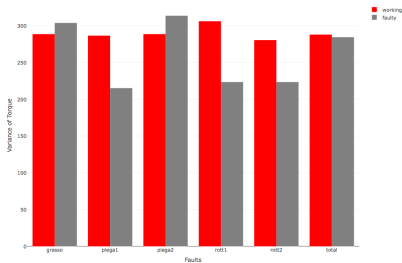
# PCA

PCA results go here

# Data Properties — Means



# Data Properties — Variances





# Conclusions

What we got so far

Questions?