Electric motors data analysis

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March-April 2018

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?

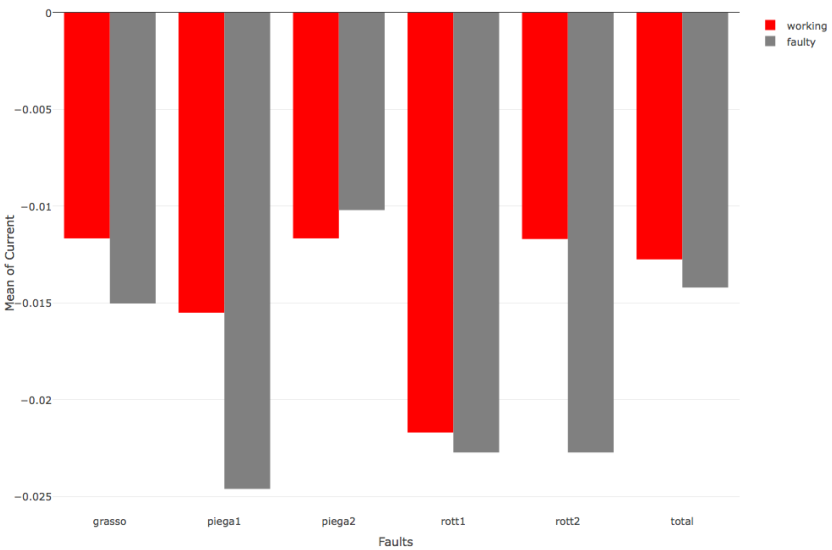
First Steps

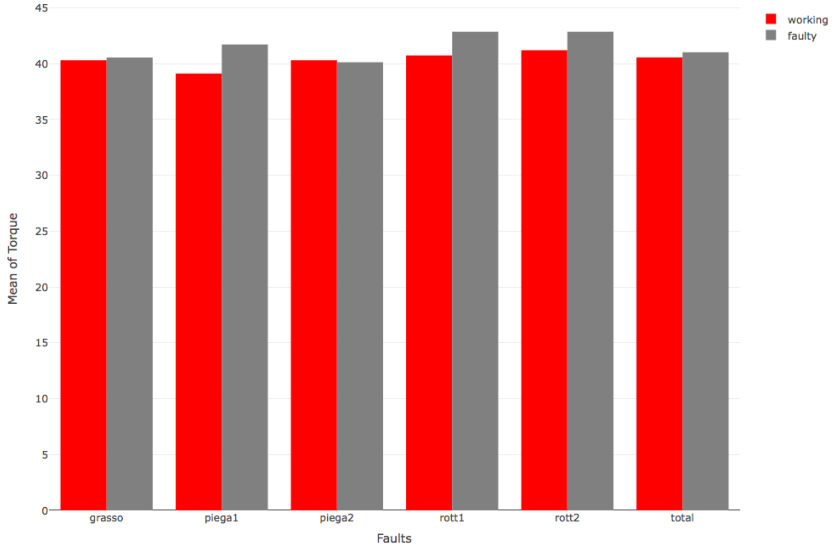
- Loading data
  - *Problem* — data samples have different length
  - *Solution* — cut all samples to the length of minimal one
- Before PCA
  - *Problem* — underdetermined data — ≈1k statistical units with ≈100k variables
  - *Solution* — downsample data, take every 100th measurement
- PCA
- Data exploration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

PCA

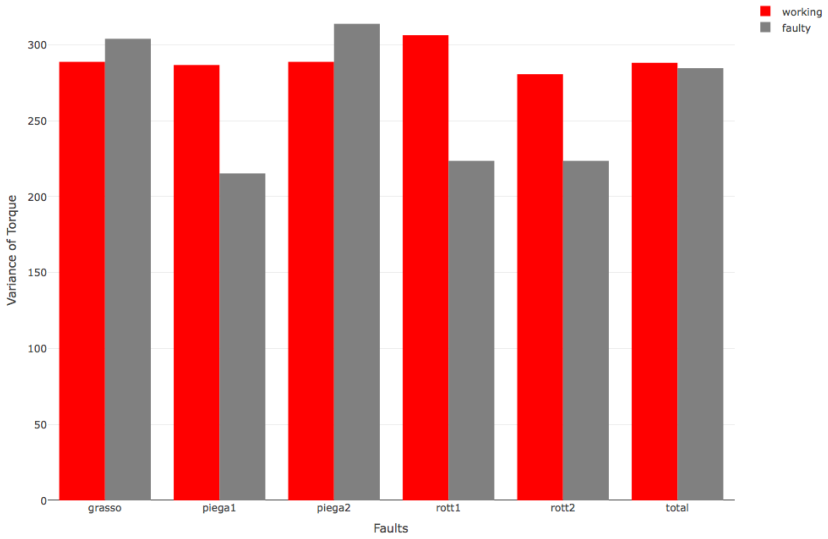
PCA results go here

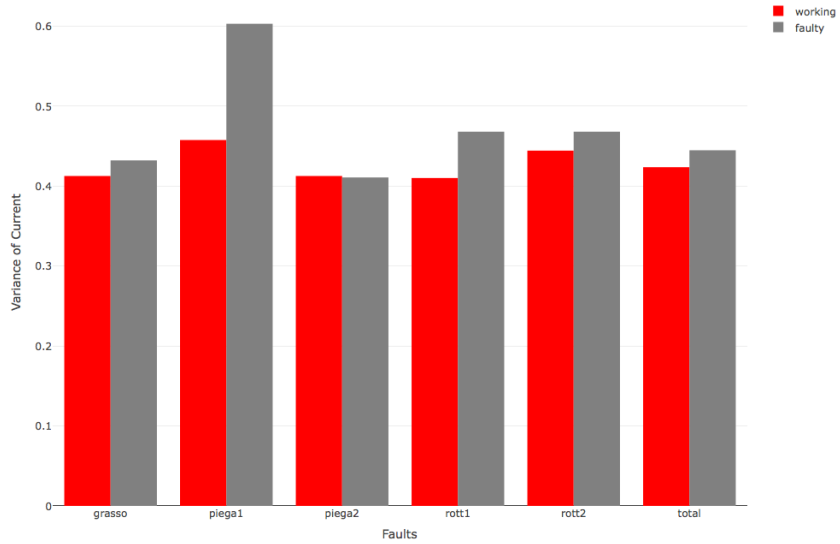
Data Properties — Means





Data Properties — Variances





Conclusions

What we got so far

Questions?