

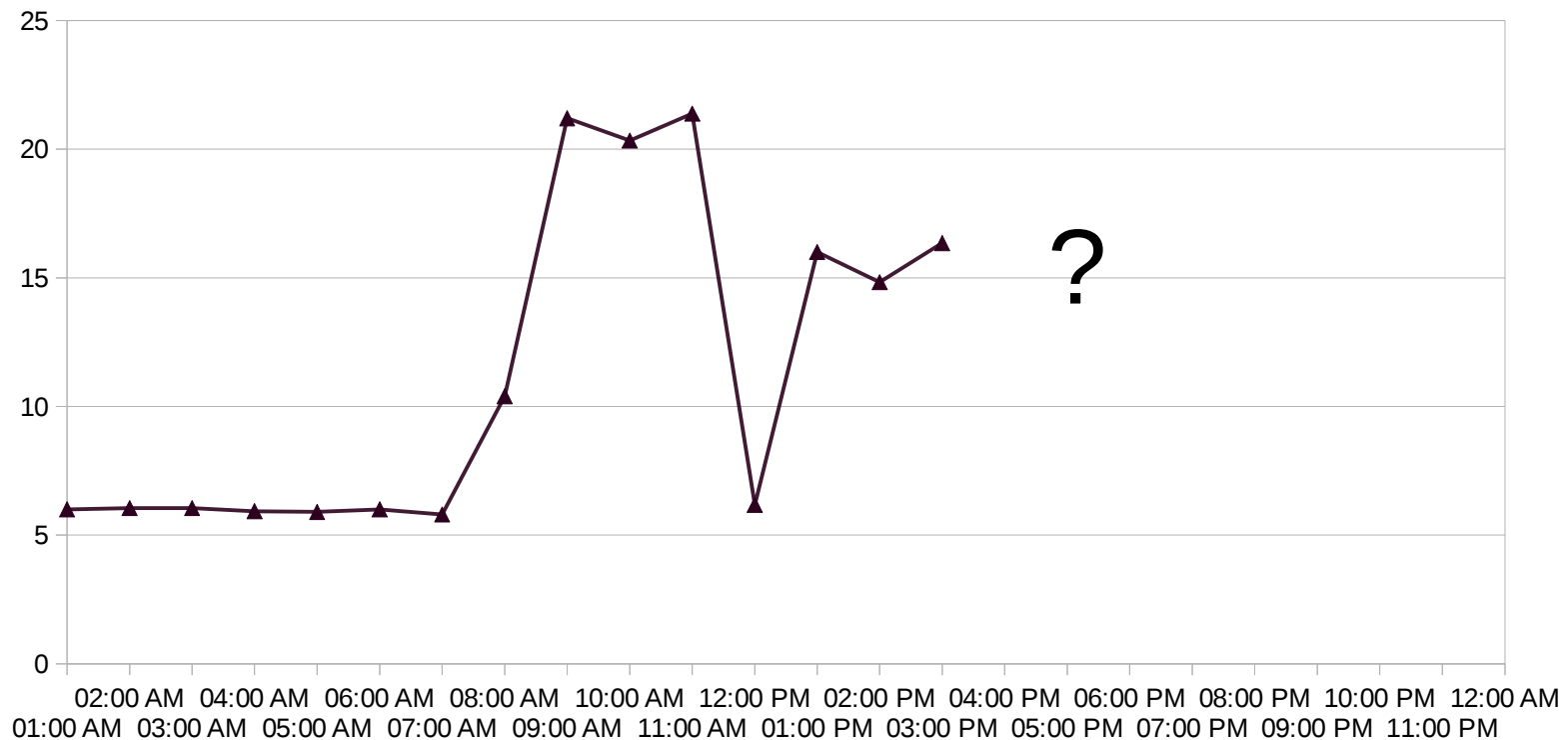


Energy demand model for CREEM

Wojciech Adaszynski

The problem

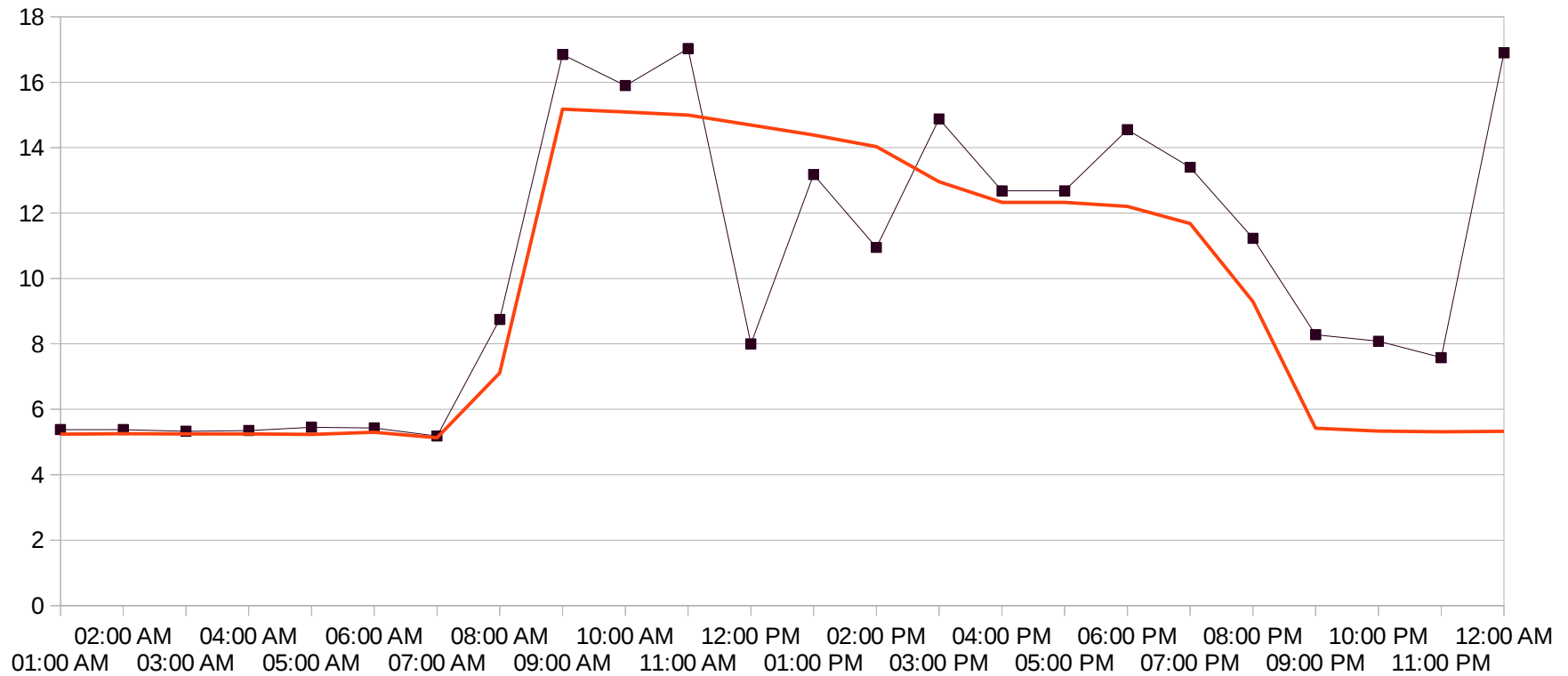
Finding good model for predicting energy consumption of building in the system.



Goals

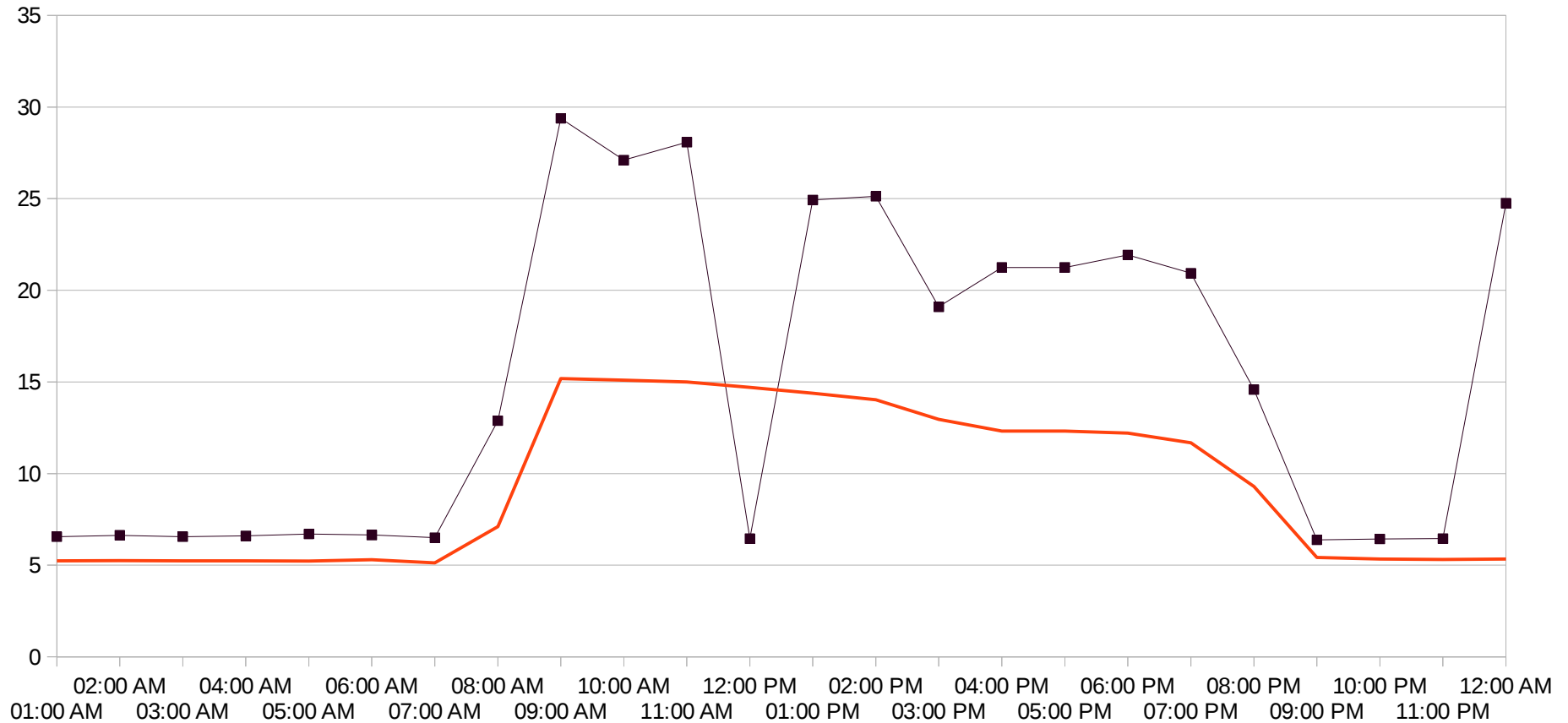
- A method to calculate energy forecast.
- Efficient algorithm for retrieving and processing data from database.
- Increase in accuracy of our predictions.

Current method



Average relative error: $\delta = 17.25\%$

Current method



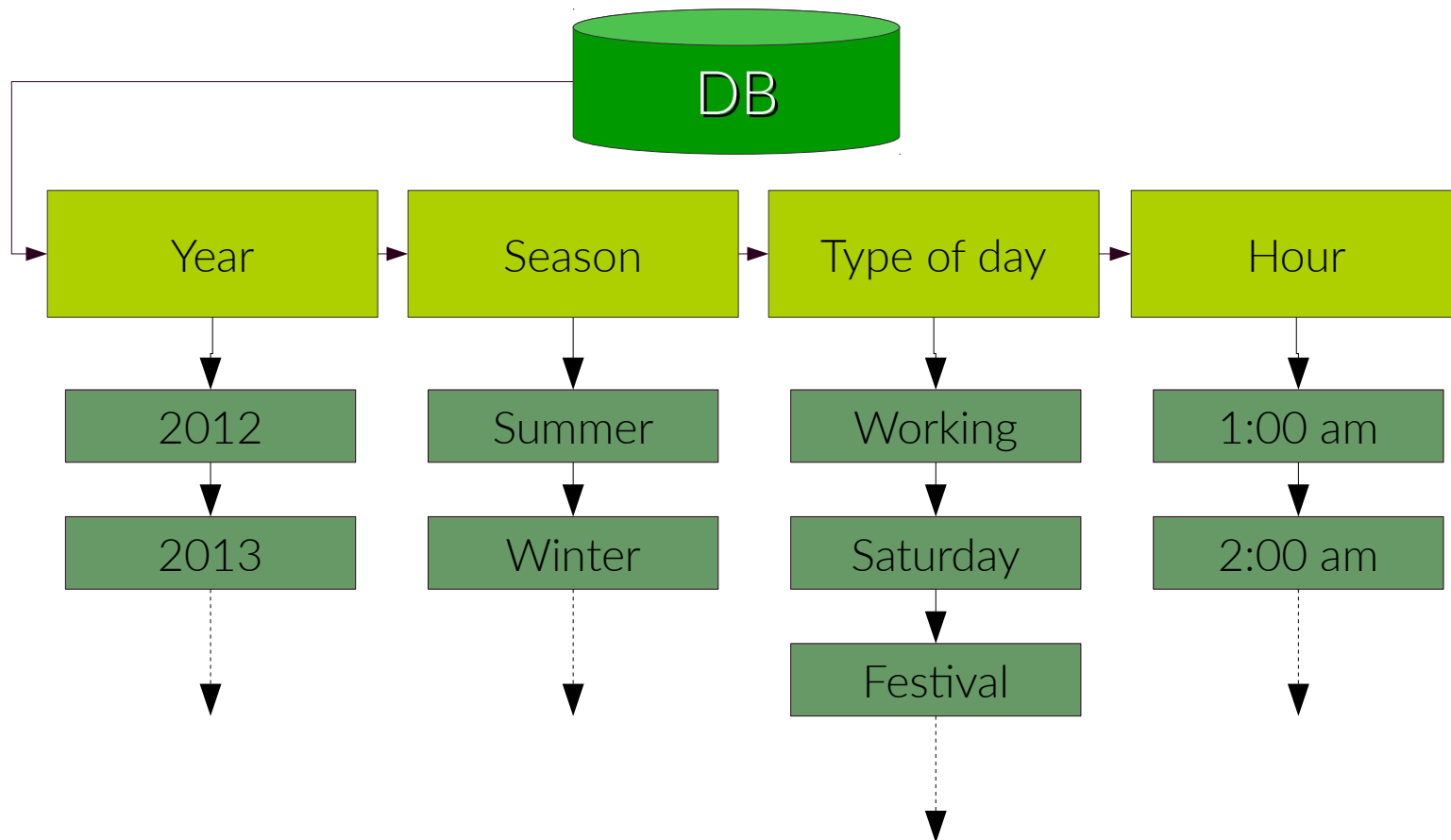
Average relative error: $\delta = 38\%$

Key idea

- 1) Find relevant patterns in the measurements
- 2) Cluster data to smaller chunks
- 3) Apply two-variable regression

Key idea

How to divide our measurements?

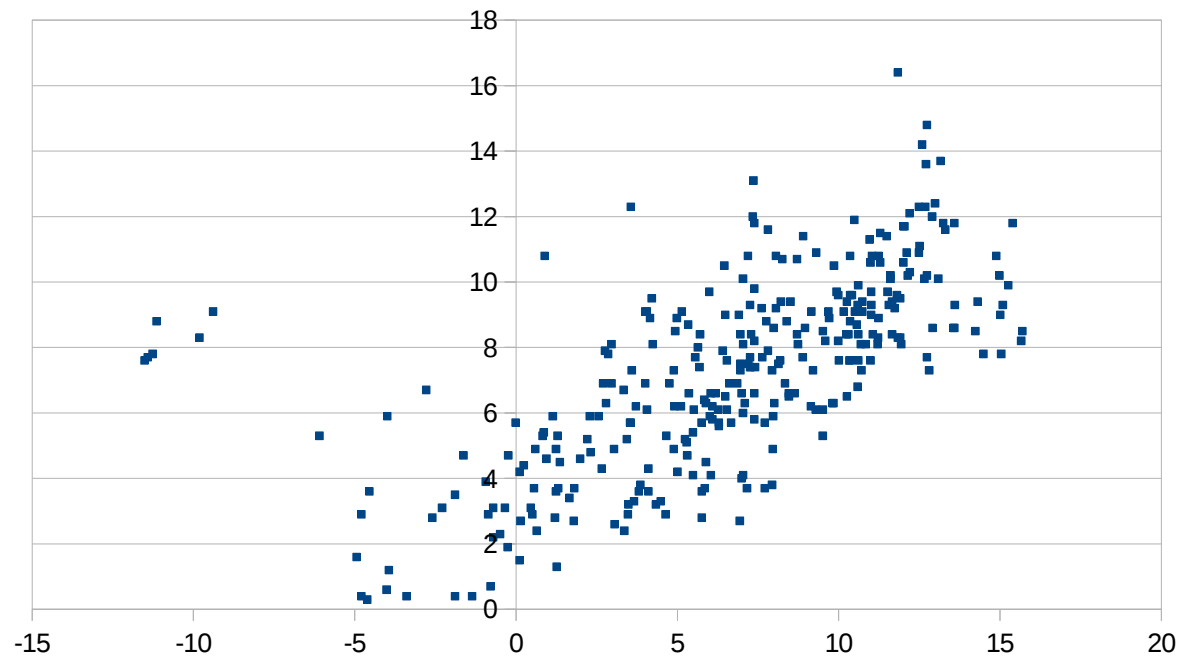


Key idea

Finding correlation.

$$X = \{x : x = |Internal - temperature|\}$$

$$Y = \{y : y = consumption - Profile\}$$

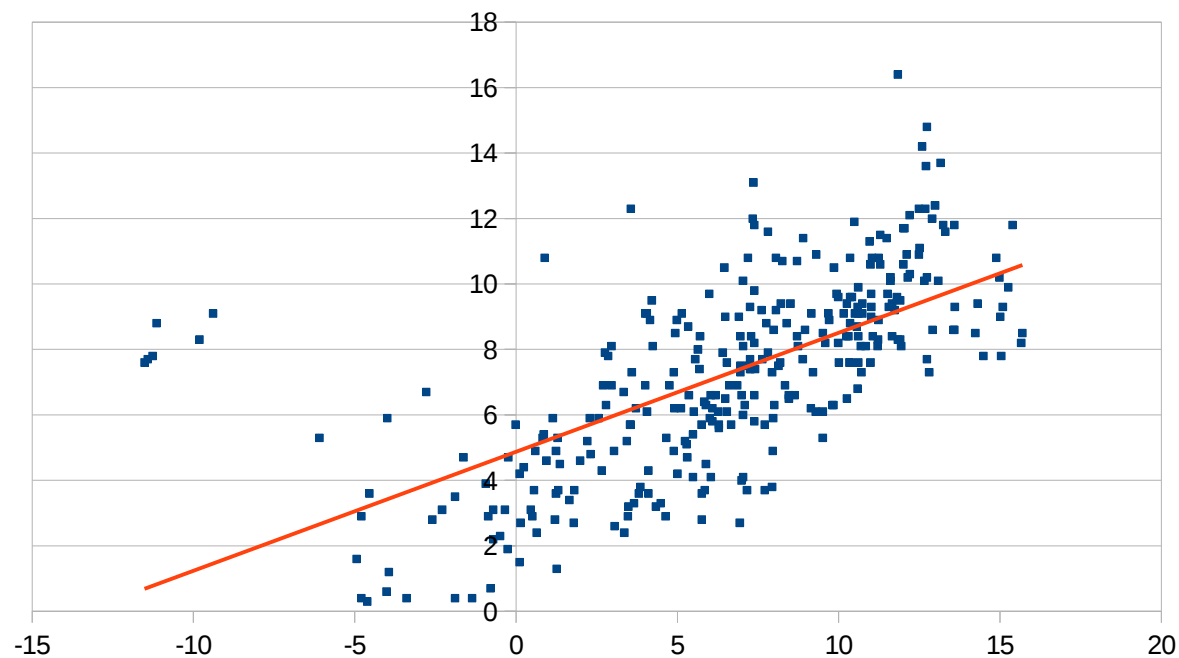


Key idea

Finding a line of best fit

$$y = s \cdot |x - t| + i + p$$

y – consumption, x – temperature
 t – internal temperature, i – intercept, p – profile



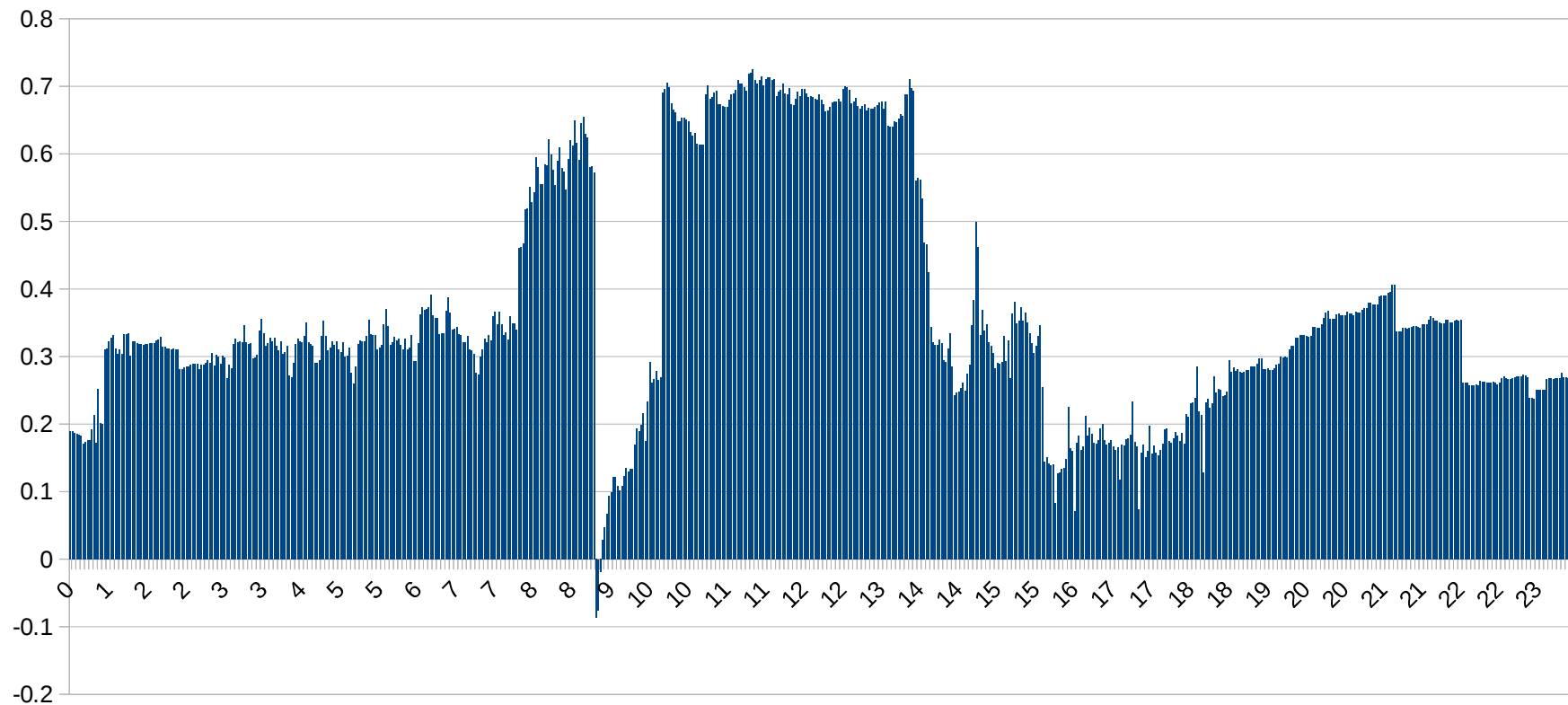
Key idea

How to improve our model?

- 1) Set division based on HDD/CDD
- 2) Checking variables correlation
- 3) Baseload

Key idea

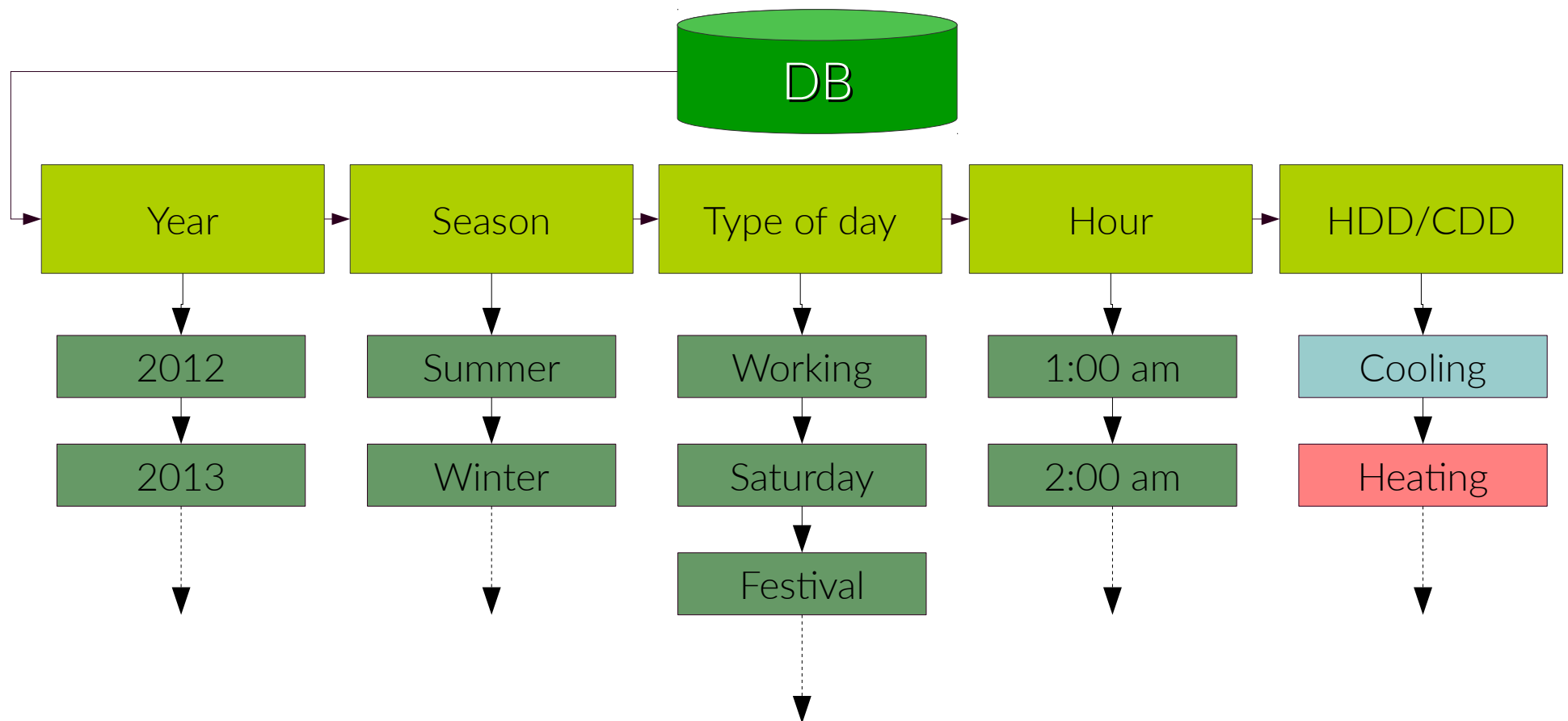
Checking variables correlation



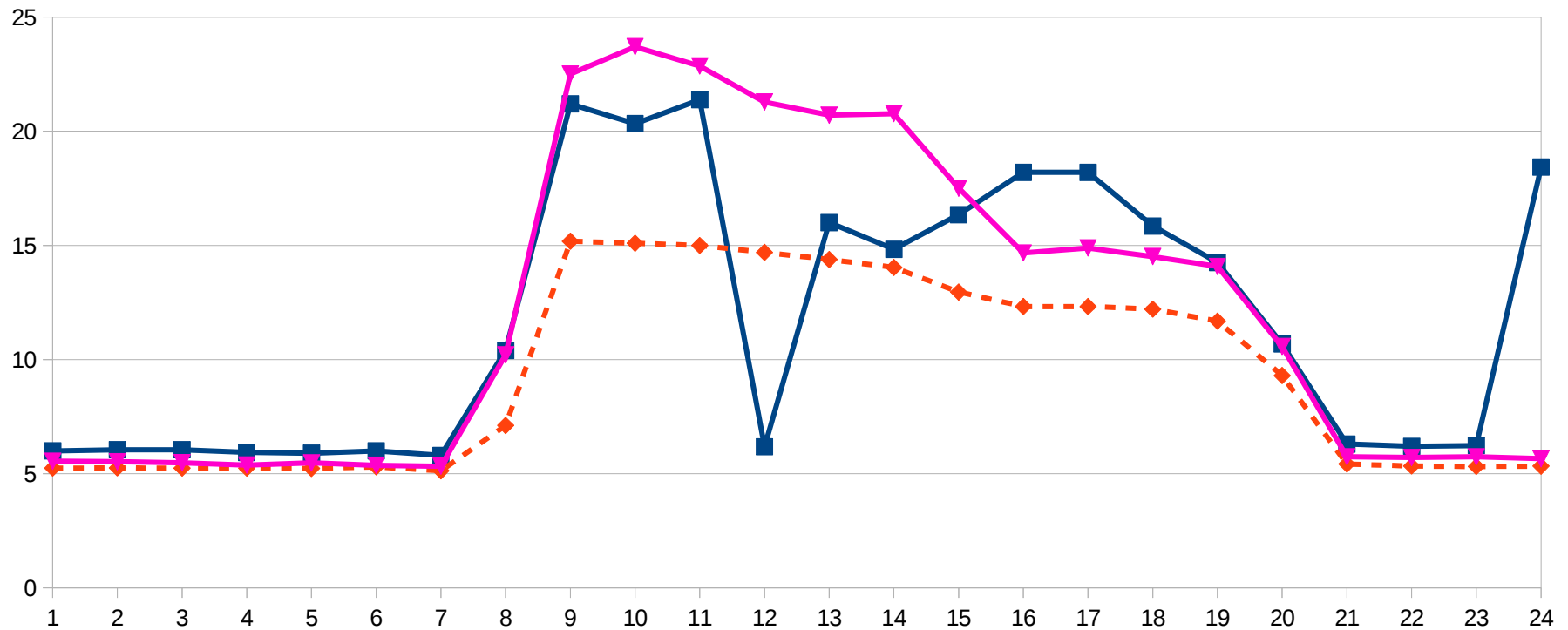
Pearson correlation coefficient throughout the day

Key idea

Set division based on HDD/CDD



Final results

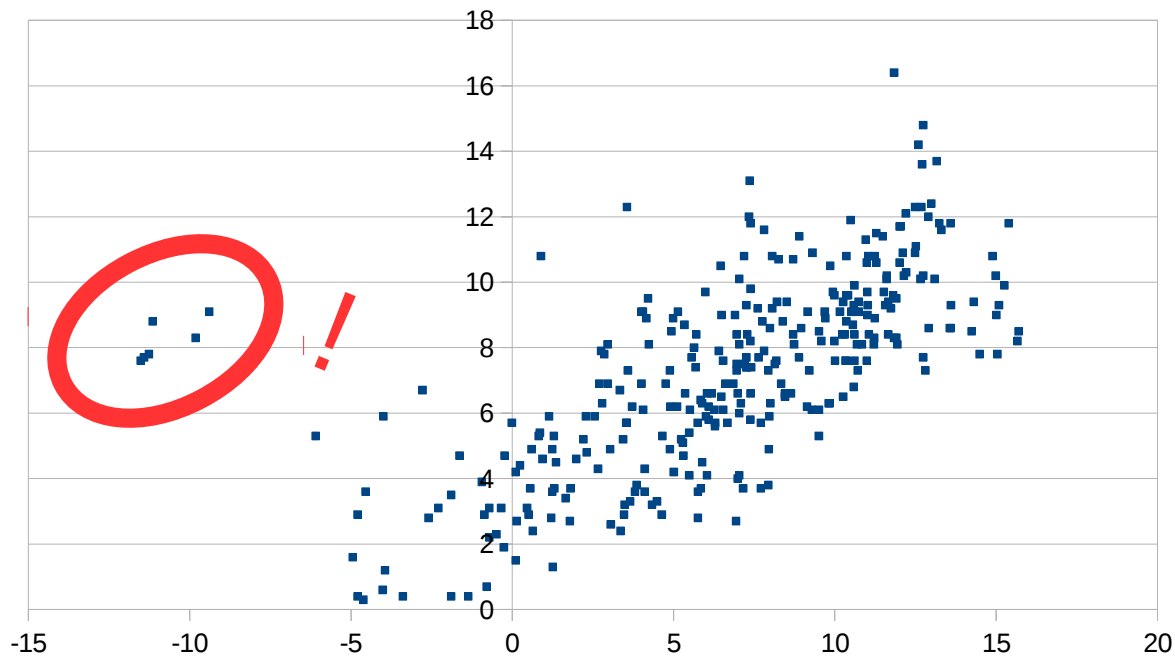


Before: $\delta = 23.3\%$

After: $\delta = 20.2\%$

Future improvements

- 1) Different correlation type (non-linear distributions)
- 2) Subtracting baseload from consumption
- 3) Decision analysis / removing outliers



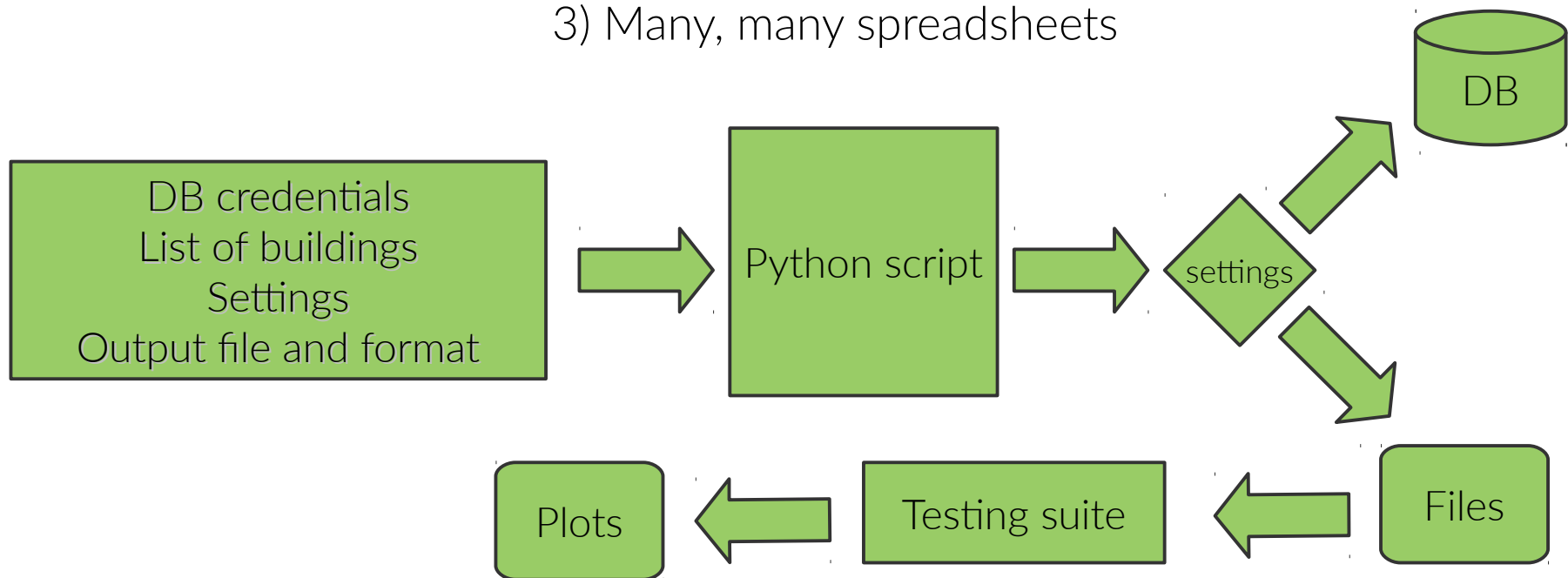
Implementation

1) Python Script for retrieving and calculating data

- mysql connector
- numpy library
- Matplotlib charts

2) Testing suit for results comparison

3) Many, many spreadsheets



Links

<https://github.com/wojciechAdaszynski/EnergyForecaster>

<http://www.onlinestatbook.com>

<http://www.docs.scipy.org/doc/>