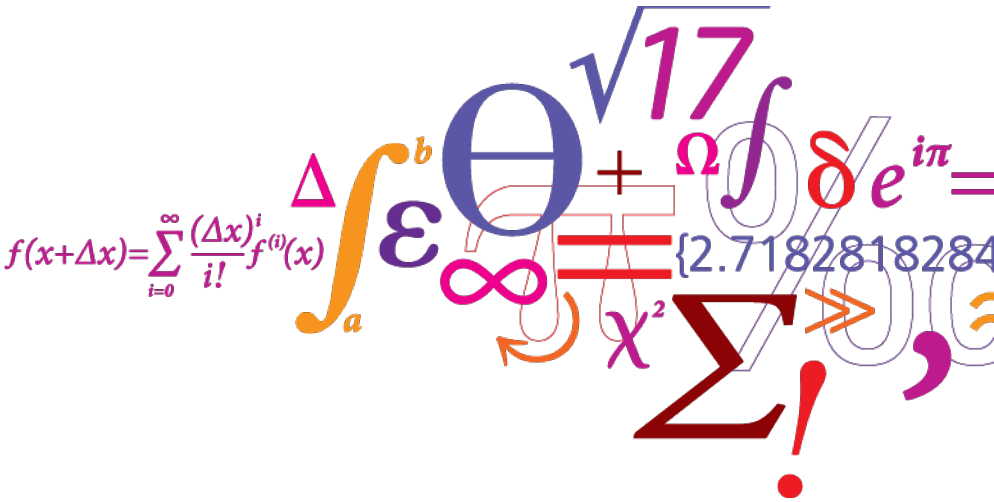
Classification of electricity consumption using smart meter data

Alexander Tureczek, Ph.D. Candidate
atur@dtu.dk

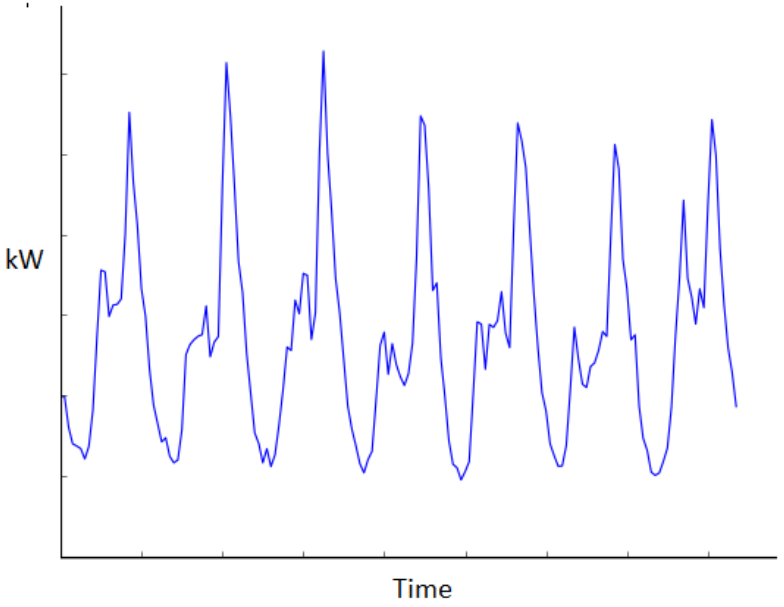
In collaboration with:

DANSK ENERGI



DTU Management Engineering
Department of Management Engineering

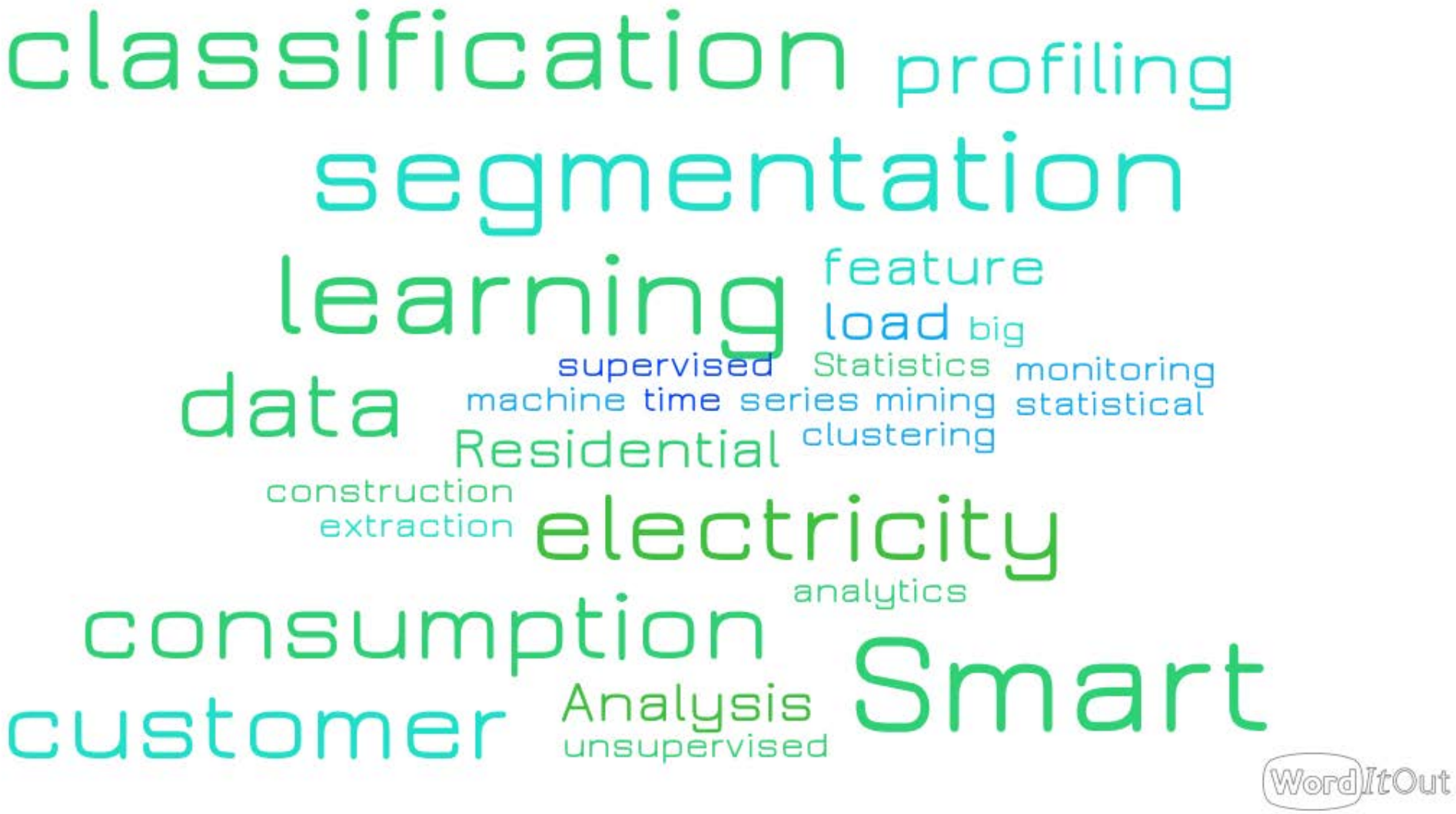
Smart Meters and Analytics



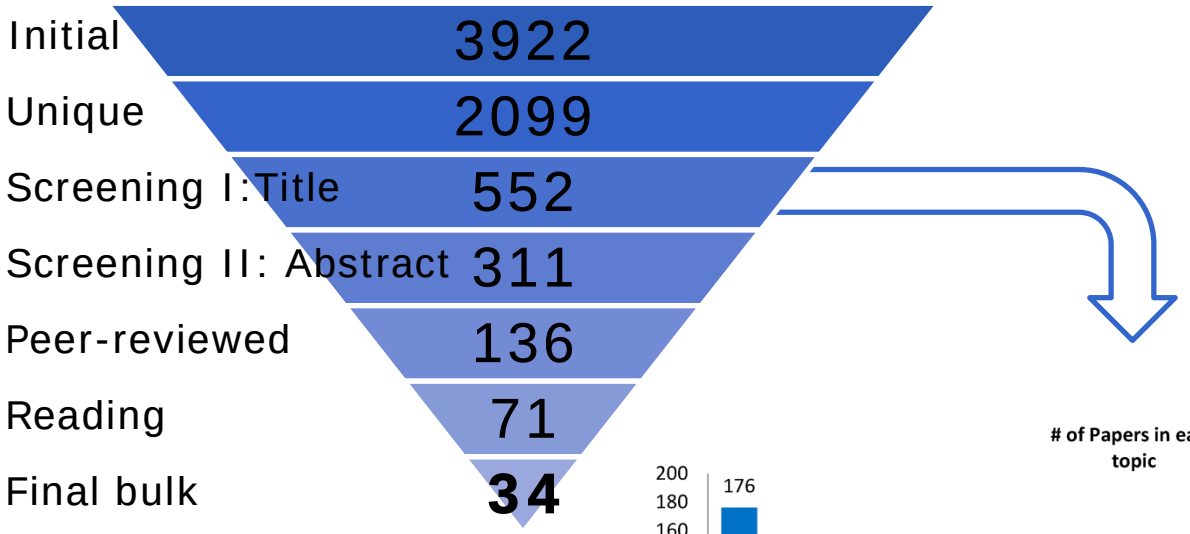
Presentation Outline

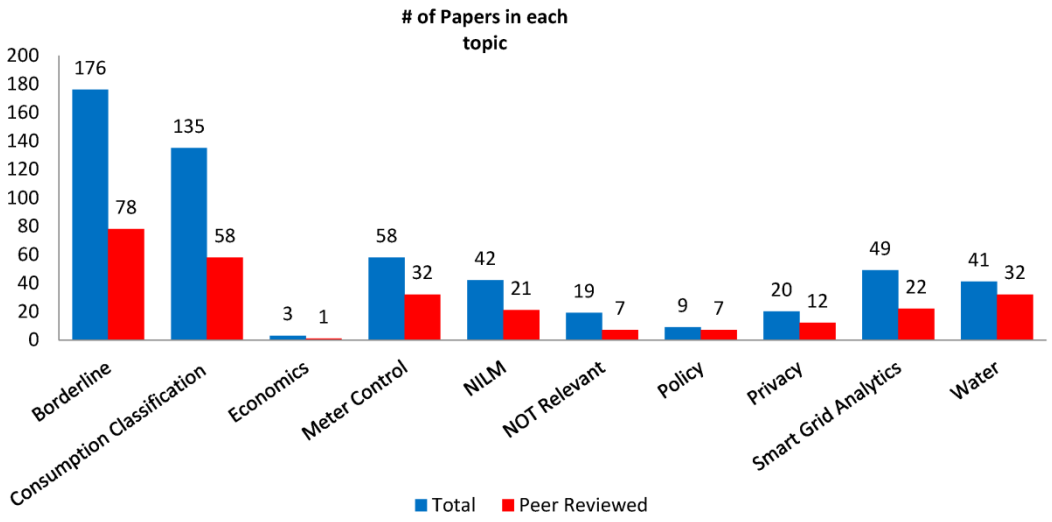
- Systematic Literature Review
  - **Structured Literature Review of Electricity Consumption Classification Using Smart Meter Data**
  - http://www.mdpi.com/1996-1073/10/5/584

- Analysis
  - SydEnergi data


classification
profiling
segmentation
learning
feature
load
big
supervised
Statistics
monitoring
data
machine
time
series
mining
statistical
clustering
Residential
construction
extraction
electricity
analytics
consumption
Smart
customer
Analysis
unsupervised
WordItOut

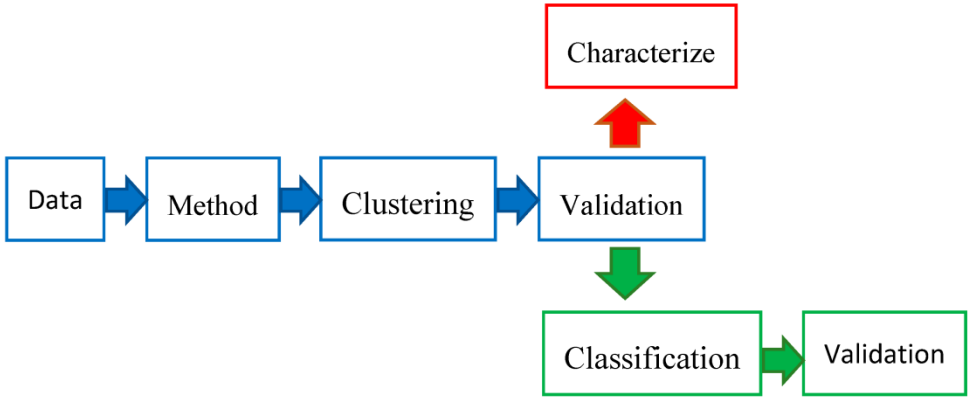
Smart Meter Papers





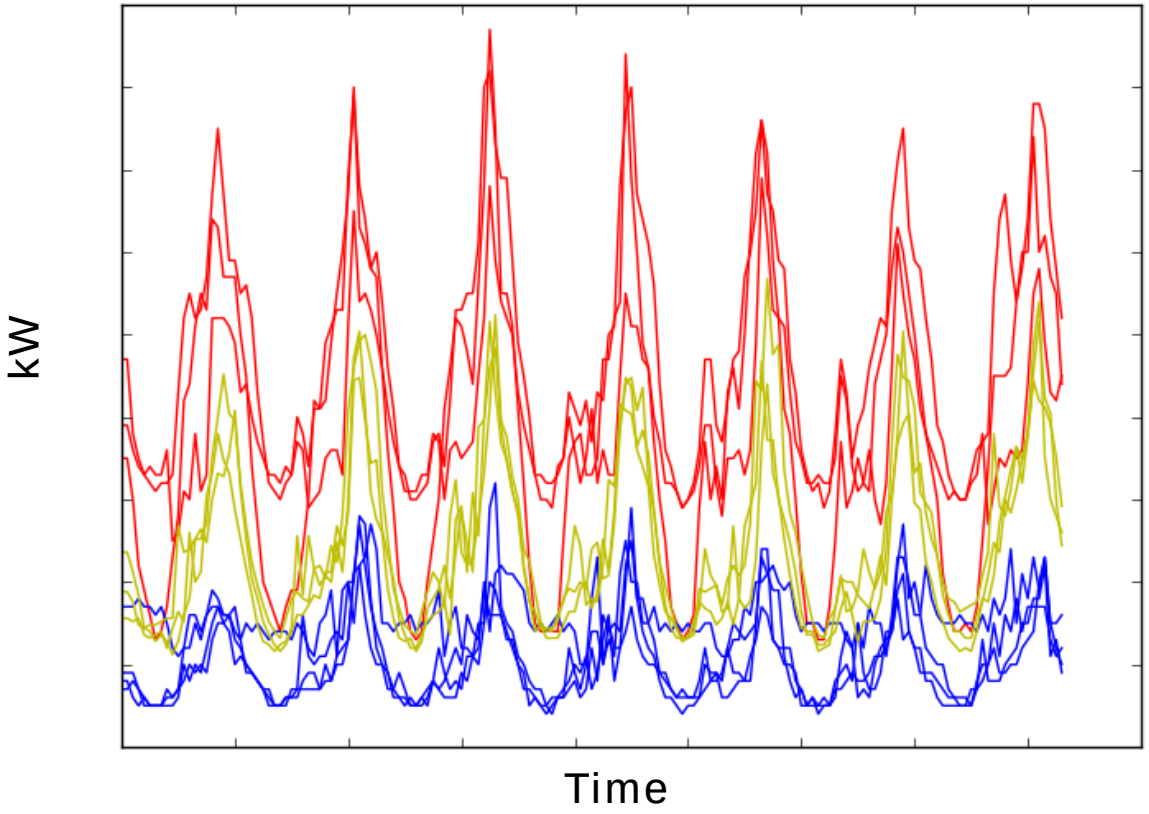
Common Clustering methods and workflow

Metode	Total
K-Means	**65 %**
Hierarchical	**45 %**
Fuzzy K-Means	12%
Follow-The-leader	9%
Mixture Model	9%
K-Medoid	6%
Neural Network	6%
Fast Fourier Transform	3%



Is it possible to classify smart meter data…?

Classification 10 meters 3 classes k-means



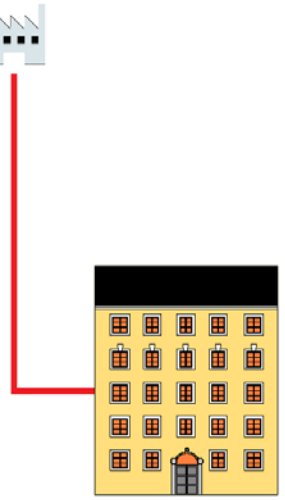
(ENSYMORA data)

SydEnergi Smart Meter Data

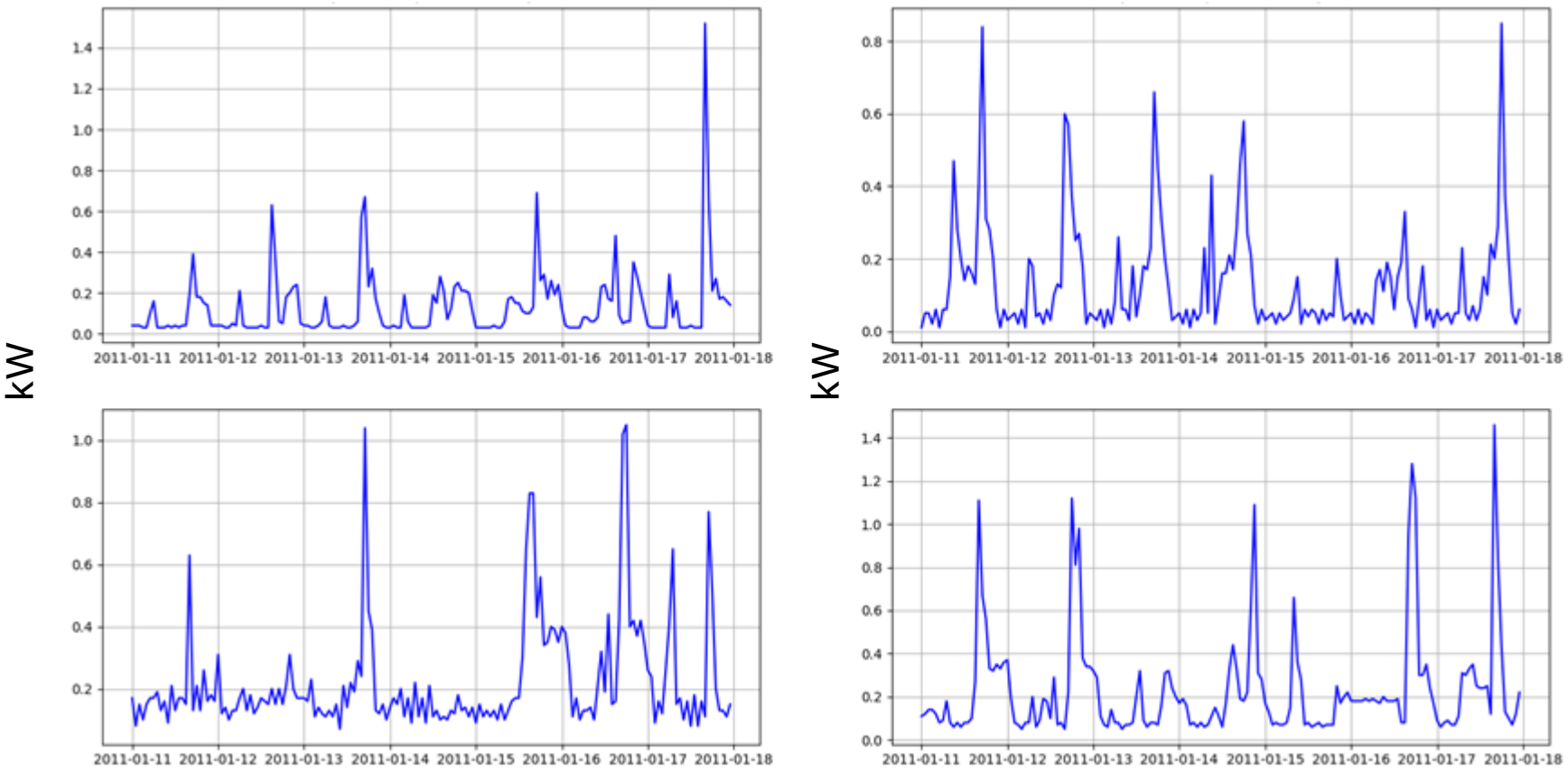
SydEnergi

Subset:

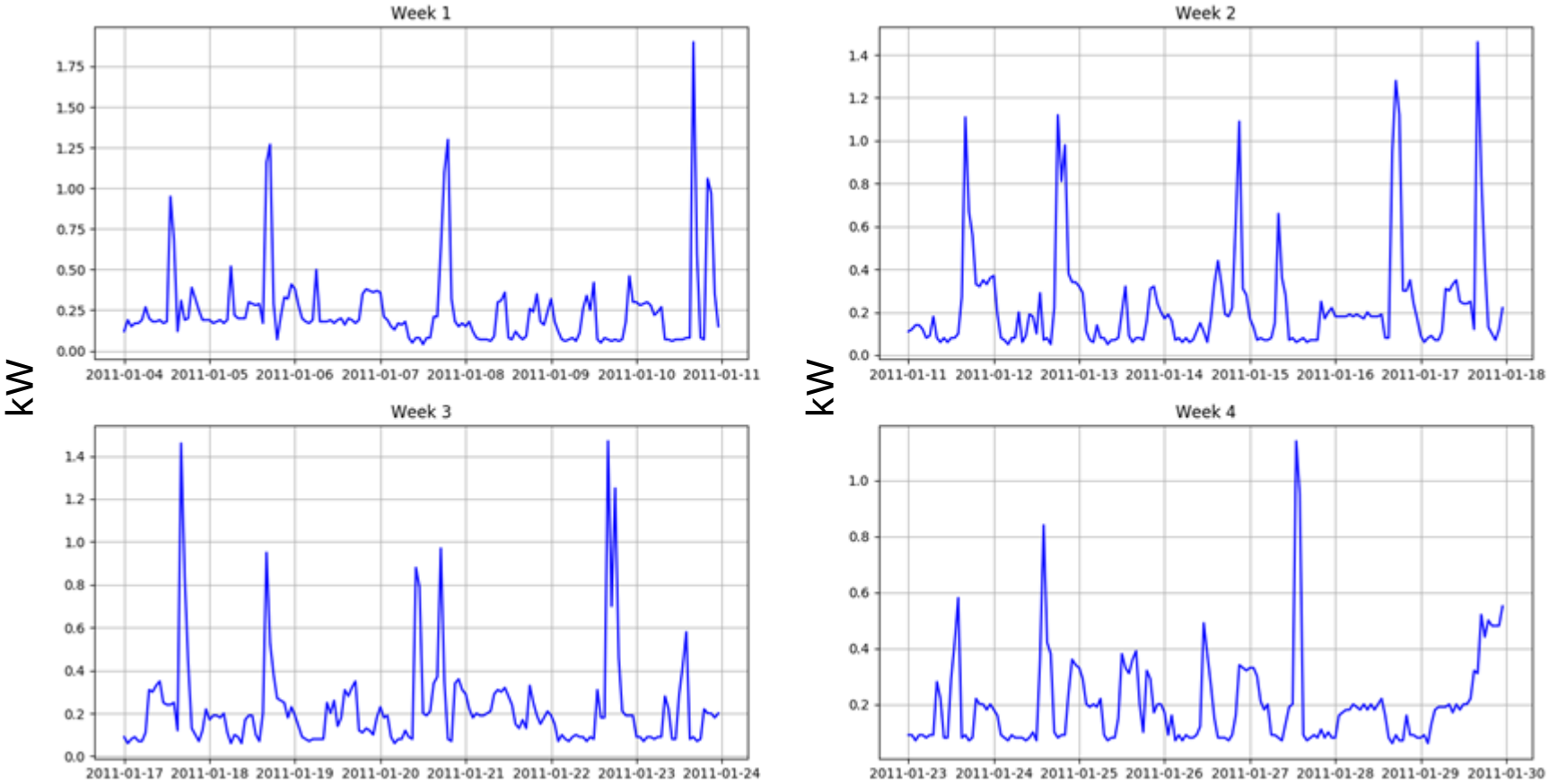
100 Apartments with district heating in Esbjerg.



January 2011 (11th-17th) 4 meters (mon-sun)

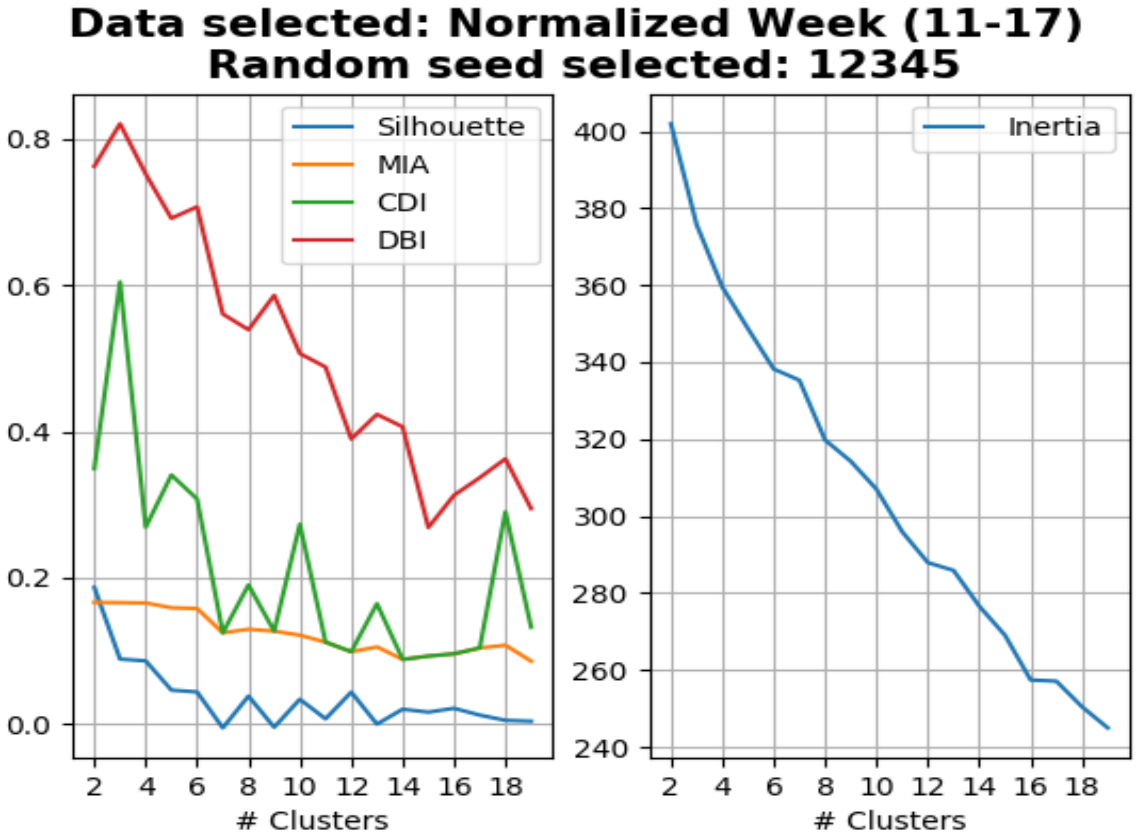


January 2011 1 meter

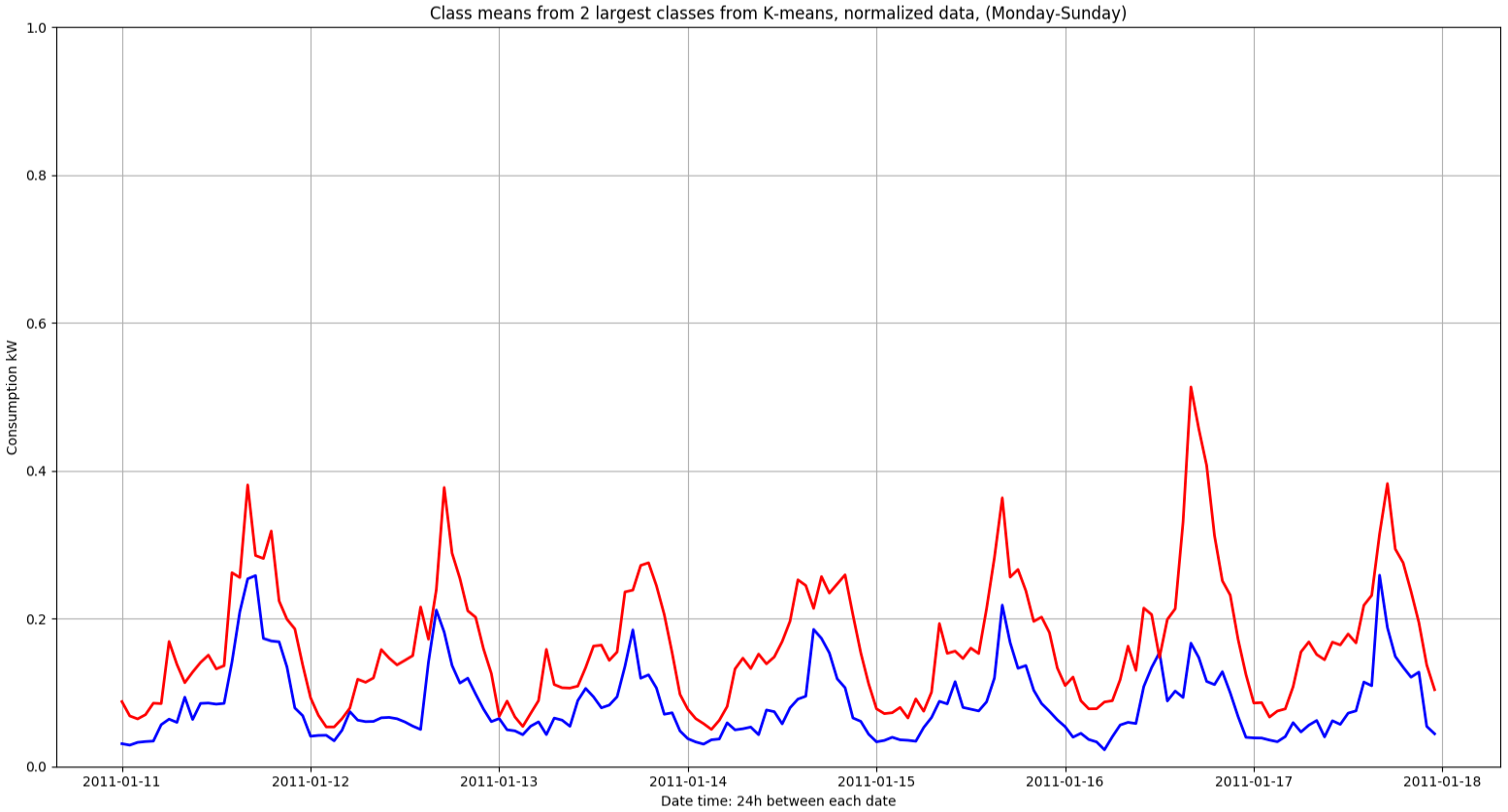


Optimum number of clusters

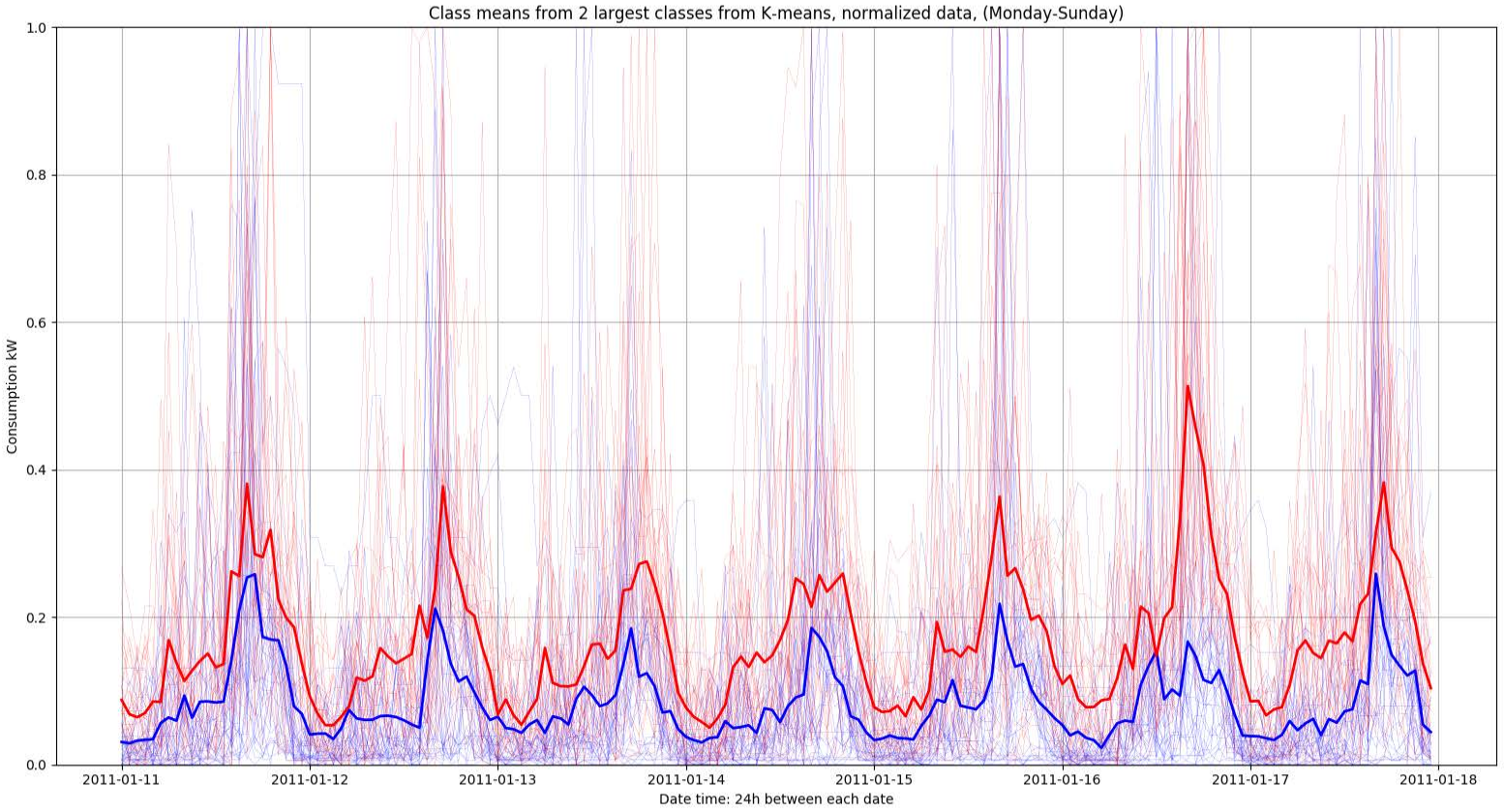
K-means classification: 2-20 classes, 100 meters



Mean of 2 largest classes



2 largest classes all meters



Conclusion

- Classification is possible
  - Cluster dispersion is large
  - Not much help from reducing time window, month…week…day…

- Potential:
  - Adding Socio-economicdemographic and housing data
  - Feature extraction of meter data:
    - Wavelets / Splines
    - Principal components
    - Account for autocorrelation…
    - Weather

- Audience input…