

Automatic leak detection

Final presentation

Motivation

- Damages to property
- Lost in resources
- Estimated water loss from leakages
 - 8-24% in developed countries
 - 24-45% in developing countries

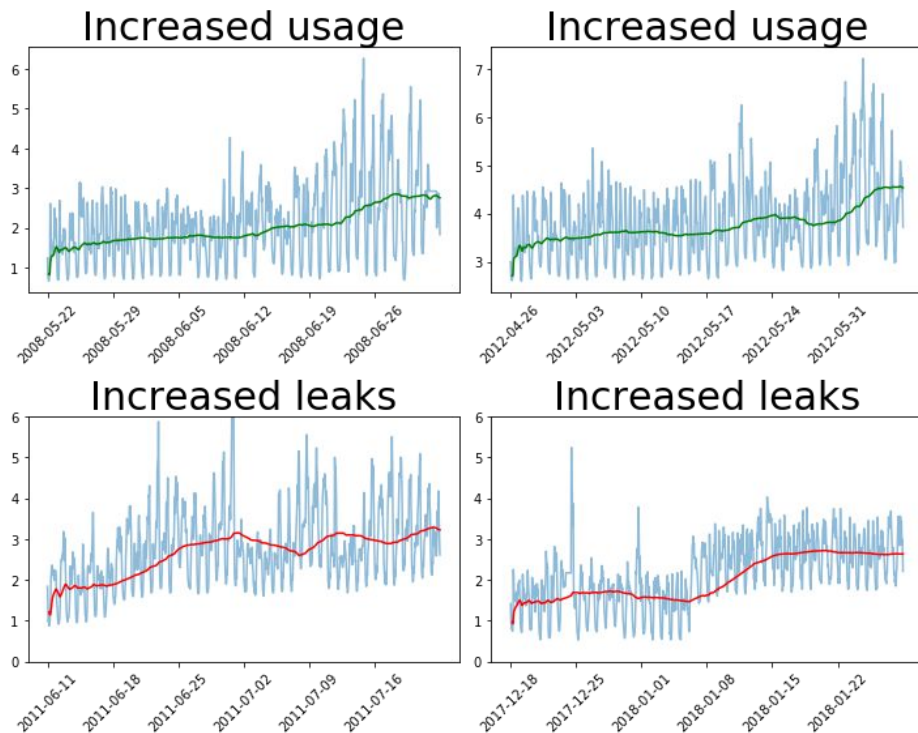
Goals

Detection & size estimation of leakages

Challenges/Problems

Increased flow \neq increased leakages

Requires some form of *source-separation*



Solution

Semi-blind source separation

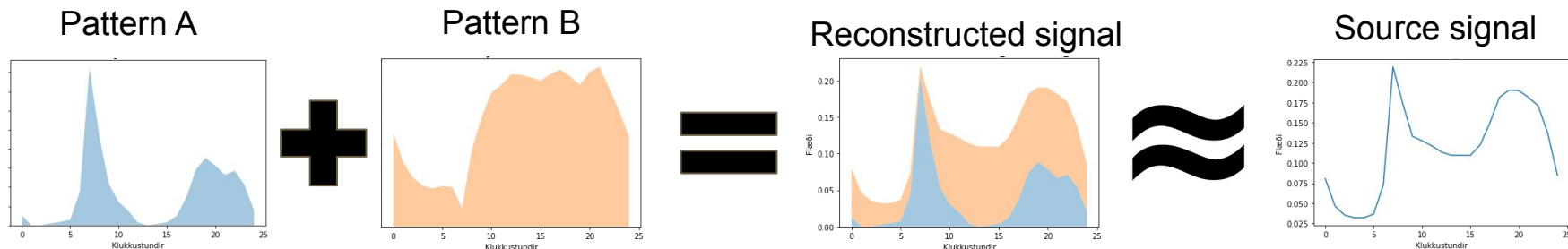
(Decomposition with prior knowledge)

Model objective:

- Estimate patterns for minimal reconstruction error

Prior knowledge

- One of the patterns is flat (Leakage pattern)
- All the patterns are non-negative
- All the patterns are daily or weekly



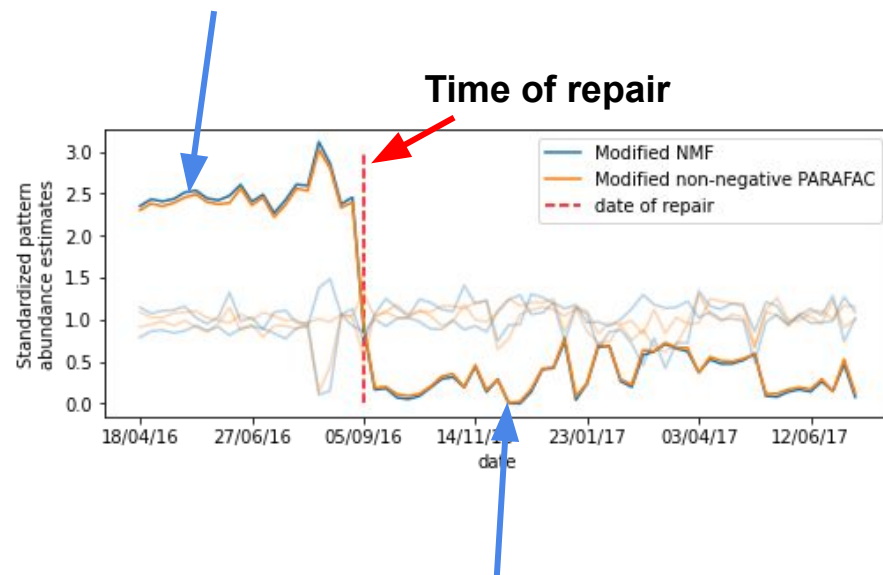
Results (1 of 2)

Here: One known repair

Both models estimated leakages well

- Leakage estimates decreasing in tandem with known leakage repairs
- Other pattern estimates unchanged

Leakage estimates before repair



Leakage estimates after repair

Results (2 of 2)

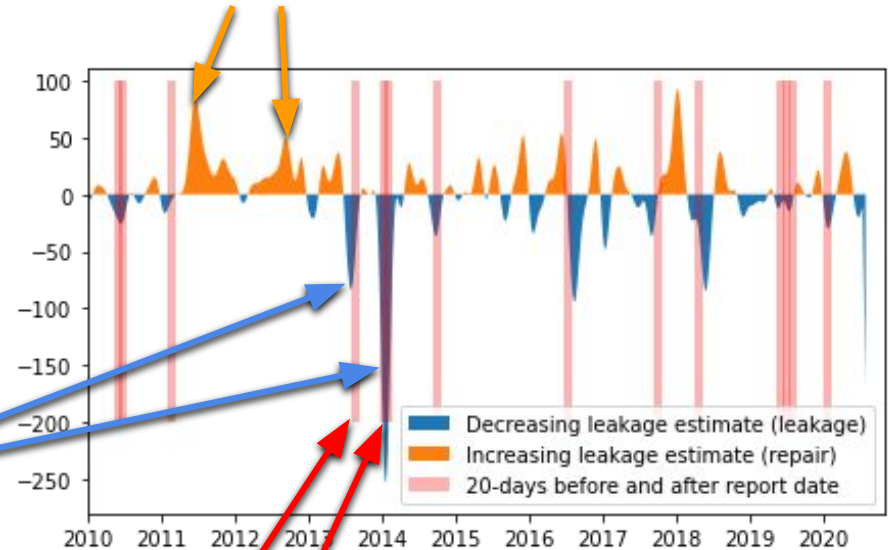
Change in leakage estimate over 10 years

Both models estimated leakages well

- Leakage estimates decreasing in tandem with known leakage repairs
- Other pattern estimates unchanged

**Likely dates of repair
(Estimates)**

Likely leakages (Estimates)



Actual repairs

Conclusions

The fixed pattern is a good latent representation for leakages

Both methods successfully produced desired results using flat pattern constraint

Method worked in two neighbourhoods with very dissimilar patterns

- Residential
- Stable area