CONCRETE USE-CASES WITH REAL-WORLD DATA FOR ENERGY TRANSITION

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Deepki Ready is a SaaS that collects data and provides various tools that allow companies to have a better insight of their real estate and increase their energy efficiency. Deepki Ready relies on a wide range of functionalities: visualizations for exploration and comparison of sites, bill control, prices optimization, real-time alerts, assessment of gains, recommendation of actions...

**DATA @DEEPKI**

FROM RAW DATA TO VALUABLE INFORMATION

1 - DATA COLLECTION

2 - DATA INTEGRATION

3 - DATA ANALYSIS

MULTIPLE SOURCES

RAW DATA

mongoDB

nSQL

influxdb

Time-series

COLLECT AND ANALYZE HETEROGENEOUS DATA

< PATRIMONIAL DATA >

Sites, addresses, surfaces, buildings description...

< ENERGY >

Load curves and gas/water consumption (from annual to fine-grained)

pipes, conduits

< ACTIVITY >

number of occupants/visitors

revenue, equipments...

< OPEN DATA >

weather, opening hours, geocoding, taxes...

WORKING WITH REAL-WORLD DATA : CHALLENGES

QUALITY ISSUES : handling errors and missing values

NOMENCLATURE & STRUCTURE : unifying databases while preserving each domain/client specificities

DEALING WITH DIFFERENT TIMESCALES : static vs. dynamic data, handling updates, optimizing performances for time series

USE CASES

EXPLORE A REAL ESTATE AND PRIORITIZE ACTIONS FOR A BAKERY CHAIN

Understand the issues of a bakery chain, qualify what is a «usual» or «anomalous» behaviour as regards energy consumption, and explain what causes the anomalies.

The median of energy consumption per surface was significantly higher in the third cluster

All batteries from the third cluster were equipped with a kneading machine

Batteries from the third cluster were more likely to have overdoses

Batteries from the third cluster consumed more during off-peak hours compared to the other clusters. We have evidenced their ovens were malfunctioning.

COMPUTE GAINS ASSOCIATED WITH A CHANGE OF EQUIPMENT IN A FACTORY

Determine the counterfactual after changing equipments in order to estimate gains.

ANOMALY DETECTION : REAL-TIME ALERTS IN INTERMARCHÉ STORES

Plug a real-time anomaly detection system to detect electricity overconsumptions due to regulation or equipments issues in an Intermarché store.

Once we corrected for a change in mean, we applied HMM algorithm considering 2 hidden states respectively open vs close.

We were able to distinguish several phases in the time series by crossing hmm results with opening hours

It enables us to detect different kinds of errors, depending on which phase the problem occurred. Here are several examples of over-consumptions during inactivity phases.

IN THE FUTURE

CONTINUOUSLY IMPROVE DATA QUALITY

- Missing data imputation
- Feature engineering : extract the most valuable information from raw data

INCREASE THE ROBUSTNESS OF THE METHODS USED

- Performance analysis of unsupervised methods
- Generalized metrics/processes for continuous monitoring of models’ performances

TAKE ADVANTAGE OF ALL DATA AND MAKE THE SOLUTIONS MORE AND MORE UNIVERSAL

- DKI : across-clients, cross-domains database relying on a unified nomenclature and normalized data
- Inductive/transductive transfer learning : multi-task models, domain adaptation

TACKLE PERFORMANCE ISSUES

- Online methods, cluster computing

CONSULTING

- client-specific methods/analyses
- strong reliance on expert knowledge
- use domain-specific kpis

BIG DATA

- universal models
- reproducible research
- make the most of all data types combined
- knowledge discovery