P29 - Electricity Grid Congestion Manager

A Team of 1st Year Data Science Students

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Tartu

- Electrical Substations [50]
How to solve an ML issue you haven’t faced before?

from sklearn import RandomForestRegressor

model = RandomForestRegressor()
model.fit(X_train, y_train)

predictions = model.predict(X_test)

Google search:
time series modelling if you have little data

About 1,130,000,000 results (0.65 seconds)
HOW TO CHOOSE TRAIN/TEST SPLIT?
Things We Tried for Machine Learning:

→ Models:
  ◆ Random Forest
  ◆ Simple Neural Network
  ◆ Linear Regression (regular, ridge and ElasticNet)
  ◆ AR(I)MA - autoregressive integrated moving average
    ● Combined similar charging stations into “one” to create longer time series.

→ Features:
  ◆ # of connected home charging stations
  ◆ # of connected public charging stations
  ◆ Coordinates
  ◆ Hour of the day
  ◆ Previous values
  ◆ Baseload
  ◆ Max current
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➡️ **Models:**
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Few examples of performance on test set

Test substation #1

Test substation #2

Test substation #3
Smart charging

Reduce current for chargers when overload was predicted.

➔ 68/121 overloads were prevented on test set
➔ In other cases our throttling was not enough (or overload was not detected)
Things We Tried for Visualisation:

**Experimental phase**

The regular ol’ Matplotlib!

ggplot2!

**We need a map…**

Geopandas and folium?

R and Leaflet?
Time for a Shiny Dashboard!

https://ilmaru.shinyapps.io/dashboard/
That's all Folks!
Links

Github Repo - Electricity Grid Congestion Manager

Shiny Dashboard
Data Exploration!

The base loads of different electrical substations around Tartu

The loads created by EV charging in different electrical substations