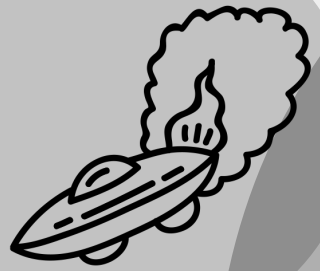


Take a deep breath?

Friday, March 18th 2022

The Team

Filip Rankovic
Mathematics and Economics

Fresh out of university and interested in Data Science for Good

Johannes Herbig
Materials Science

5 years of experience in materials research and drone development

Dr. Kirsten Sunder
Materials Physics

7 years of experience in research & development and project management

Nicole Stijfhals
Industrial Engineering

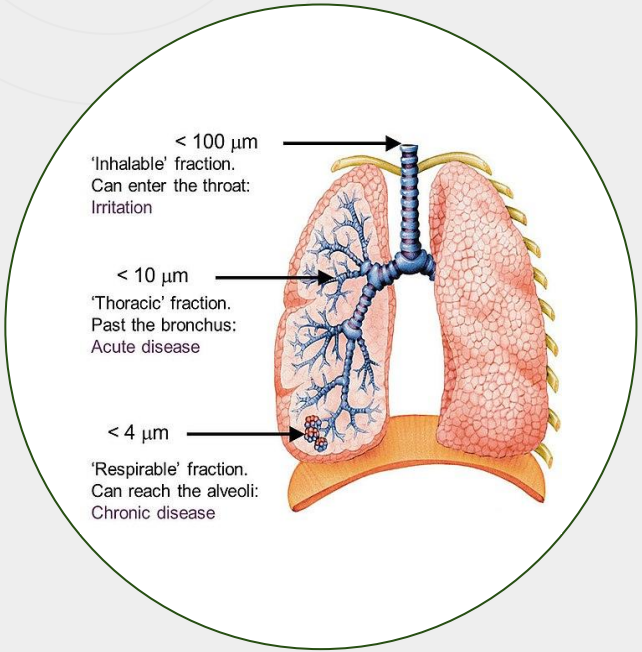
10 years of experience in IT-Consulting and Business Intelligence

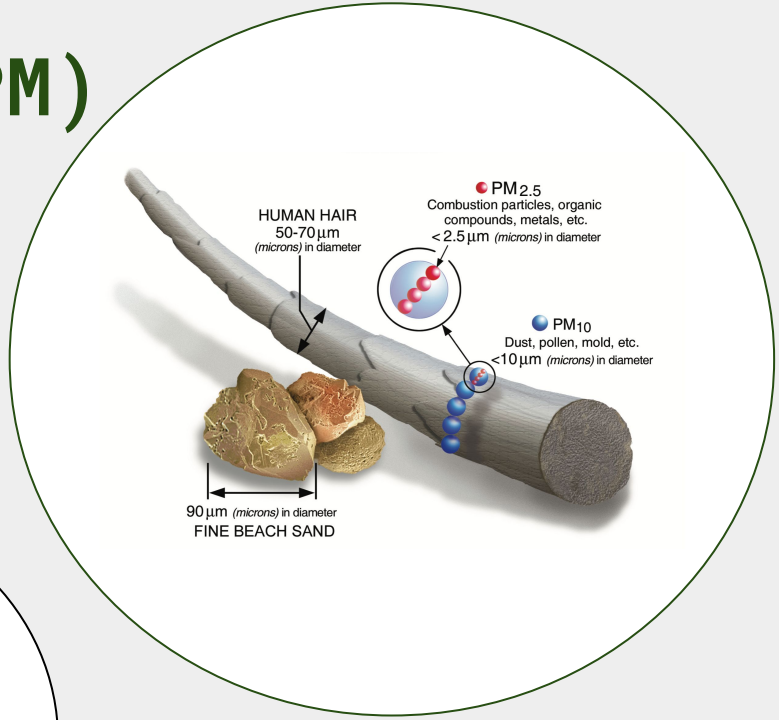
1

The Problem

> Outdoor air pollution was estimated to cause 4.2 million premature deaths worldwide in 2016 alone.
>
> **-WHO**

Particulate Matter (PM)





Permitted daily limits

PM_{10}: 50 µg/m³
(may not be exceeded more than 35 times a year, permitted annual mean value: 40 µg/m3)

$PM_{2,5}$: 25 µg/m³

2

The Solution

Particulate matter prediction

Take preventive measures

Time-limited bicycle paths

Exclusive bus lanes

Prohibition of air polluting cars

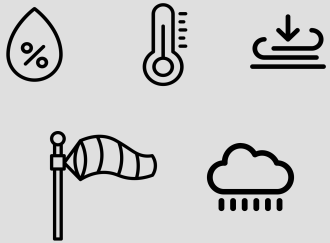
Reduction of industrial pollution

Inform the public

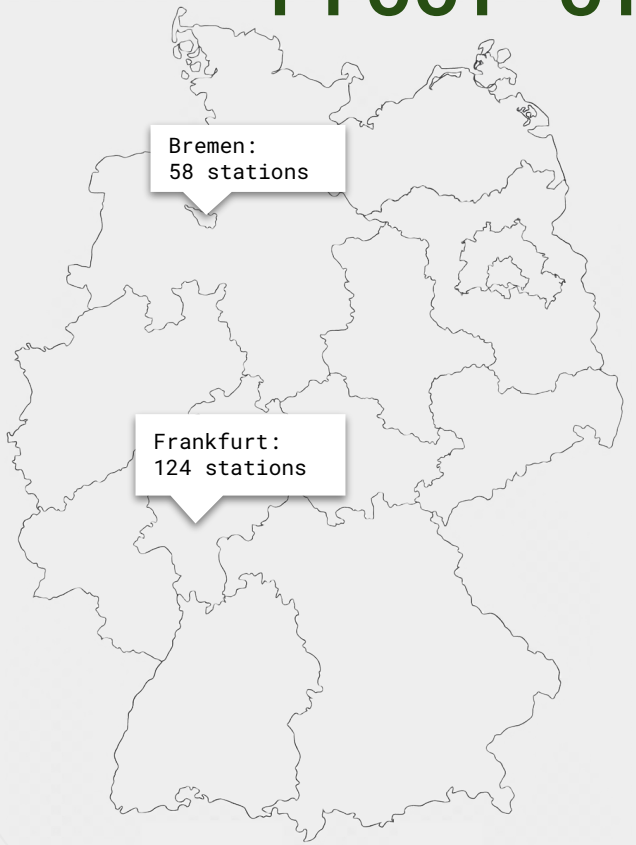
3

The Data

Data Sources for Germany

Source?	Sensor Community	Deutscher Wetterdienst	Meteomatics
What?	Historical-Current Weather data  Particulate Matter  $PM_{2.5}$ PM_{10}	Historical-Current Weather data 	Future Weather data 
How many?	~5500 stations ~Every 5 min	~500 stations Every 10 min	Any location Per Hour

Proof of concept



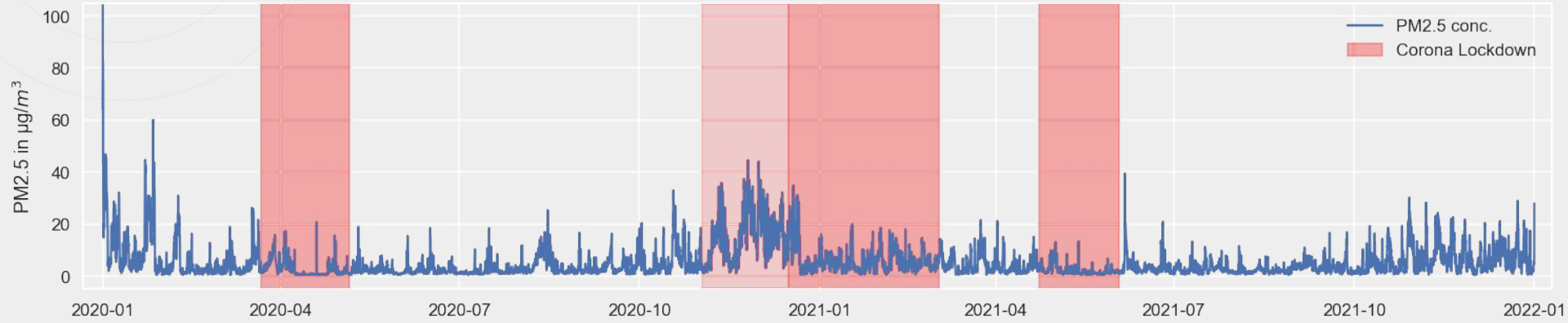
PM prediction for 2 cities

- Geographical domain knowledge
- Different climates
- Relatively high dispersion in pollution values

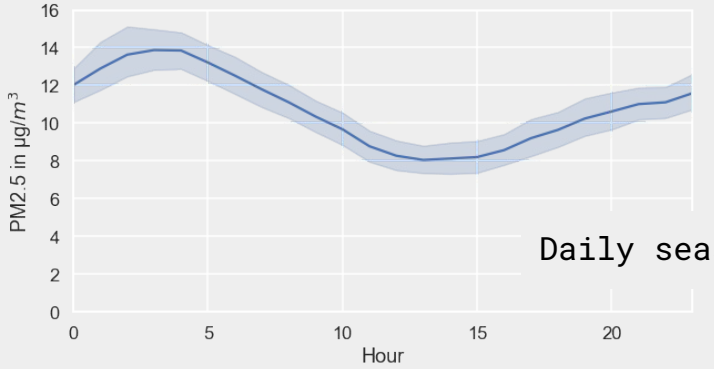
Time range

- 2 years for model training
- 2 month of testwise prediction

Exemplary $PM_{2.5}$ concentration



2 years of training data

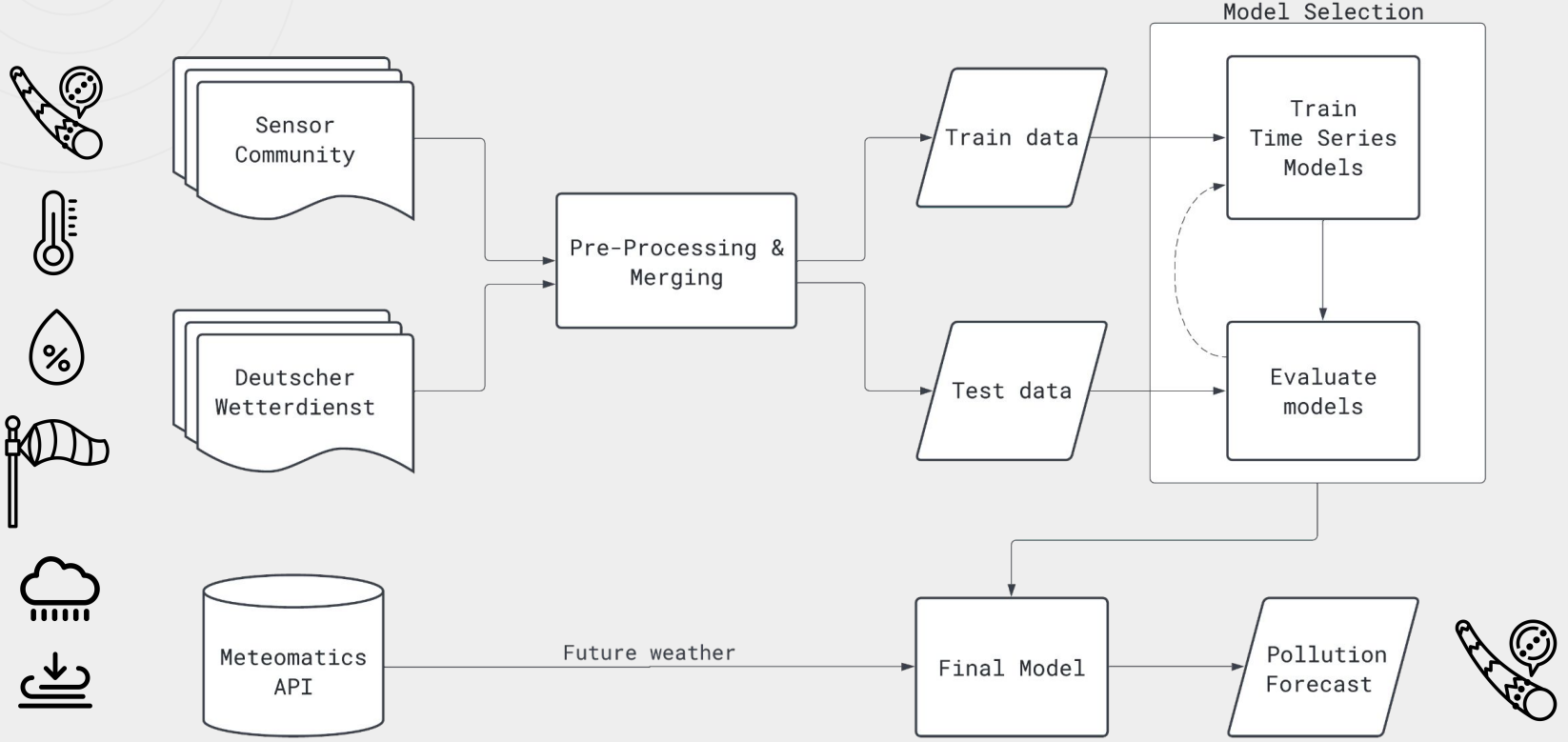


Daily seasonality

4

The Approach

Workflow



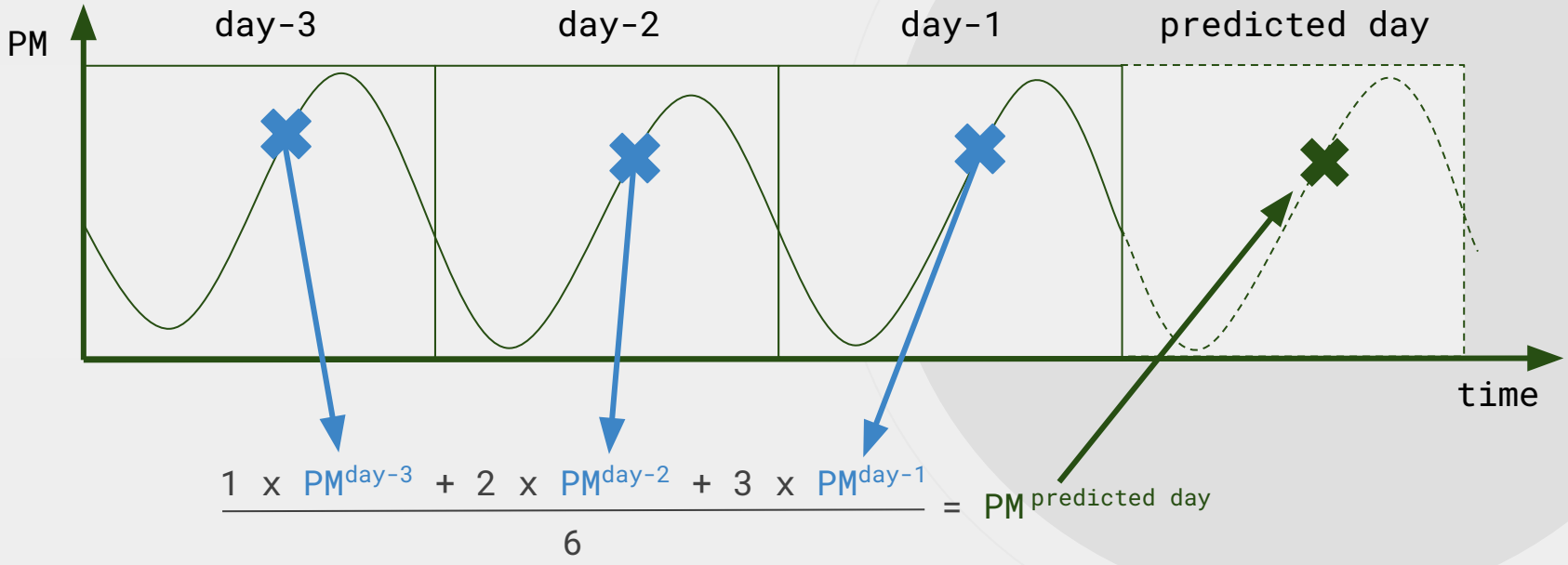
Icons from thenounproject.com

5

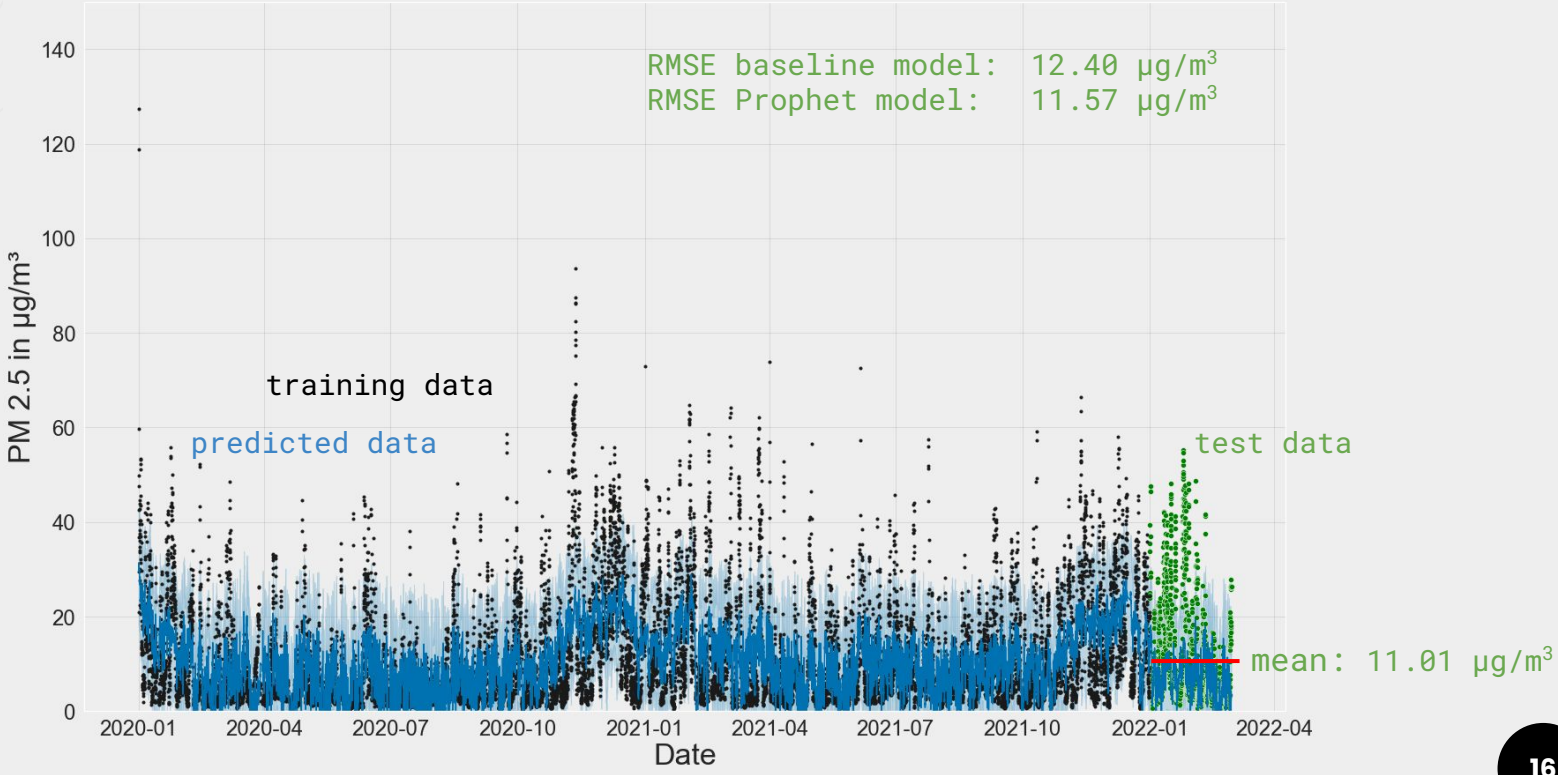
First Results

Baseline model

Assumption: PM values comparable to the three days before



Time Series Analysis with Prophet



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Next Steps

Next Steps

- Further tuning of Prophet model
- Create second Time Series model for comparison
- Predict future air pollution based on weather forecast data
- Visualize different locations on map