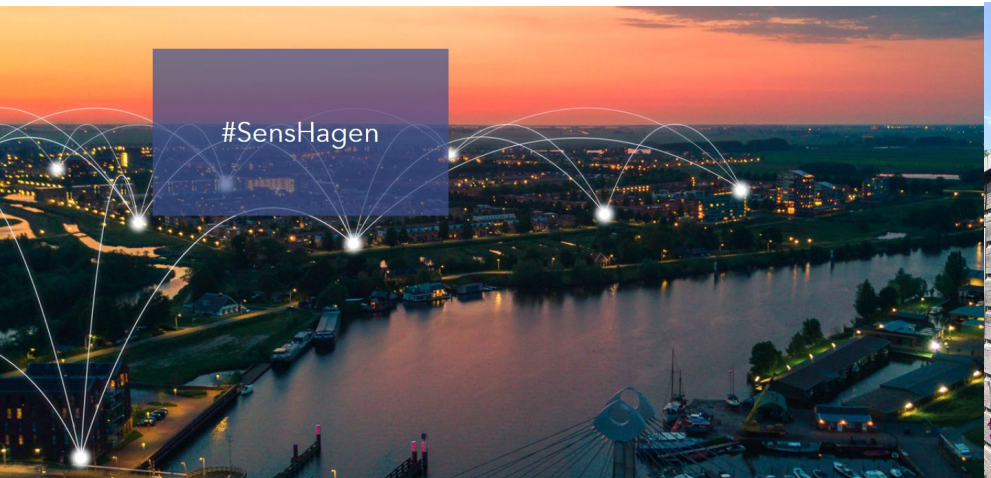
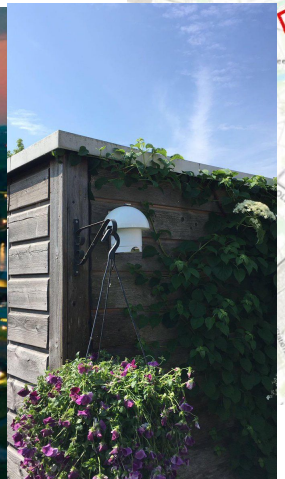
The challenge

Exploring future possibilities and verifying results from the SensHagen citizen science pilot project. Specific interest lay In:

- The data measured by citizens can be used as ground truth for satellite data
- If the pilot can be scaled up to cover the whole municipality using satellite data.





Team members

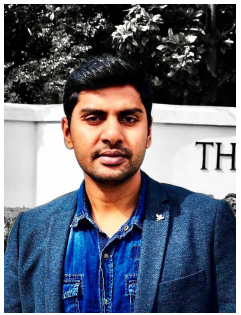
Management and business

Elaine - Strategy and Business Development (expertise in space sector)

Diego - Business Developer / Marketing

Science and tech

Sehan- GIS/AI

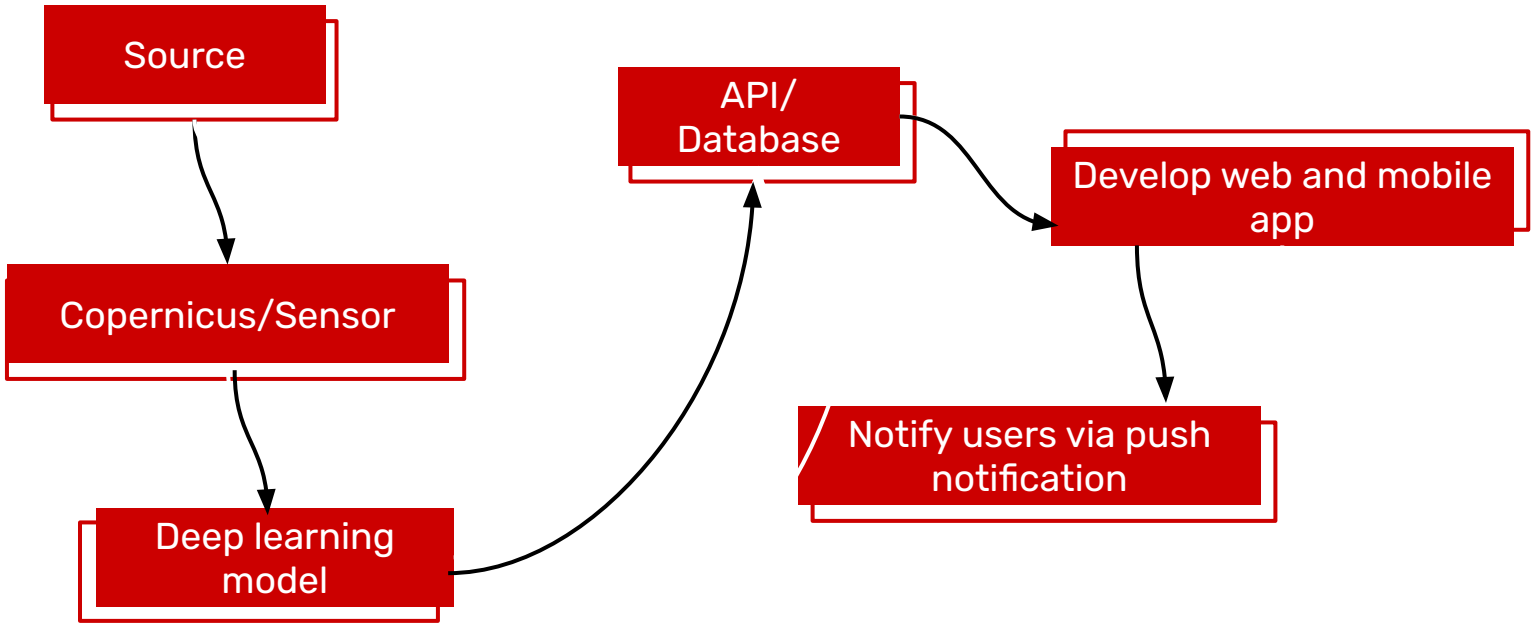


Mahabir- Software Developer

Harman - GIS

Yuan - GIS

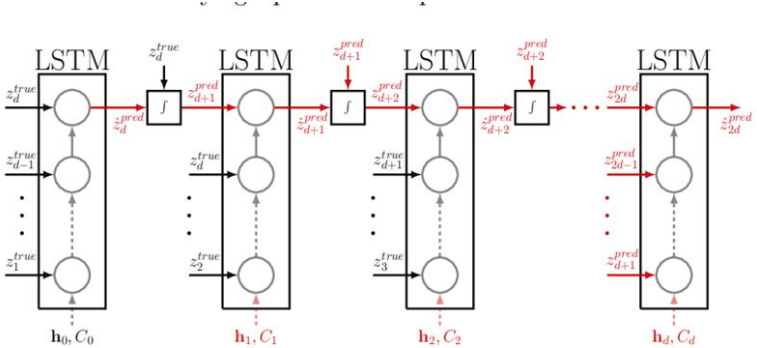
Our approach

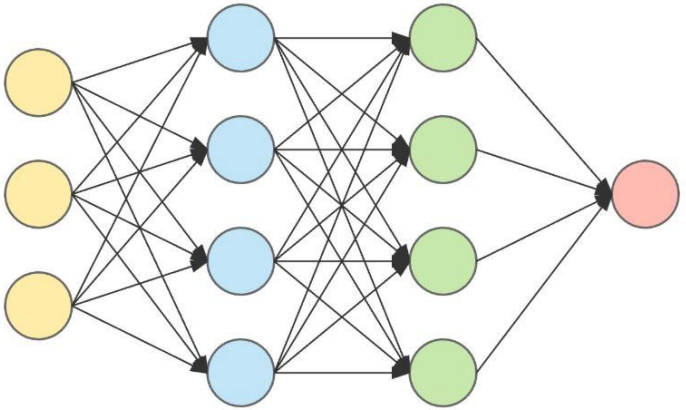


Our approach - The deep learning model

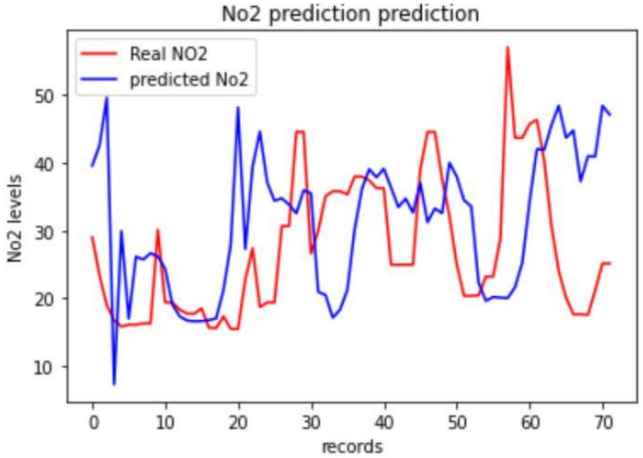
Following are the step to use generate AI model:

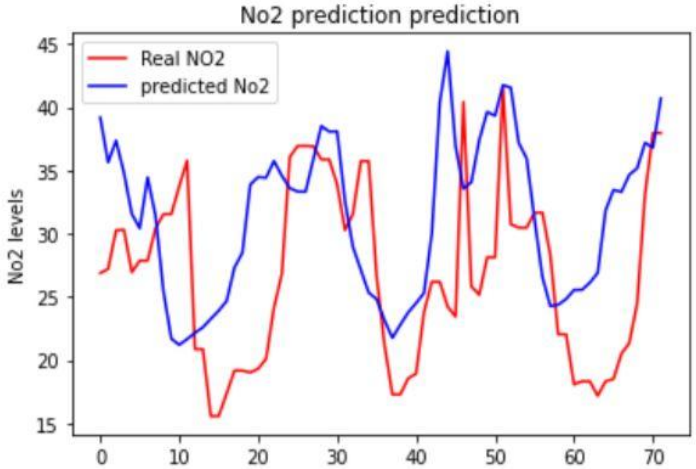
- Step 1 : Using senshagen data to make predictions for the senshagen pilot region (prototyped)
- Step 2: Combining senshagen and sentinel 5P data to make estimations for the region of zwolle
- Step 3: combining step 1 and 2 to make future predictions for the whole of zwolle

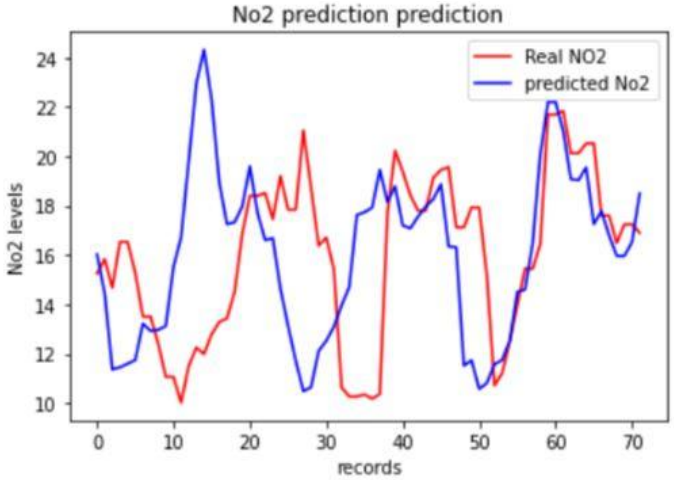




Step 1: Prototype results



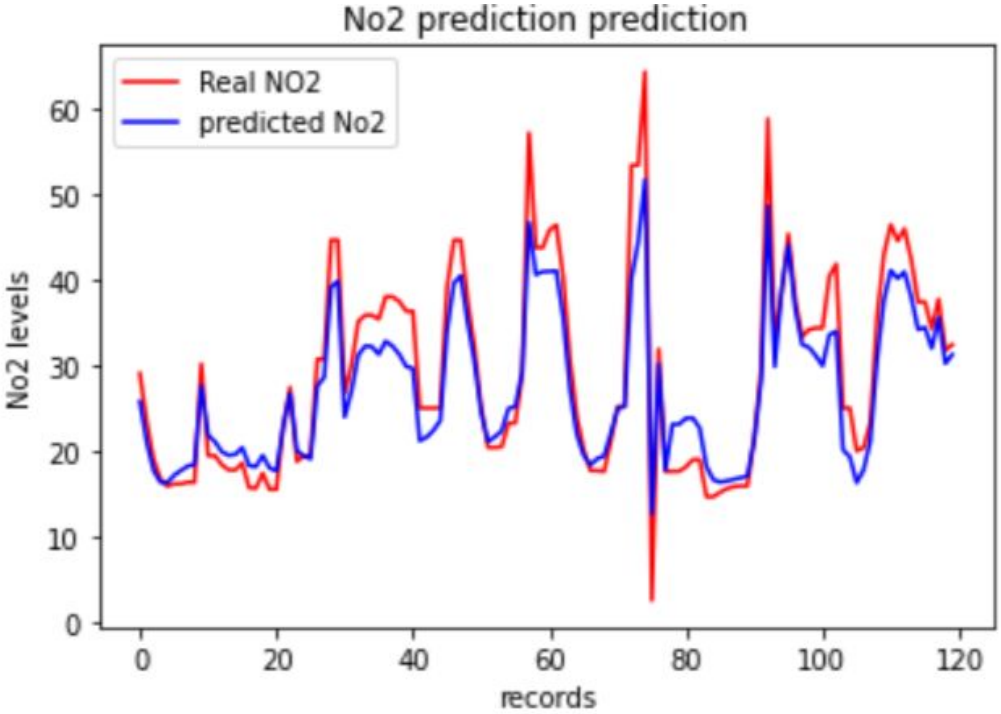




- Sensor 1 loss: 0.42% (top left)
- Sensor 2 loss: 0.19% (bottom left)
- Sensor 3 loss: 0.35% (top right)

Note: the sensors for NO2 record data hourly/

Step 1: Prototype results



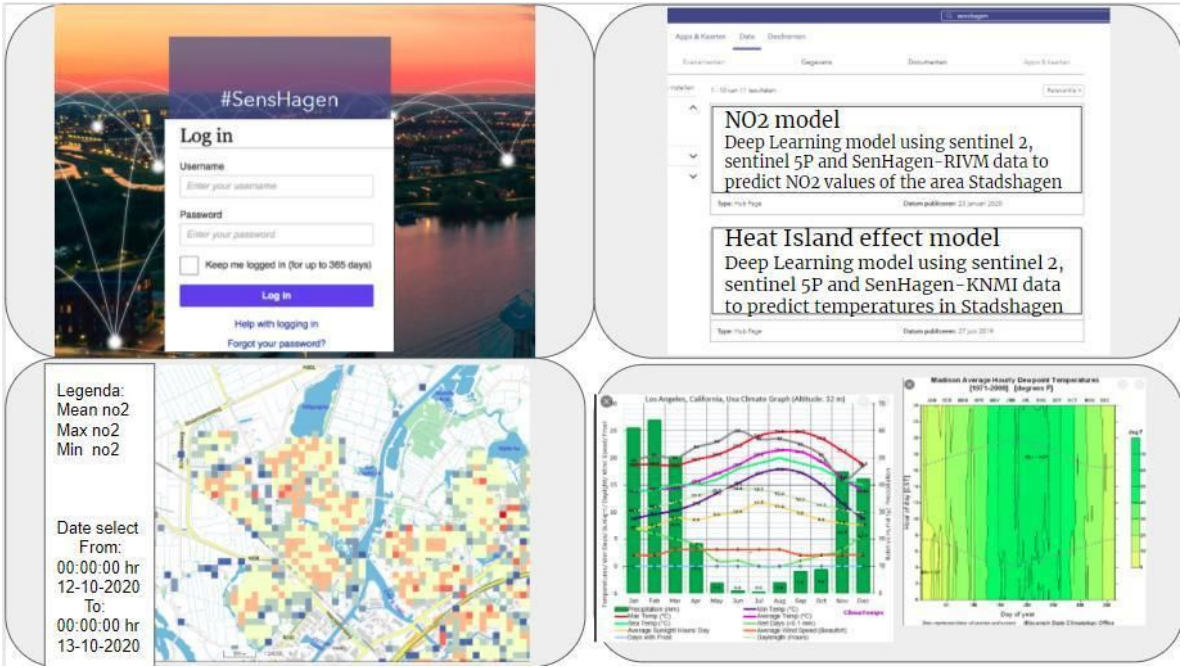
- Sensor 1 loss: 0.44% (top left)

What we propose

Create an AI model (using both SensHagen and Copernicus satellite data) that provides future ongoing measurements and the capability to predict future air quality within the city of Zwolle.

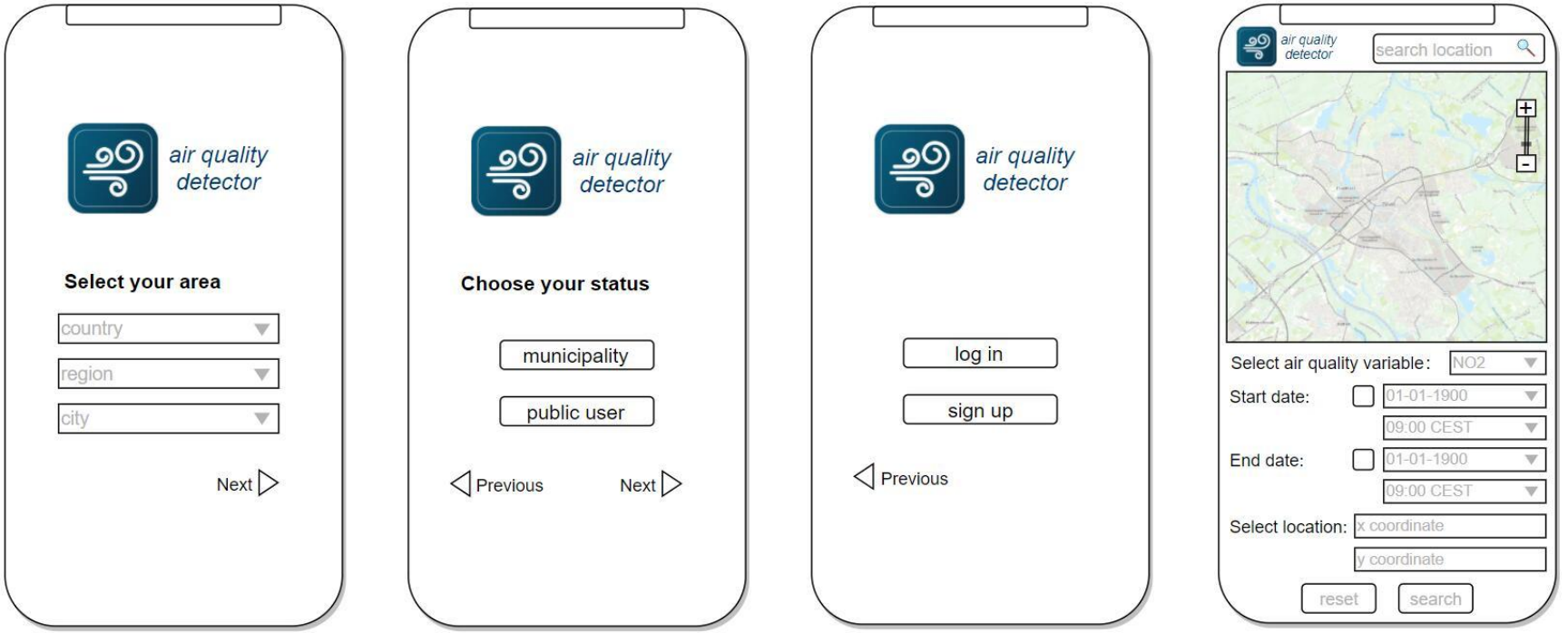
In particular, our AI model will:

- Give insight into the spatial and temporal fluctuations of emissions
- Predict areas that are most prone to hazardous values
- Function with a sparse sensor network.



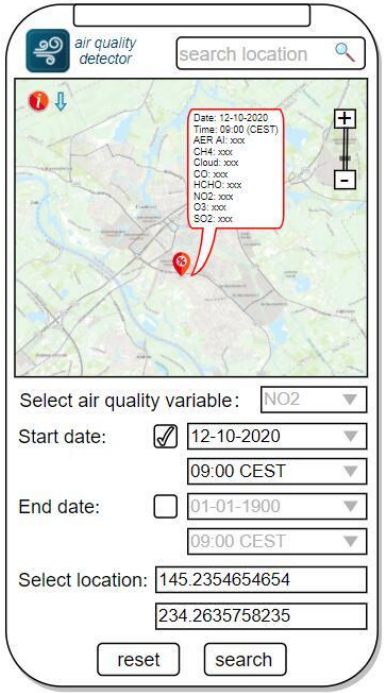
Mobile App Dashboard

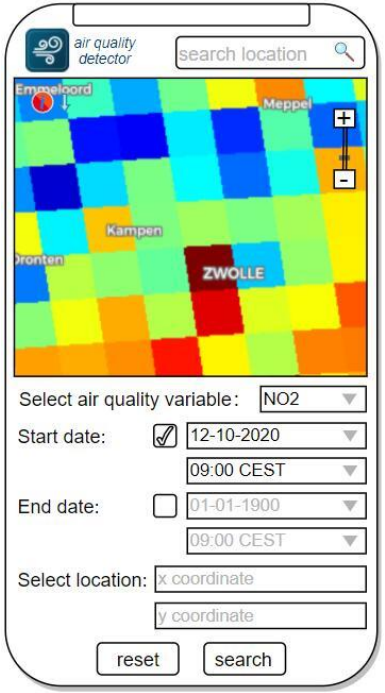
(Website Dashboard is designed in the same way)

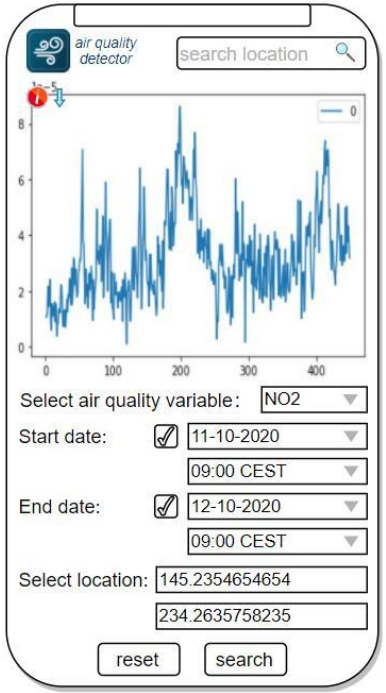


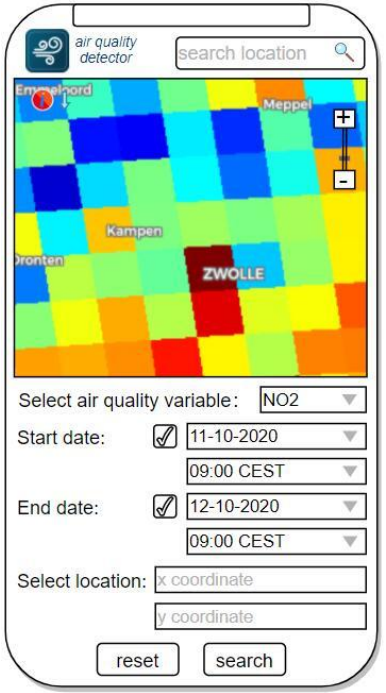
Scenario 1: show the overall air quality at exact location and time
Scenario 2: show an exact variable of air quality criteria across a region at an exact time
Scenario 3: show the time series of a certain variable of air quality criteria at an exact location
Scenario 4: show the dynamic change of a certain variable of air quality criteria in a region during a period

Note: for each scenario, there are icon 'i' and '↓' on the left-up corner of the screen, and they represent respectively reporting errors and downloading data.

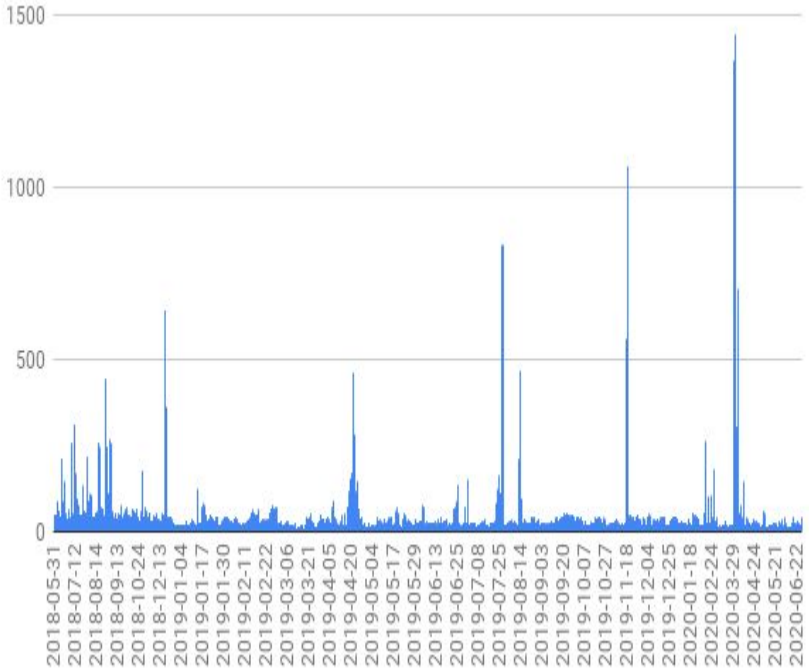




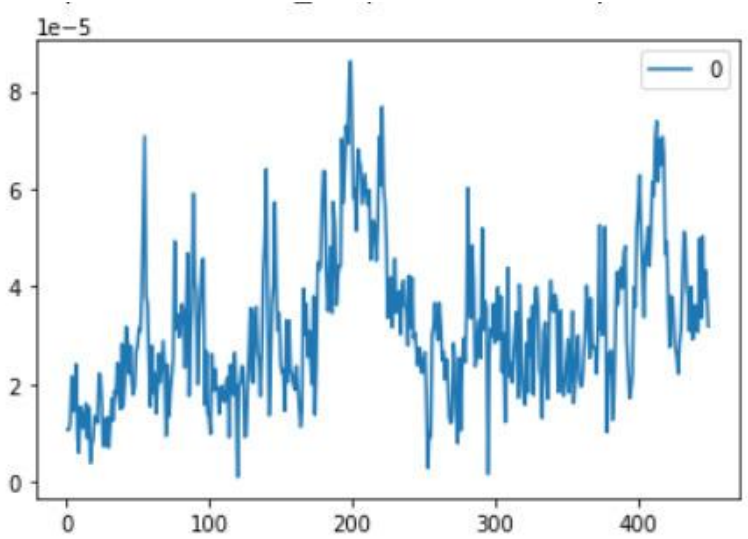




No2 Visualization based on date using Sensor data



No2 Visualization based on Satellite data



Why is our solution innovative?

There is a strong market demand around the world for better monitoring solutions climate variables.

In short, our model:

- Utilizes AI; accounting for factors that otherwise people might miss
- Integrates sensor data and satellite data
- Can predict climate variables for the whole of zwolle with limited sensor data
- Offers considerable cost savings in terms of installation and sensor maintenance

Potential Uses

- Provide **support for policy decisions** regarding climate action:
  - Urban planning
  - measure effectiveness of green initiatives at the local level
  - identification of neighbourhoods to target for mitigation measures

- Facilitate **monitoring, regulatory, or enforcement** purposes:
  - by looking forward via prediction capability
  - by backtracking air pollution data

- **Showcase city** as a climate-smart leader

- **Support scientific research** into climate change impact on air quality at a more granular level

- Guide planning, identify objectives and **empowering private actors**:
  - identify technical standards, target areas, etc. for citizen science
  - can be used by citizens or industry to take mitigation action

Potential Stakeholders

Our tool is intended for the **Municipality of Zwolle as the primary user**

If the Municipality makes the output publicly available, **other stakeholders** could include:

- Dutch national governmental agencies responsible for air quality (eg. KNMI, RVO, lenW)
- Other municipalities in the Netherlands (and elsewhere)
- Research institutions
- Citizens of Zwolle

What is the added societal and economic value?

Well informed decisions based on air quality monitoring can lead to:

- ✓ improving the health of the population
- ✓ reducing damage to crops, forests, ecology, building and other materials

Recent studies show **improvements in air quality are also associated with economic growth**

A **2017 EC report** assessed the costs, benefits and economic impacts of the latest clean air strategies:

- ➔costs associated with lost working days to fall from €18.5B/yr (2005) to €8.5B/yr (2030)
- ➔benefits from revised emission ceilings to exceed costs by a large margin
- ➔valuation of mortality led to benefit:cost ratios of between 14 and 50
- ➔Emergence of strong domestic markets

Future Roadmap

- Implement step 2 and 3 of the deep learning model
- Add more data and variables in the AI model to get better accuracy
- Develop highly scalable AI model to support new places
- Interactive Dashboard for the stakeholder which supports decision making

GitHub Link

https://github.com/yttehs123/Coppernicus_project_zwolle

Copernicus
Europe's eyes on Earth

AZO
Space of Innovation

AeroVision

thuis

Zwolle

SINERGISE

overstory

WAGENINGEN
UNIVERSITY & RESEARCH

ramani

NEO
Uw informatie in beeld