Project proposal

Suitable location prediction for solar farms using NN

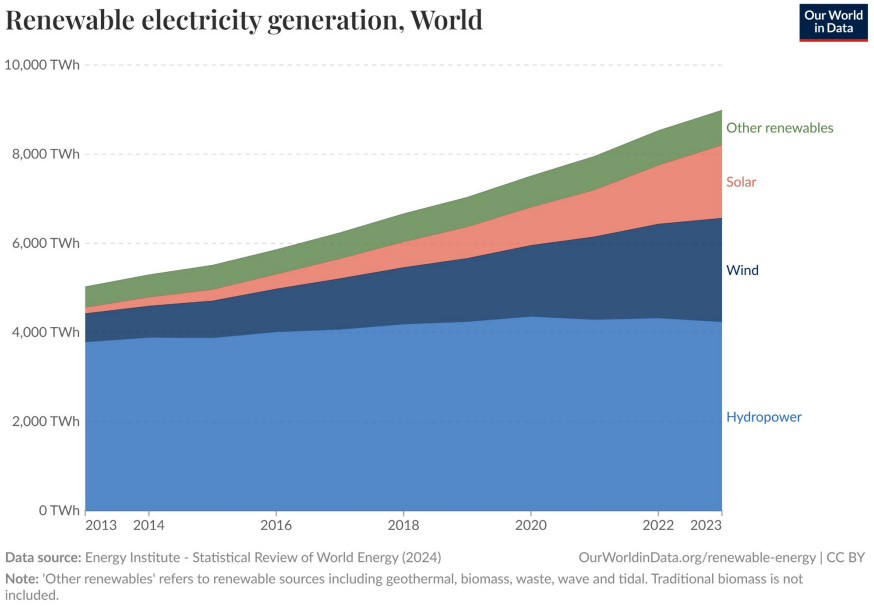
Motivation

Evolution towards renewable energy:

- Global production of solar increased
- Easiest way to increase more is solar farms

Manual finding of suitable locations:

- Slow and costly
- Not always a suitable location.



Solar farms location - influences

1. Solar irradiance

2. Land suitability

3. Grid connectivity

4. Weather and climate

5. Regulations and incentives

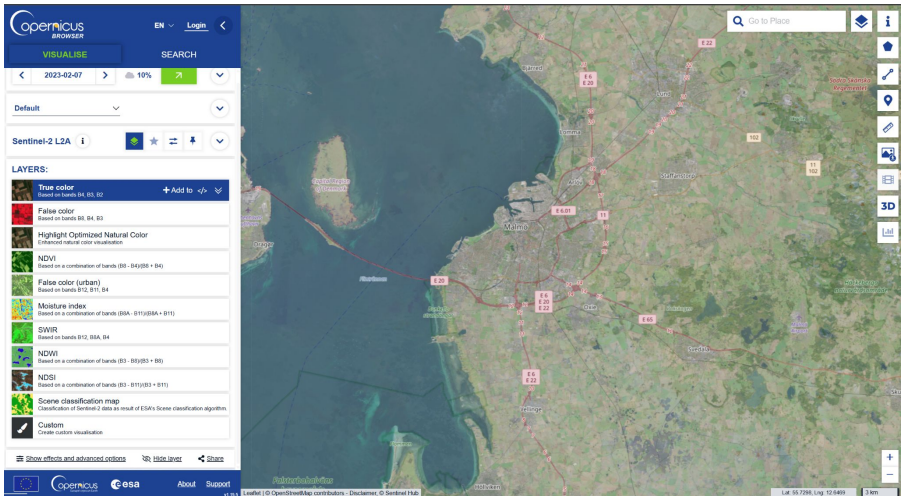
Data - Land suitability

Copernicus Browser:

- Visualisation of sentinel satellites
- allows to retrieve this imagery

Retrieving what data:

- Satellite image via Querying:
  - Via API
  - Via Request



Data - Grid Connectivity

OpenInfraMap:

- Visualization of electronic infrastructure
- Data collected from OpenStreetMaps

Retrieving what data:

- distance to closest powergrid
  - Querying through the overpass API

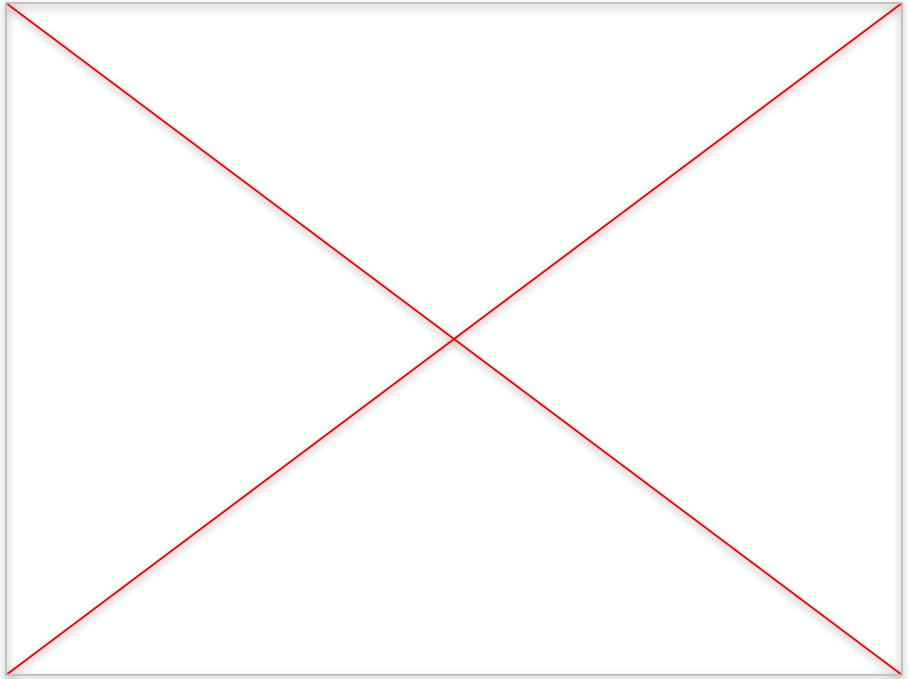
Data - Solar irradiance

Solcast:

- solar API:
  - Weather and Irradiance

Retrieving what data:

- Global horizontal irradiance (GHI)
  - Irradiance over a horizontal surface



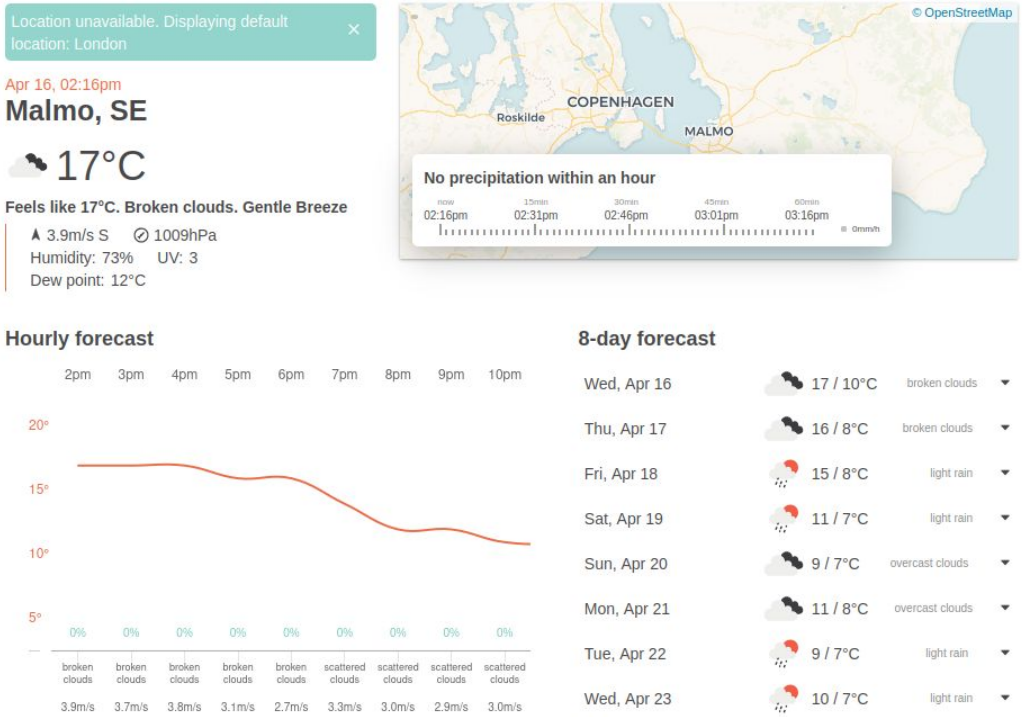
Data - Weather

Openweathermap:

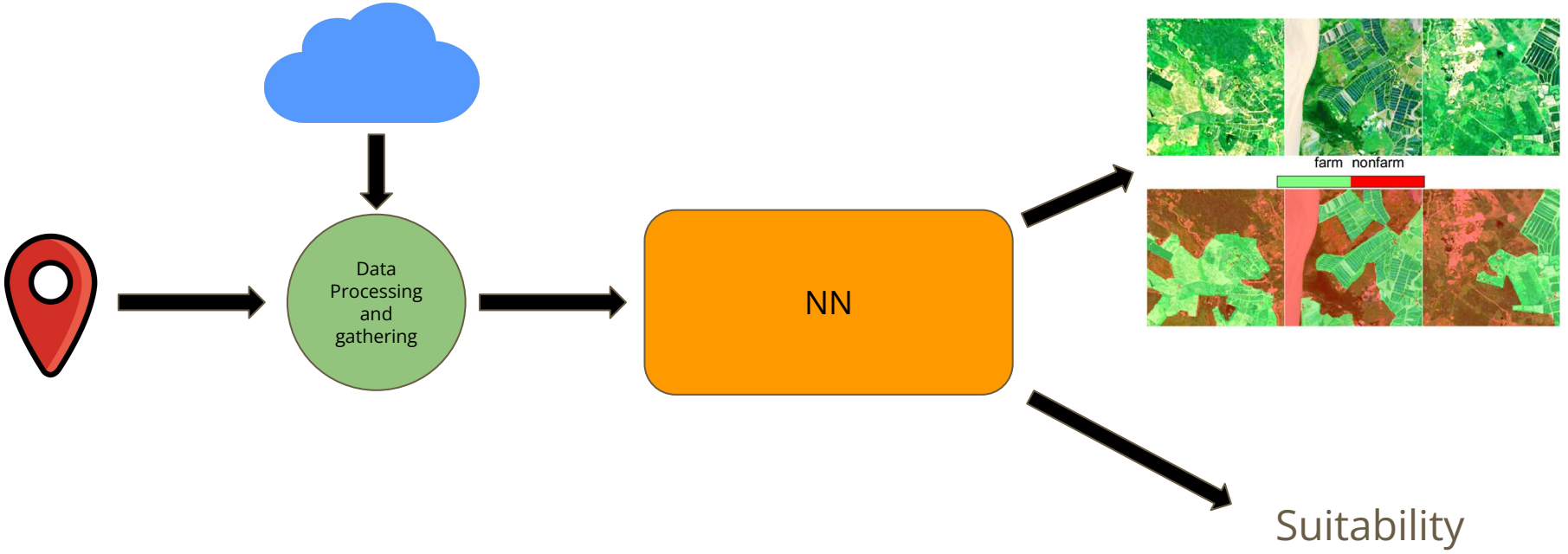
- A weather API

Retrieving what data:

- temperatures
- cloudiness
- rain
- fog



Method

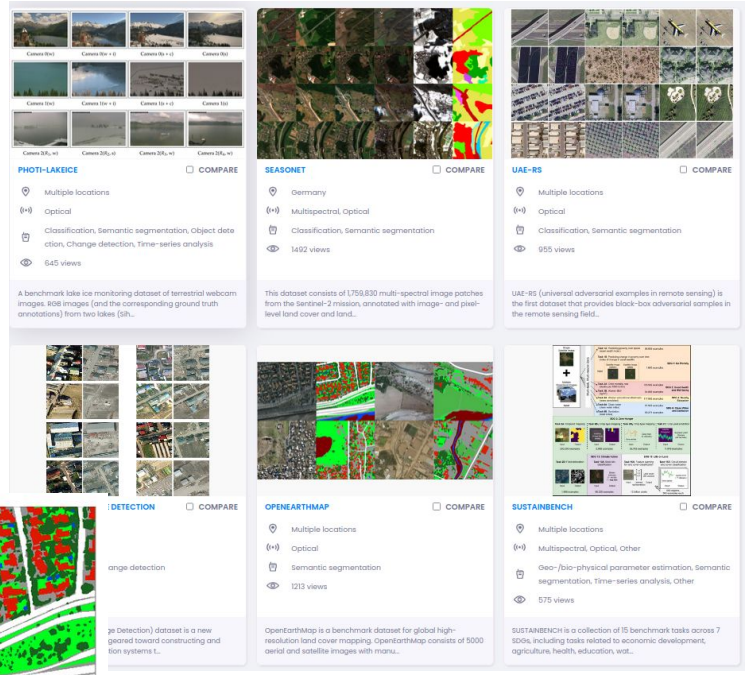

Data Processing and gathering
NN
farm
nonfarm
Suitability

Dataset

[Semantic segmentation of aerial imagery]

[SEN12MS]

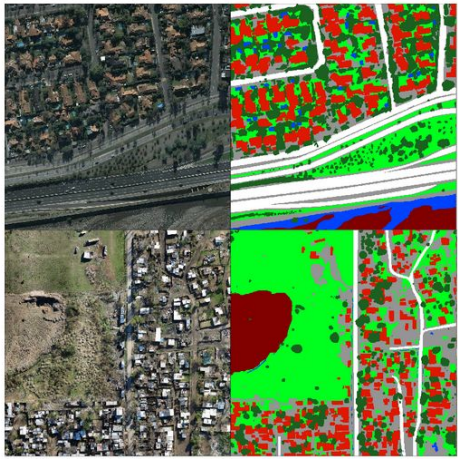
[open-earth-map]



Classes and Annotations

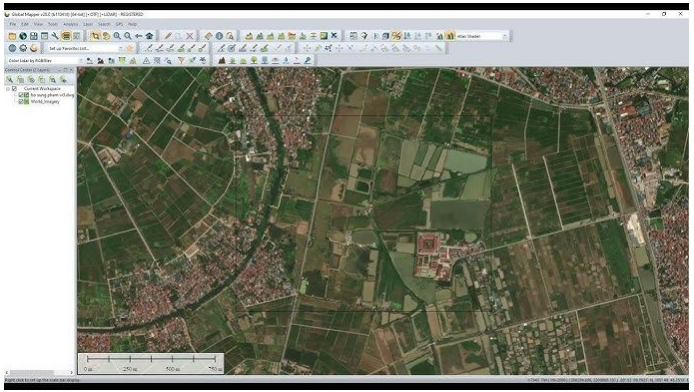
We provide annotations with eight classes: bareland, rangeland, developed space, road, tree, water, agriculture land, and building. Their color and proportion of pixels are summarized below. All the labeling was done manually, and it took 2.5 hours per image on average.

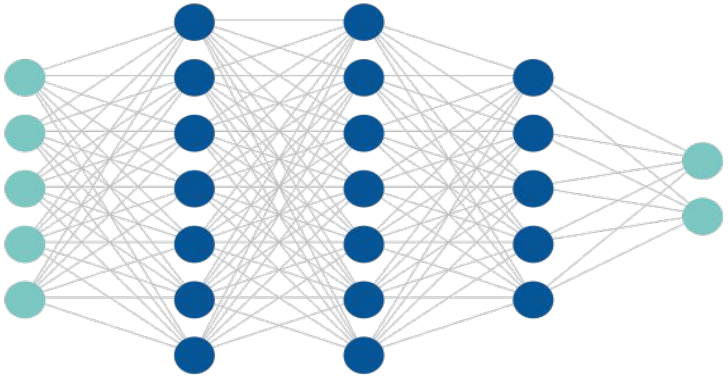
Color (HEX)	Class	%
800000	Bareland	1.5
00FF24	Rangeland	22.9
949494	Developed space	16.1
FFFFFF	Road	6.7
226126	Tree	20.2
0045FF	Water	3.3
4BB549	Agriculture land	13.7
DE1F07	Building	15.6



Evaluation

- comparison with already existing models
- qualitative evaluation
- zero suitability cases (like antarctica or jungle)





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State of the art

Solar power prediction based on Artificial Neural Network guided by feature selection for Large-scale Solar Photovoltaic Plant

Short–mid-term solar power prediction by using artificial neural networks

Spatial modelling the location choice of large-scale solar photovoltaic power plants: Application of interpretable machine learning techniques and the national inventory