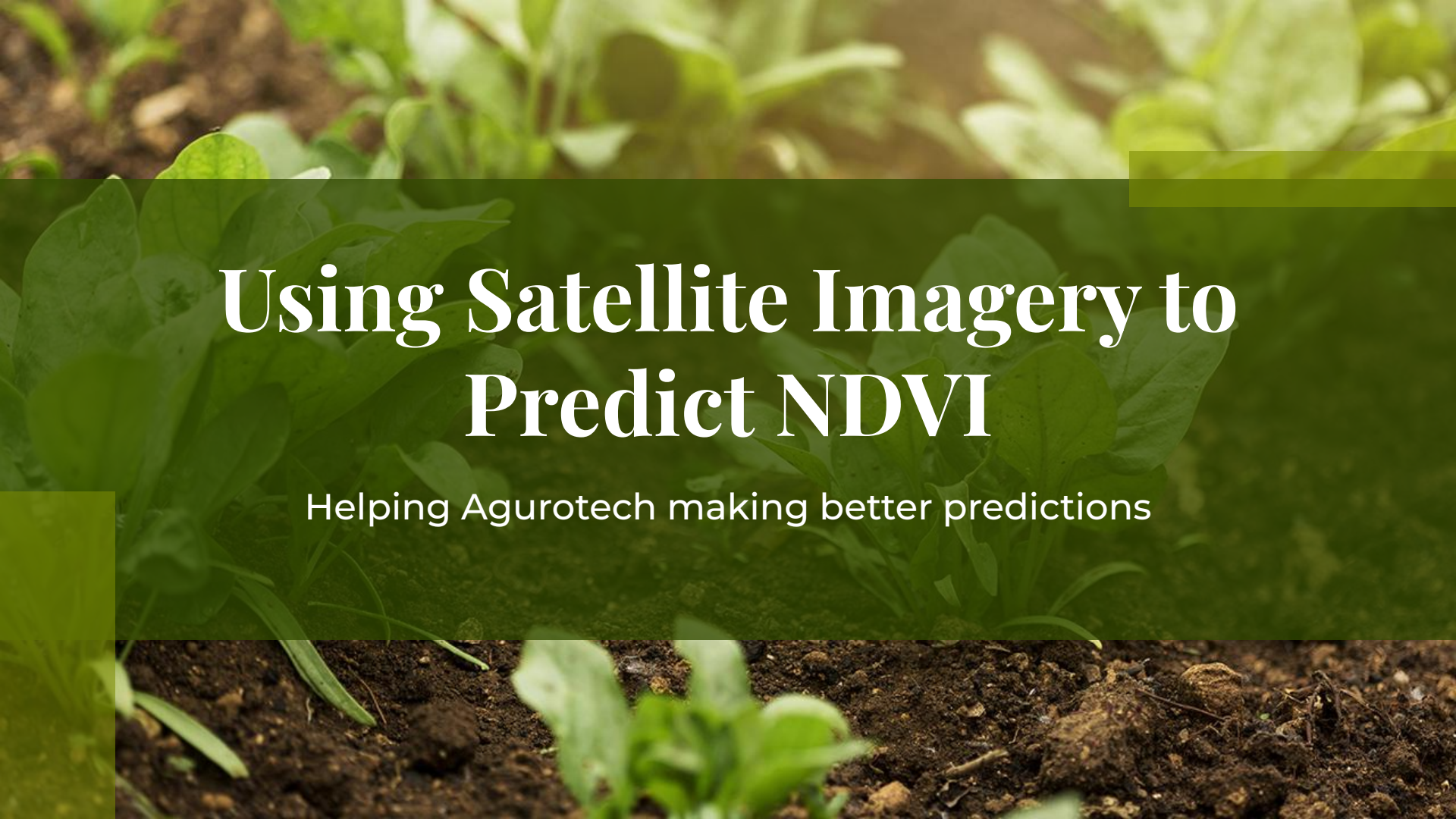


Using Satellite Imagery to Predict NDVI

Helping Agurotech making better predictions

Table of contents

01
Introduction

Problem statement &
research questions

AguroTech

Making farming more sustainable by making more efficient data-driven decisions.

- Minimize waste
- Less water use
- Efficient use of pesticides

Problem Statement

- Take precision farming to the next level by including satellite imagery into existing models.

- Making more accurate predictions
- Give better advice to farmers

- This project aim to predict the NDVI for the next 14 days.

Research Questions

Main

How can satellite imagery be used to Predict NDVI?

Sub-question

How to collect (historical) data?

Sub-question

What model performs best for predicting NDVI?

02. Data

How/what data to gather
to build a model?

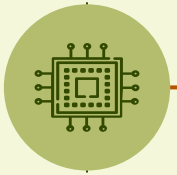
Data Collection Process Vegetation Indexes

API-Request

Make API request to sentinel data

Vegetation Indices

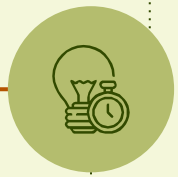
Only statistics on vegetation indices are saved



EDA

Filter bad quality data + interpolation

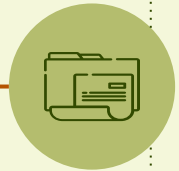
Save the data



Data Collection Weather Data

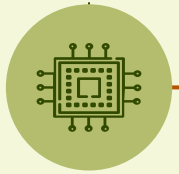
API-Request

Make API request to Meteostat



Weather Data

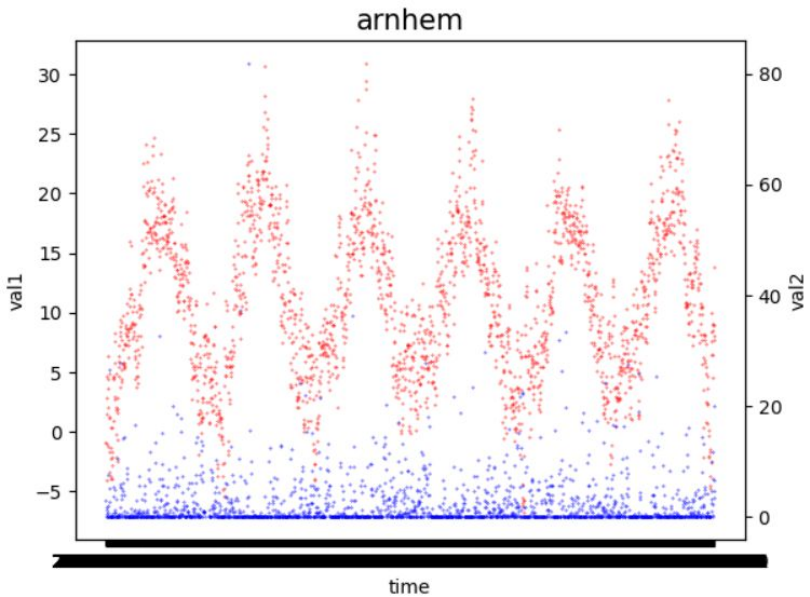
Only relevant statistics are kept

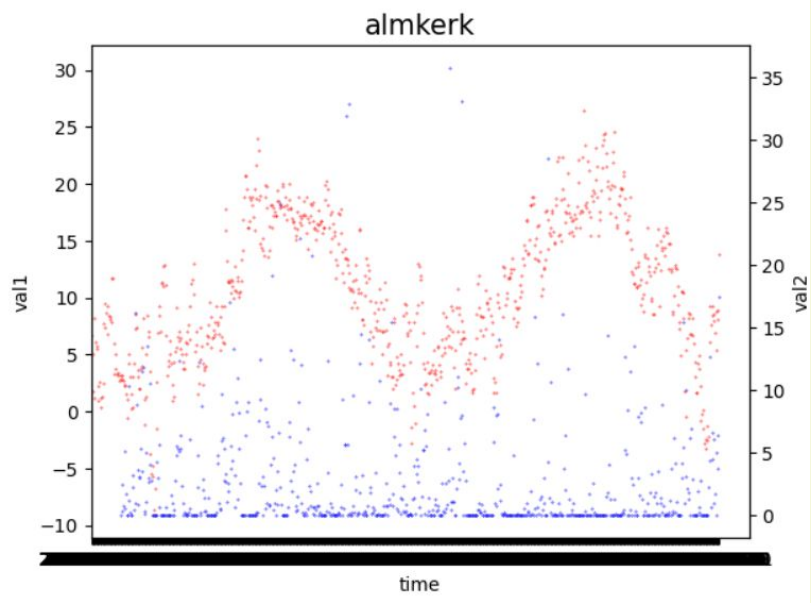


Combine with Satellite data

Filter bad quality data

Data Collection Weather Data





03
Models

Models used and performance

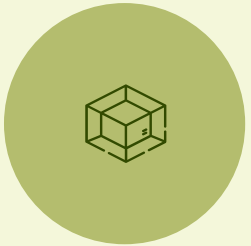
Models Used

TCN

Temporal convolution network

Prophet

Trend analysis



LSTM

Long short term memory

Model performance

Model	Description	RMSE
Prophet 	Trend Analysis based on NDVI	0.14*
TCN 	Dilated, residual blocks with multiple variables	0.12
LSTM 	RNN capable of learning sequence (time) data	0.72

* Average RMSE for all polygons

Temporal Convolution Network (TCN) model

TCN Model

Sliding window take historical data to predict 14 days in advance

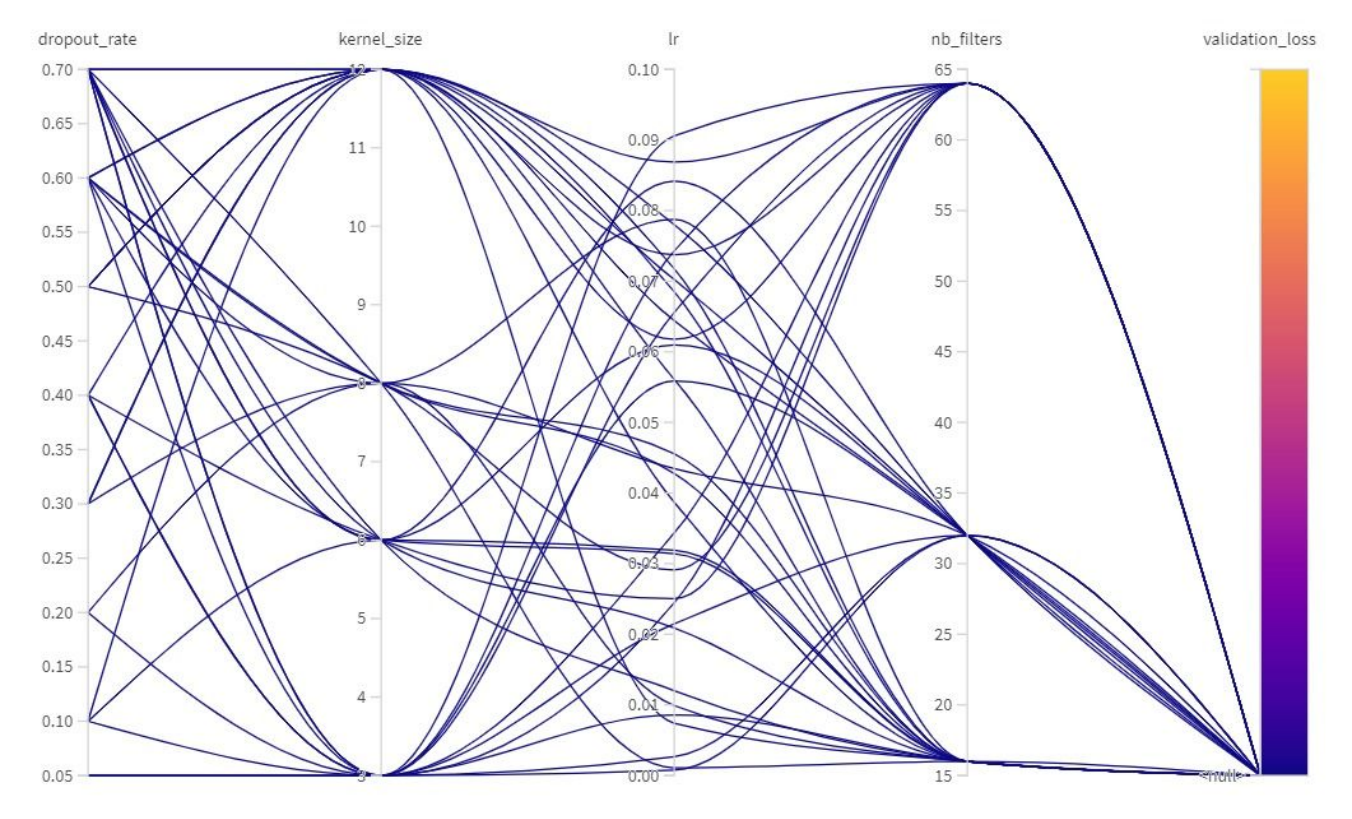
Weights and Biases

Hyperparameter optimization through sweep

Performance

Validation RMSE error of 0.12

Optimization TCN



04
Conclusion

Live Demo

Returning to the research question

Main-RQ

How can satellite imagery be used to Predict NDVI?

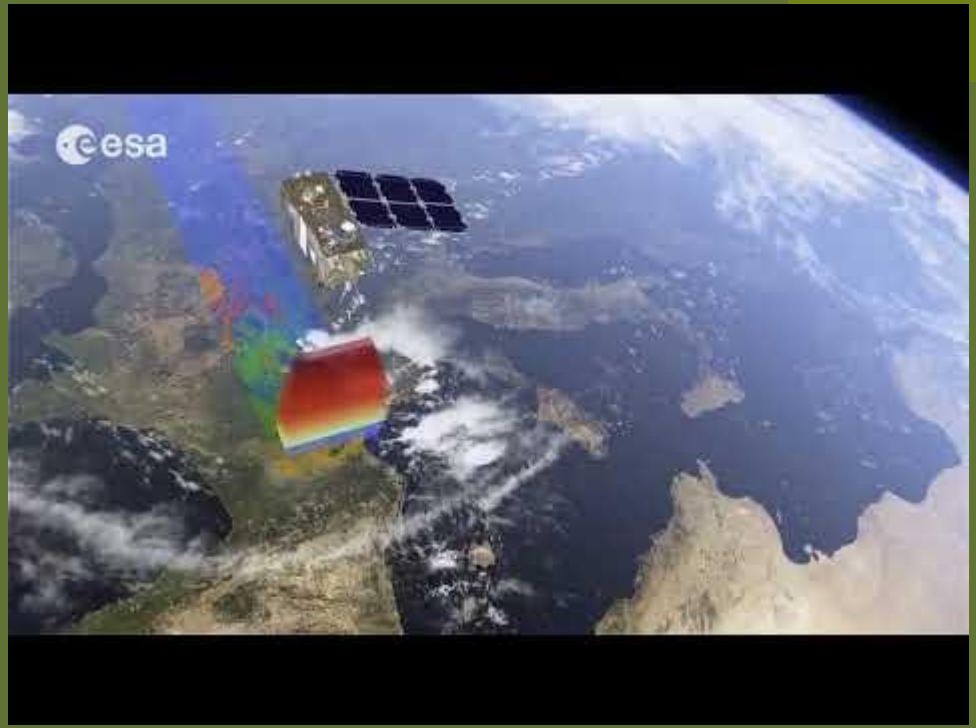
Collecting Data

- Sentinel API
- Weather API

Model

- 3 models tried
- TCN gave best results

05.
Teaser Video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