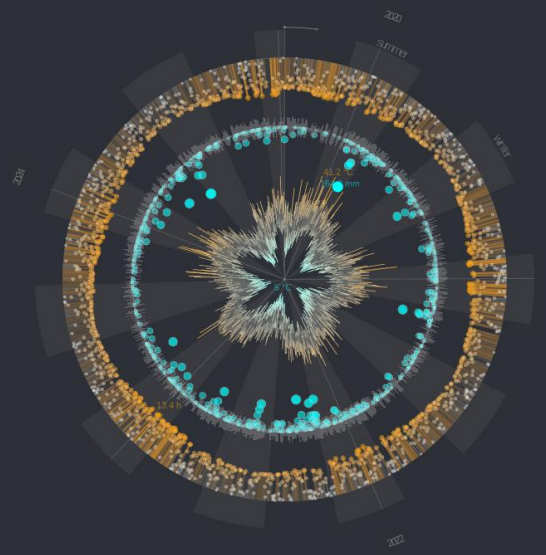
Rain Forecast Dashboard

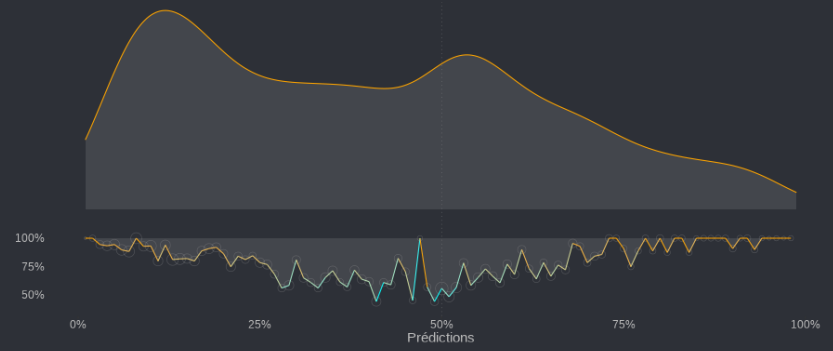
The Project

The Rain Forecast dashboard is part of a project that started in 2020.

An AI model (Machine Learning) was then trained on a 140k dataset provided by the Australian Government BOM (Bureau of Meteorology).



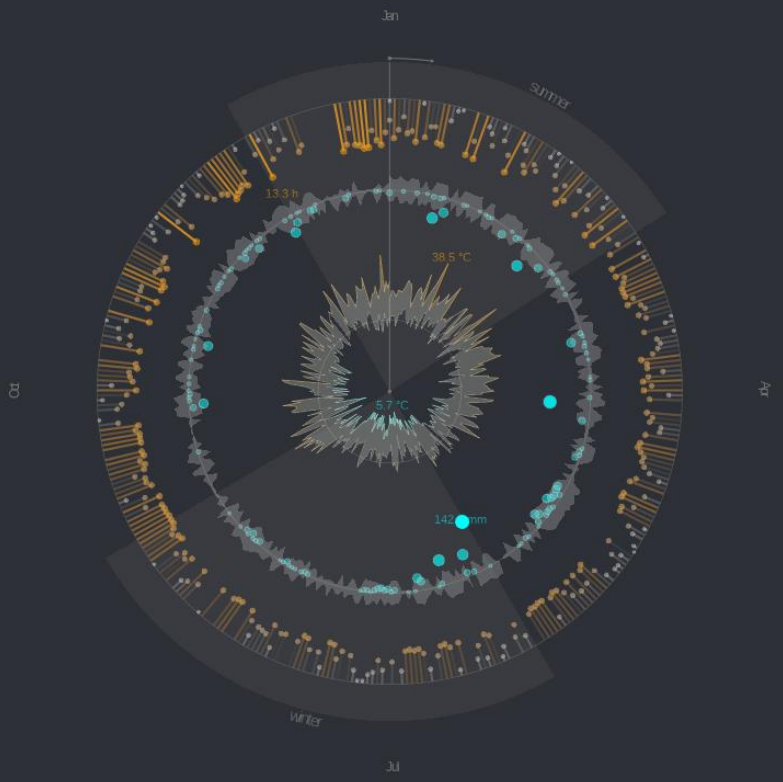
Weather observation data have been collected continuously to keep monitoring the rain predictions.

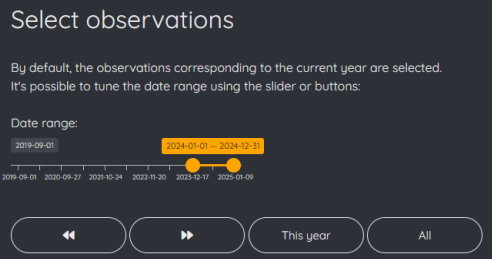


Rain Forecast Dashboard

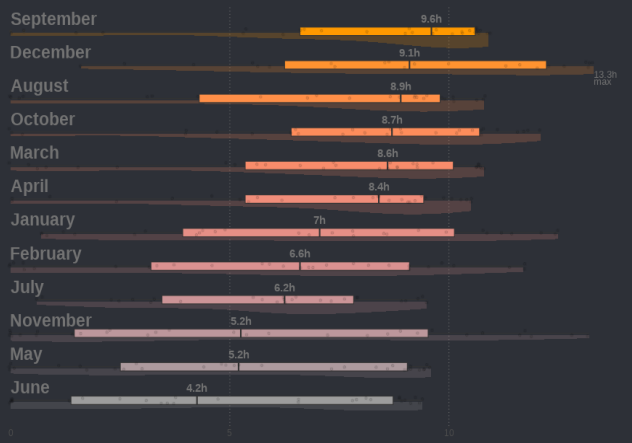
Observations

The Observation dashboard explores the weather data as collected from the source.





Inputs have been implemented to select specific date range and update the data visualizations.



Outputs are computed on server side.

Rain Forecast Dashboard

Predictions

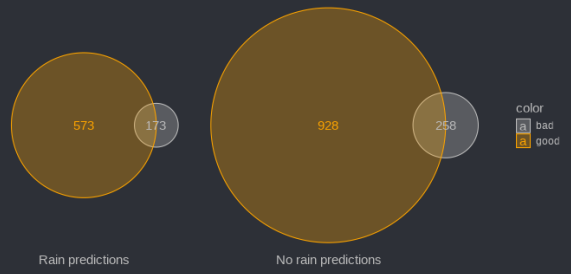
The Prediction dashboard implements performance metrics to assess the quality of the model.

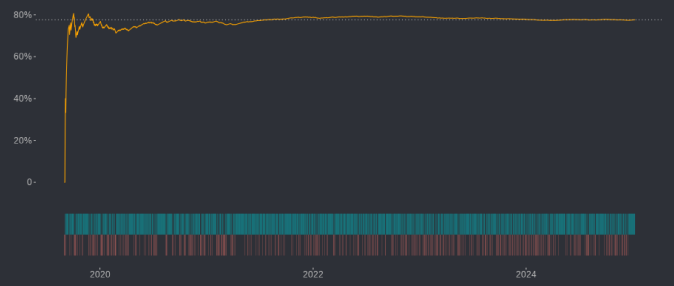
It also displays the prediction for the next day.

Predictions	Accurate	Accuracy
1932	1501	77.69%
26 predictions filtered	431 predictions KO	22.31% predictions KO

Latest Predictions

2025-01-10	2025-01-09	2025-01-08
Predict rain: TRUE Chance of rain: 70%	Predict rain: TRUE Chance of rain: 87% Real rain: TRUE Real rainfall: 45mm Status: accurate Detail: true_positive	Predict rain: TRUE Chance of rain: 70% Real rain: TRUE Real rainfall: 2mm Status: accurate Detail: true_positive

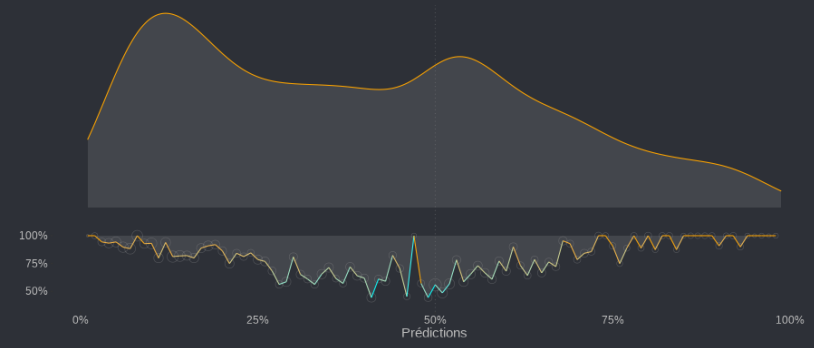




Performance Metrics

Precision	Recall	F1 Score
0.69	0.77	0.73
Precision is the fraction of accurate predictions among the positive ones. It demonstrates the ability of the model to accurately predict rain.	Recall is the fraction of actual positive occurences that were retrieved. It demonstrates the ability of the model to retrieve days with rain.	The F1 score is the harmonic mean of the precision and recall. A value of 1 would mean perfect precition & recall.

MLOps performance metrics

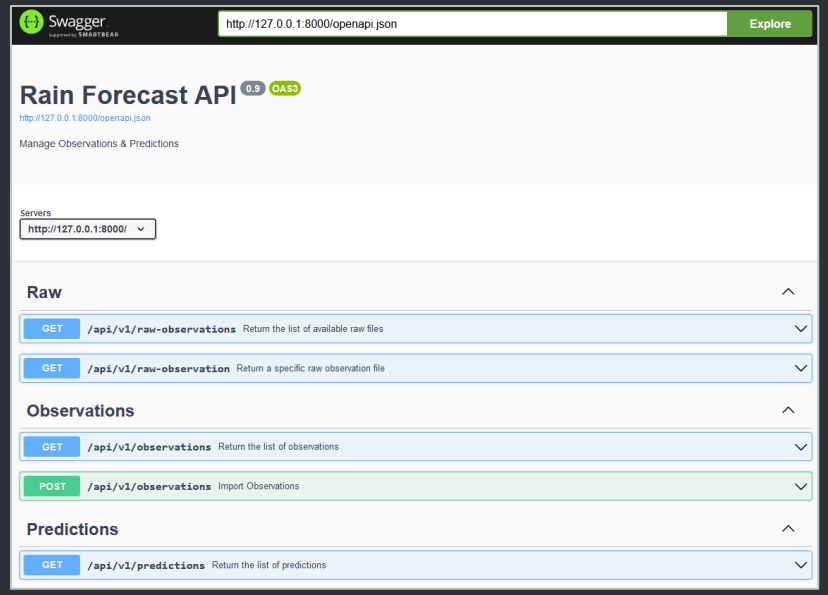


Rain Forecast Dashboard

Data Pipeline API

The Rain Forecast API manages all the data engineering steps in the background:

- Data collection (external source)
- Cleaning / transformation
- Prediction using the ML model
- Database import (PostgreSQL)
- Data serving



The API is wrapped into a specific Docker container to ease lifecycle iterations.

Rain Forecast Dashboard

Technical Stack

The Dashboard App & API features several technical libraries & tools.

Dashboard
Server & Client

- R
- Shiny, bslib
- Ggplot2, dplyr
- Docker

Data Engineering
API & Database

- R, Plumber
- RCurl
- Keras, Reticulate
- DBI, PostgreSQL
- Docker

Model & Predictions
AI / Machine Learning

- Python
- Tensorflow

Rain Forecast Dashboard

Architecture