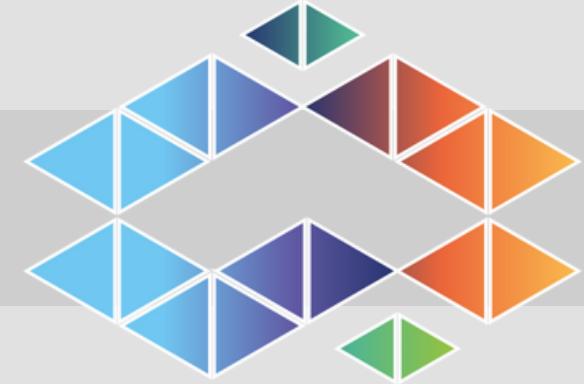


Saudi Arabia Weather

DEEP LEARNING PROJECT





أكاديمية سدايا
SDAIA Academy

REHAB ALZAIDI

AMAL ALTHAQAFI

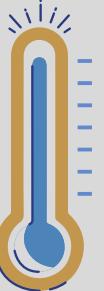
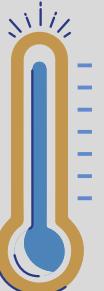
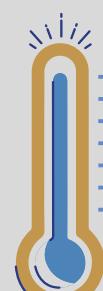
MUZOON ALSAHRANI

YARA ALDOSSARI

NOURA ALOTABI

Project implementers

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Introduction

Climate studies anywhere are one of the important studies on which geographical and non-geographical studies are based.

The Kingdom of Saudi Arabia has a changing climate throughout; Due to the vastness of its geographical area and the passage of many geological stages over it during the previous centuries , and what most distinguishes the Kingdom is the presence of various types of terrain in it, including mountains, plains, valleys and sand dunes.

The Kingdom's climate varies with different seasons. But in general, the climate is characterized by hot summer and cold and rainy winter.



DataSet

The data set is from [kaggle](#) it's contain

24K rows

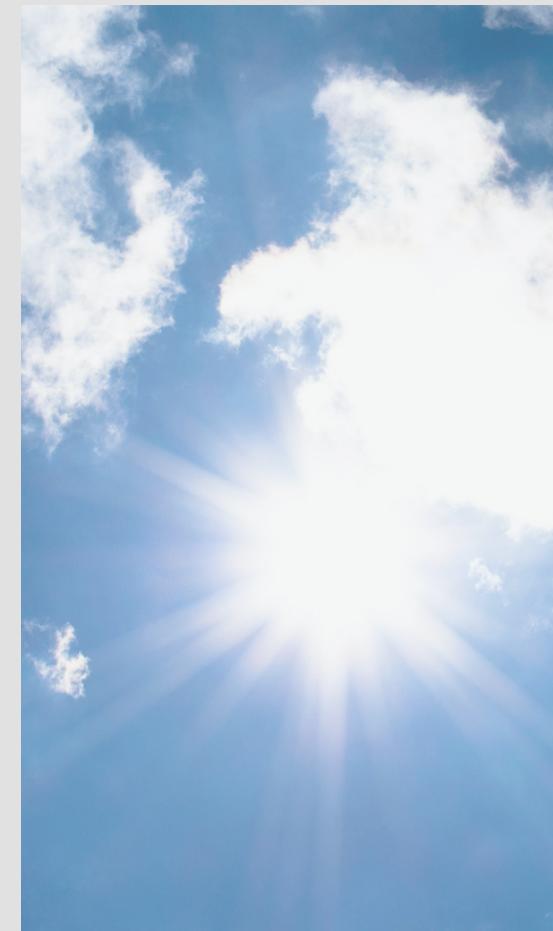
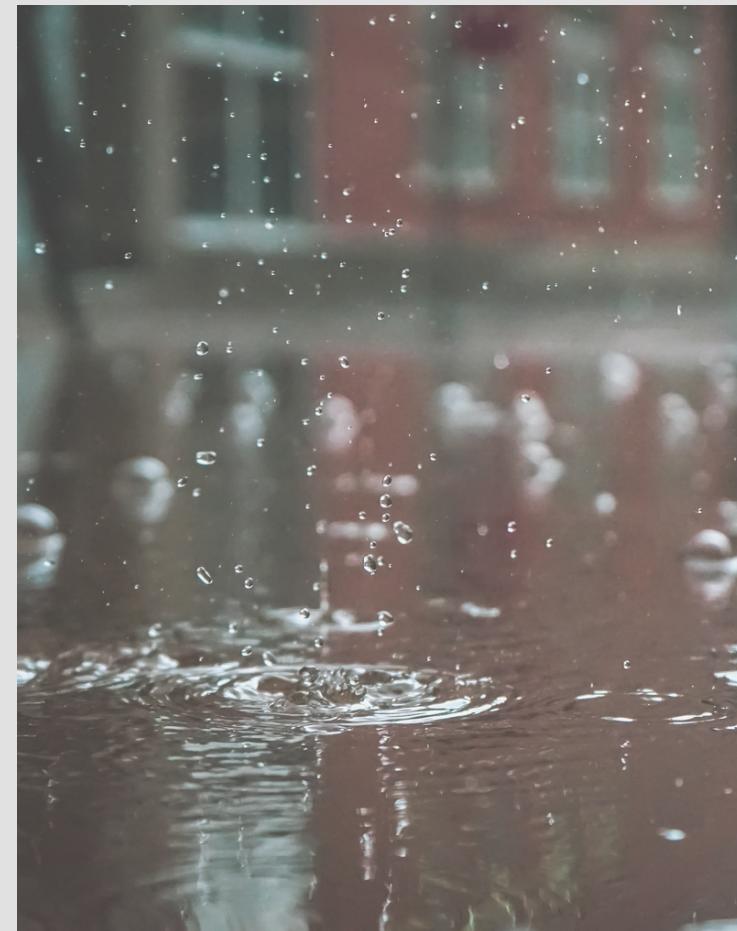
15 columns

Its describe the kingdom's climate throughout the years of 2017-2019



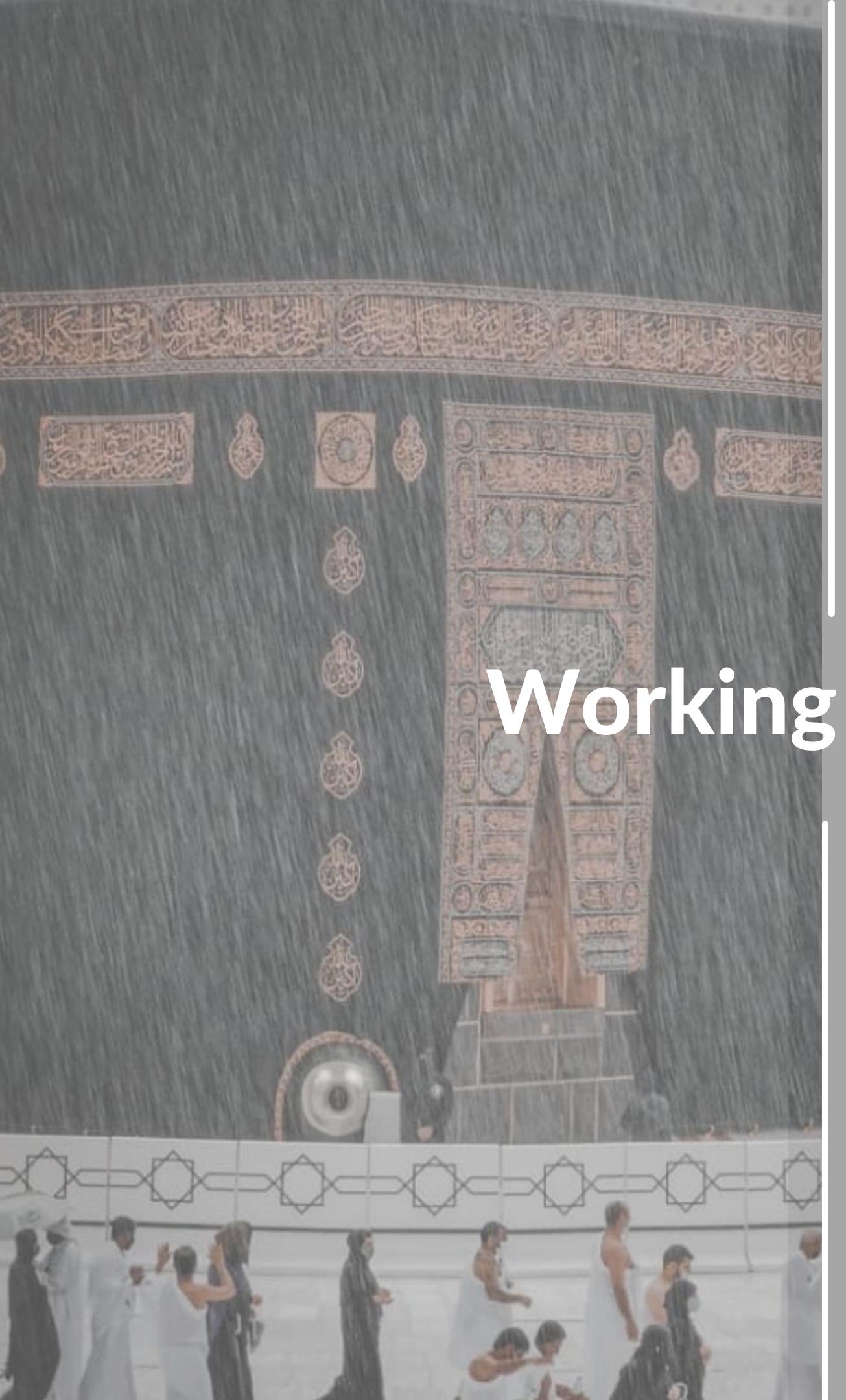
Goal

The goal of this project is to predict the temperature and the Weather in Makkah city.





Working with Time Series Large Amount of Models



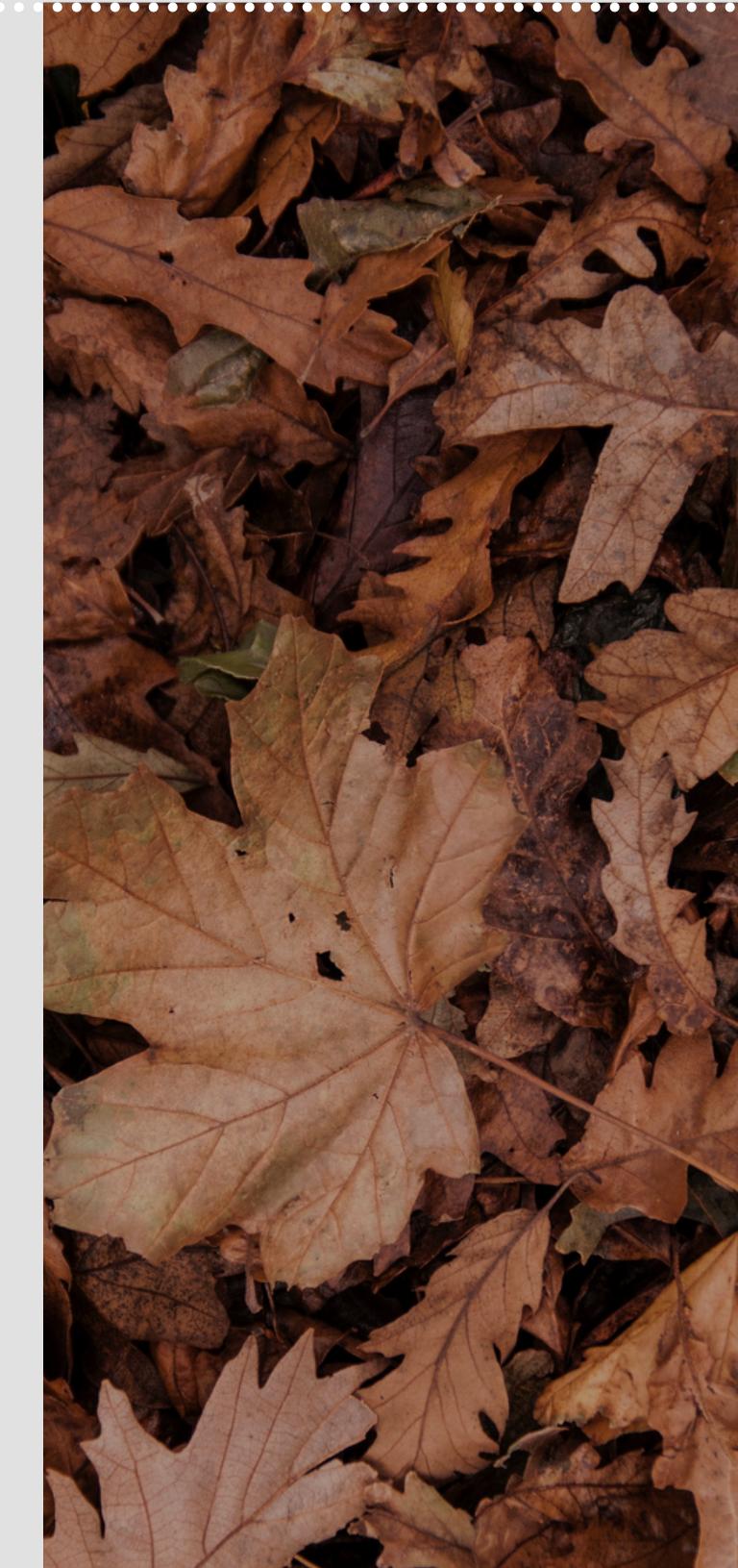
Tools

Tech
Technologies

Python

Jupyter notebook

Google colab



Libraries

Pandas , NumPy ,Math

Matplotlib ,Seaborn, rcParams

Sklearn-Scikit

Tensorflow

scipy

statsmodels

calendar

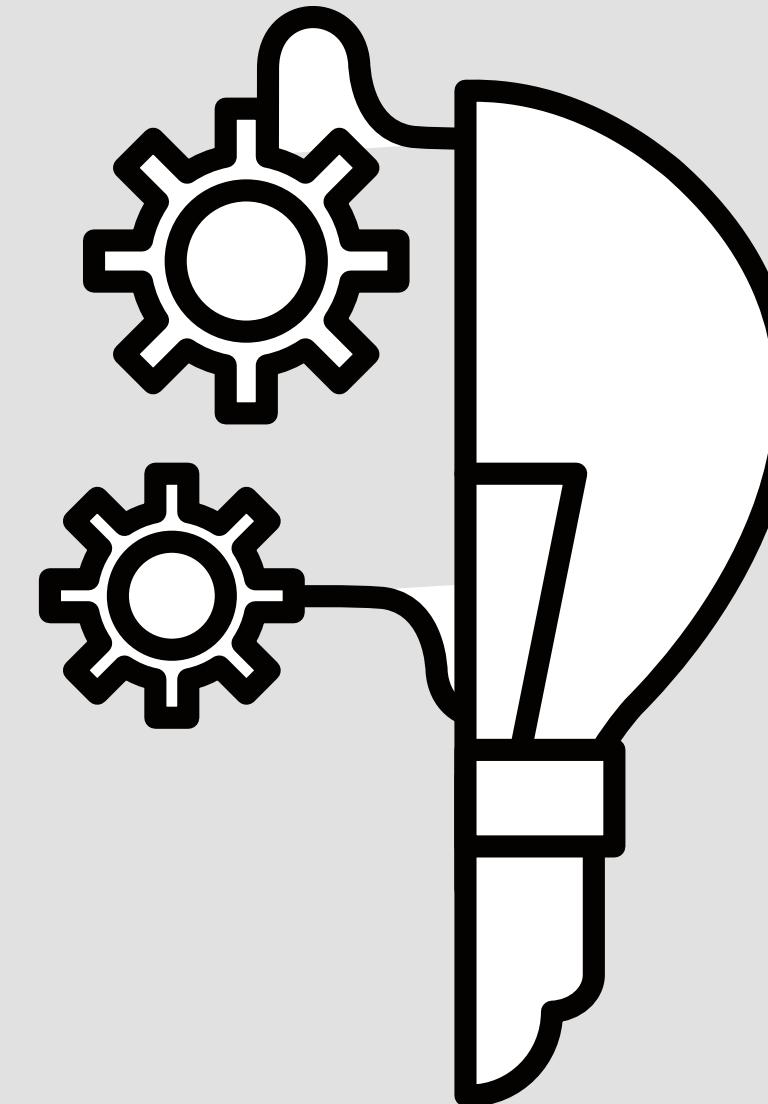
Preprocessing.

Preprocessing

Checking Null

Checking Duplicate

Drop Some columns



Converting data Type for some columns

Filling missing values

Stripping

Feature Engineering

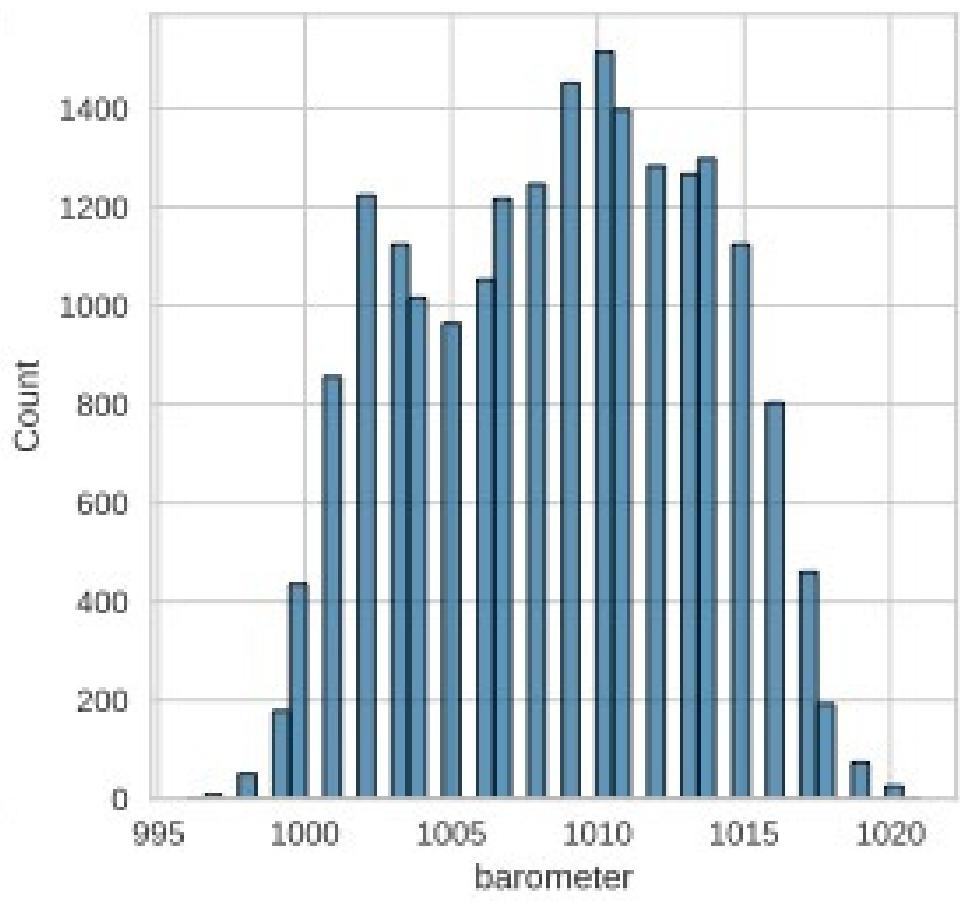
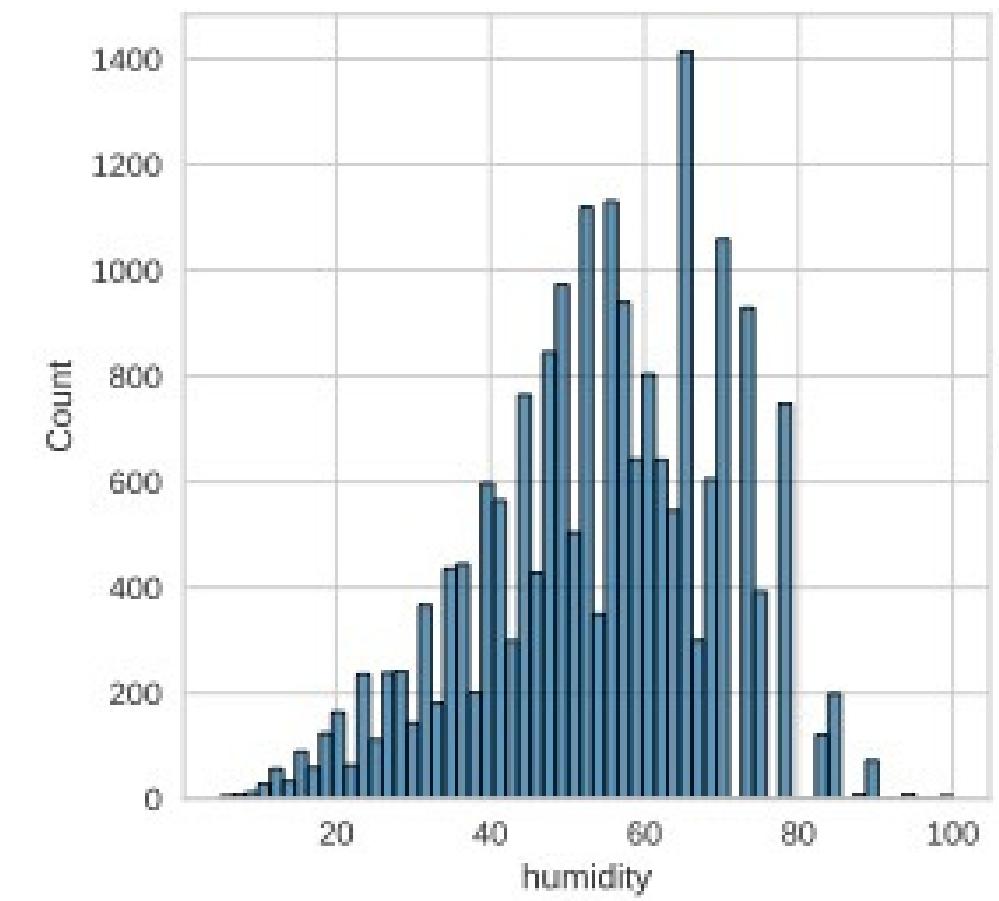
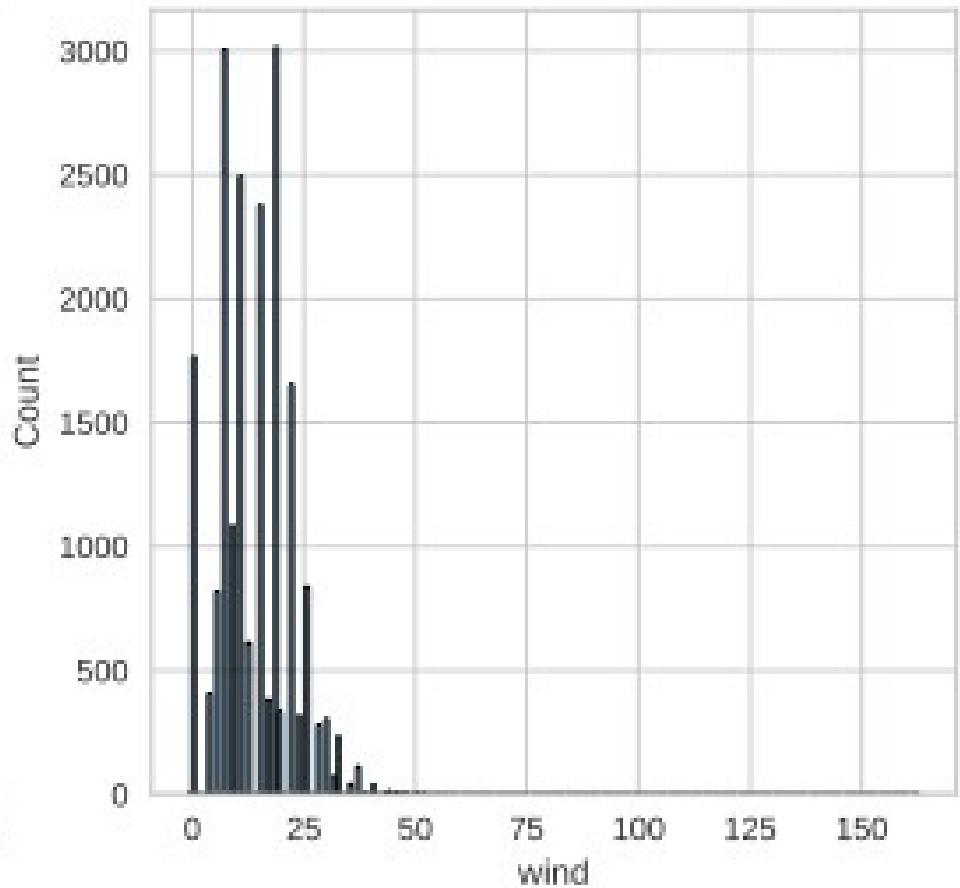
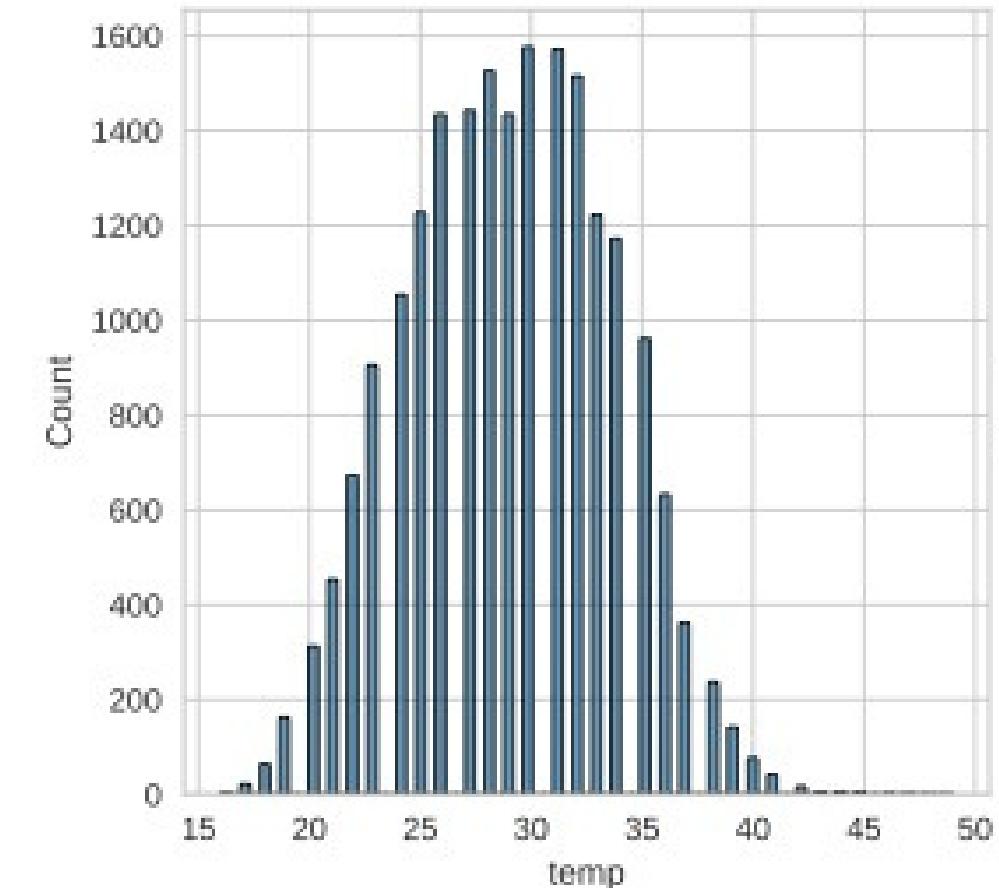


EDA

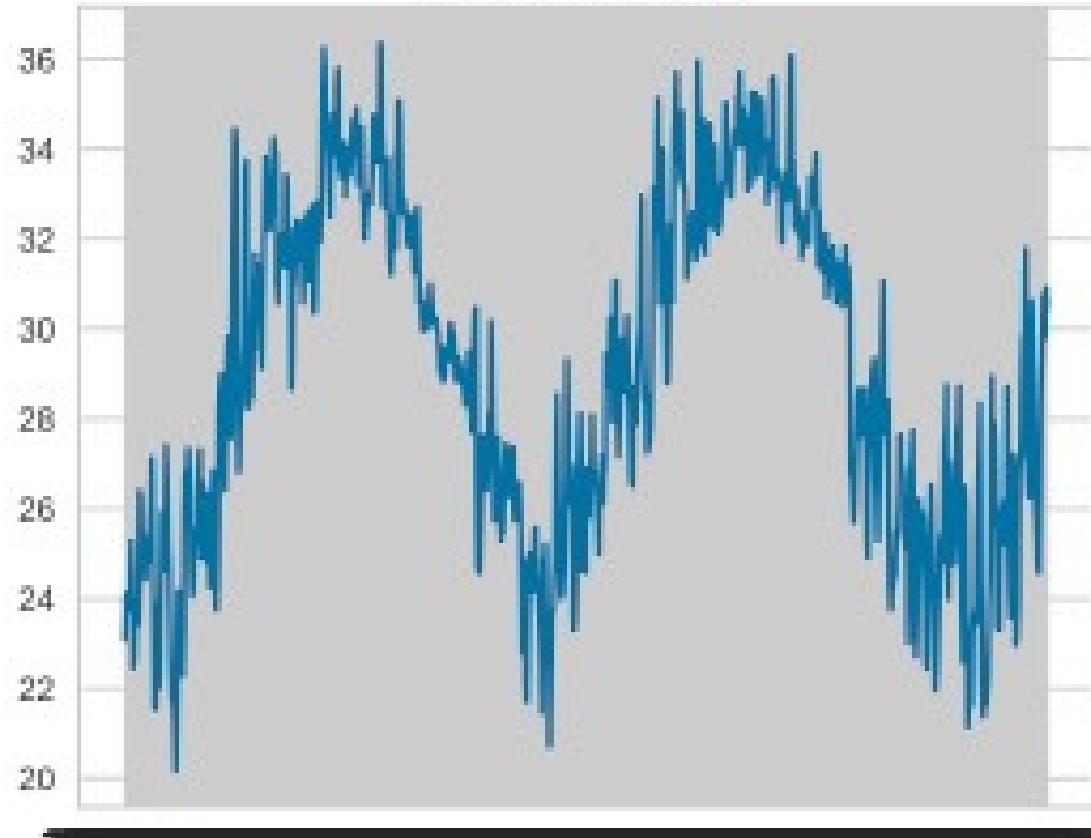
Ausfahrt



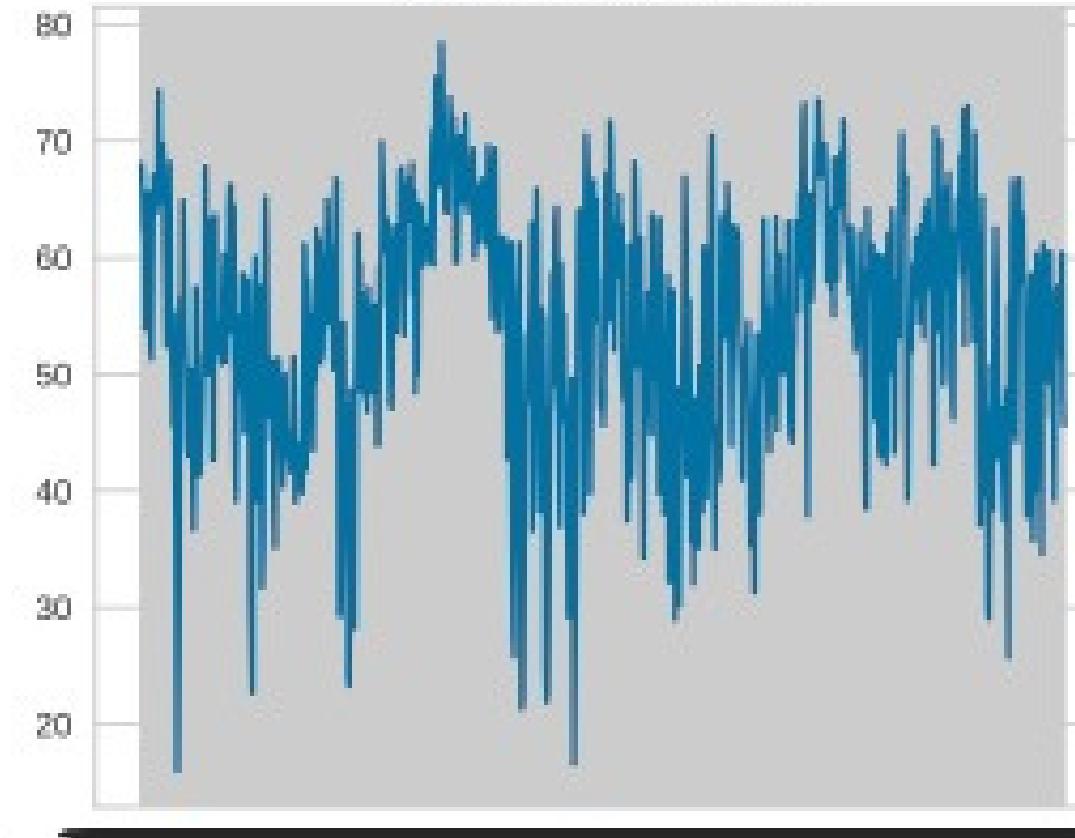
The figure shows the distribution of
(Temperture , Wind , Humidity Barometer)



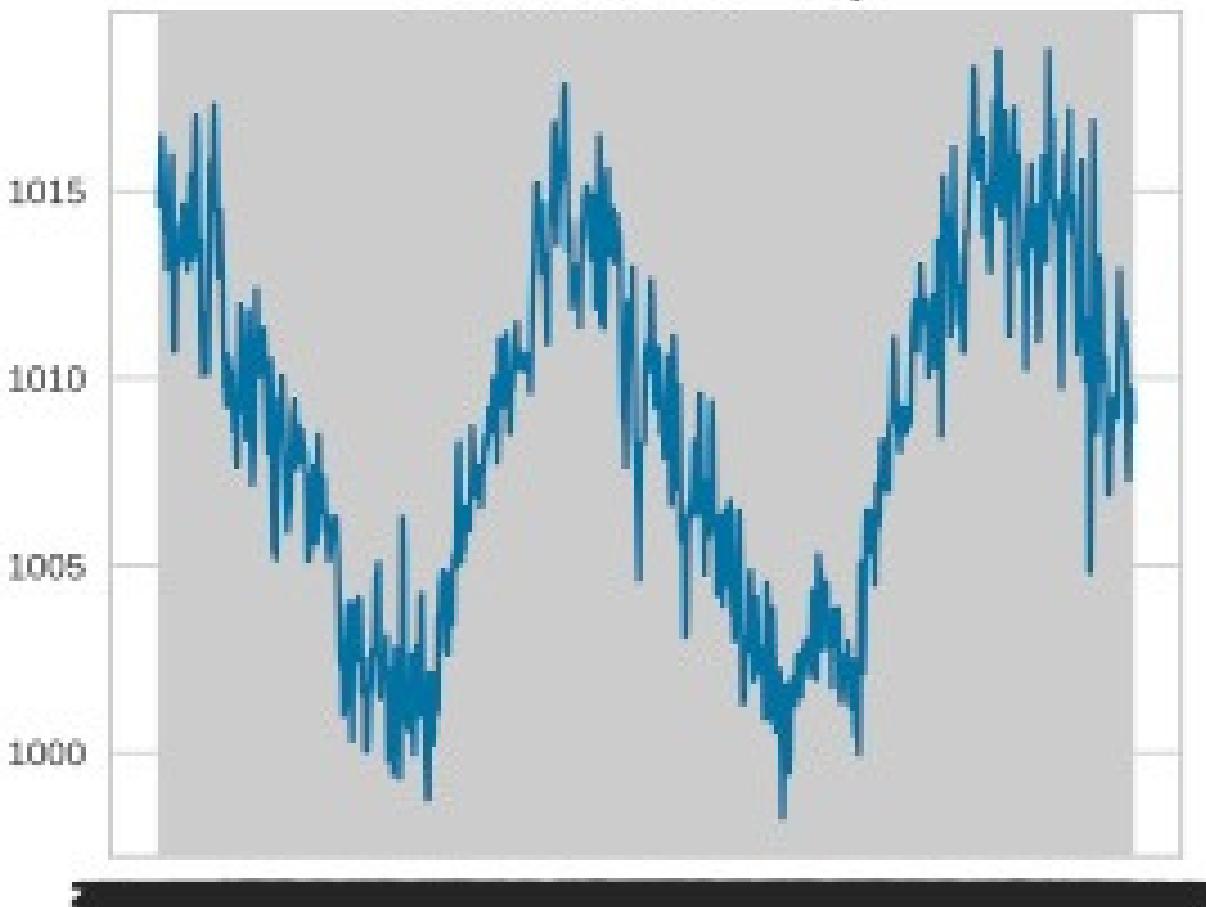
temp Mecca - daily



humidity Mecca - daily

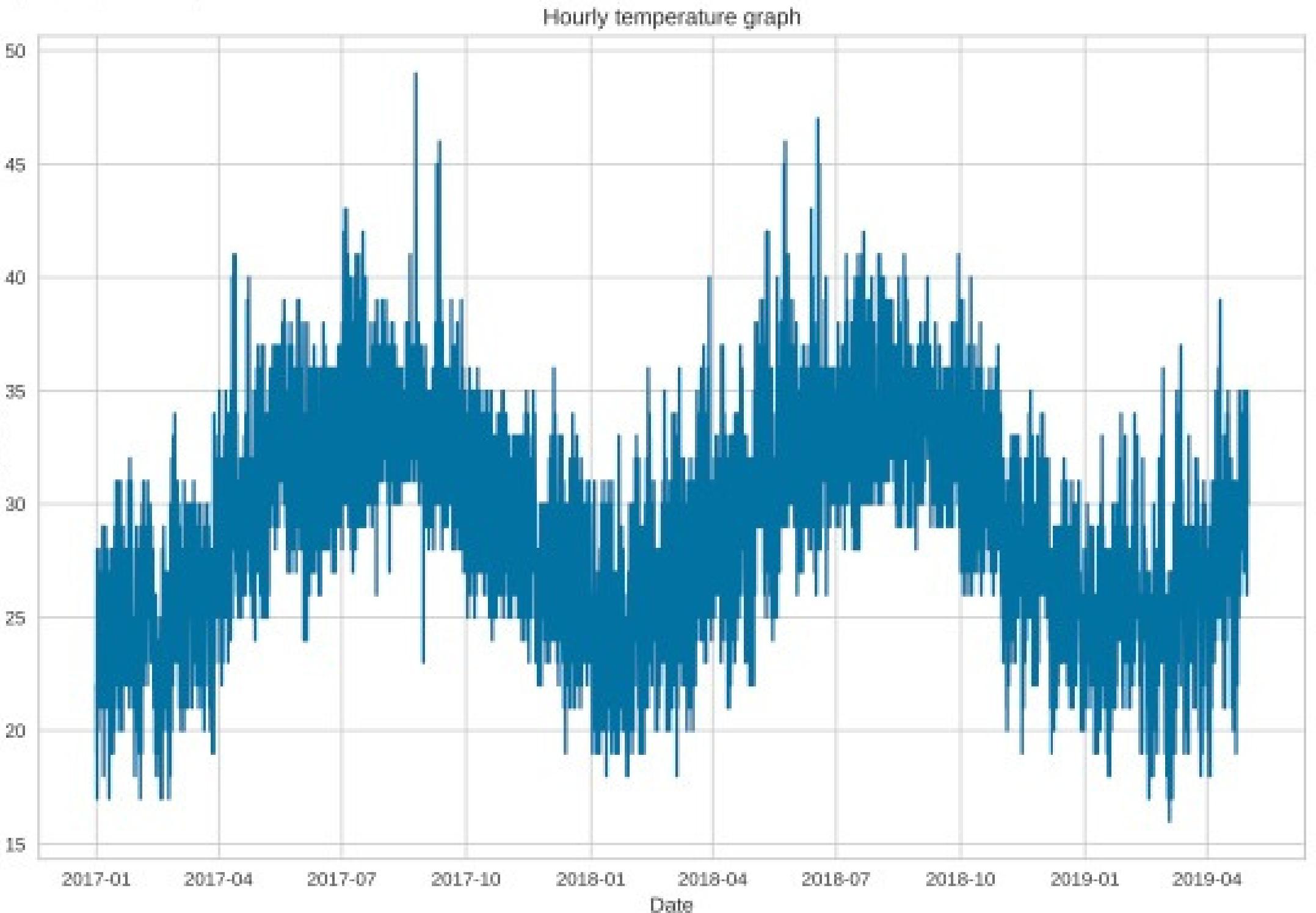


barometer Mecca - daily

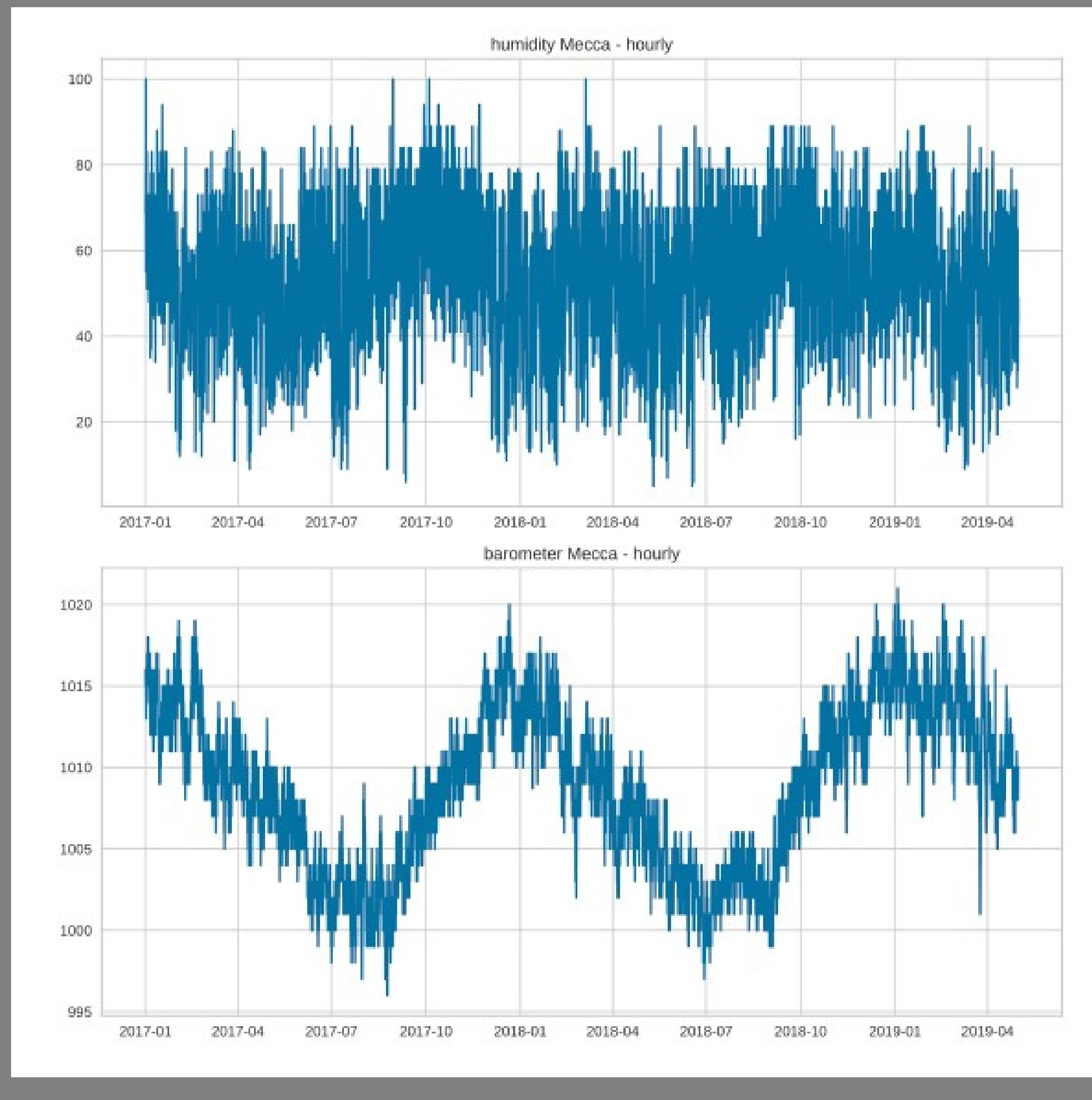


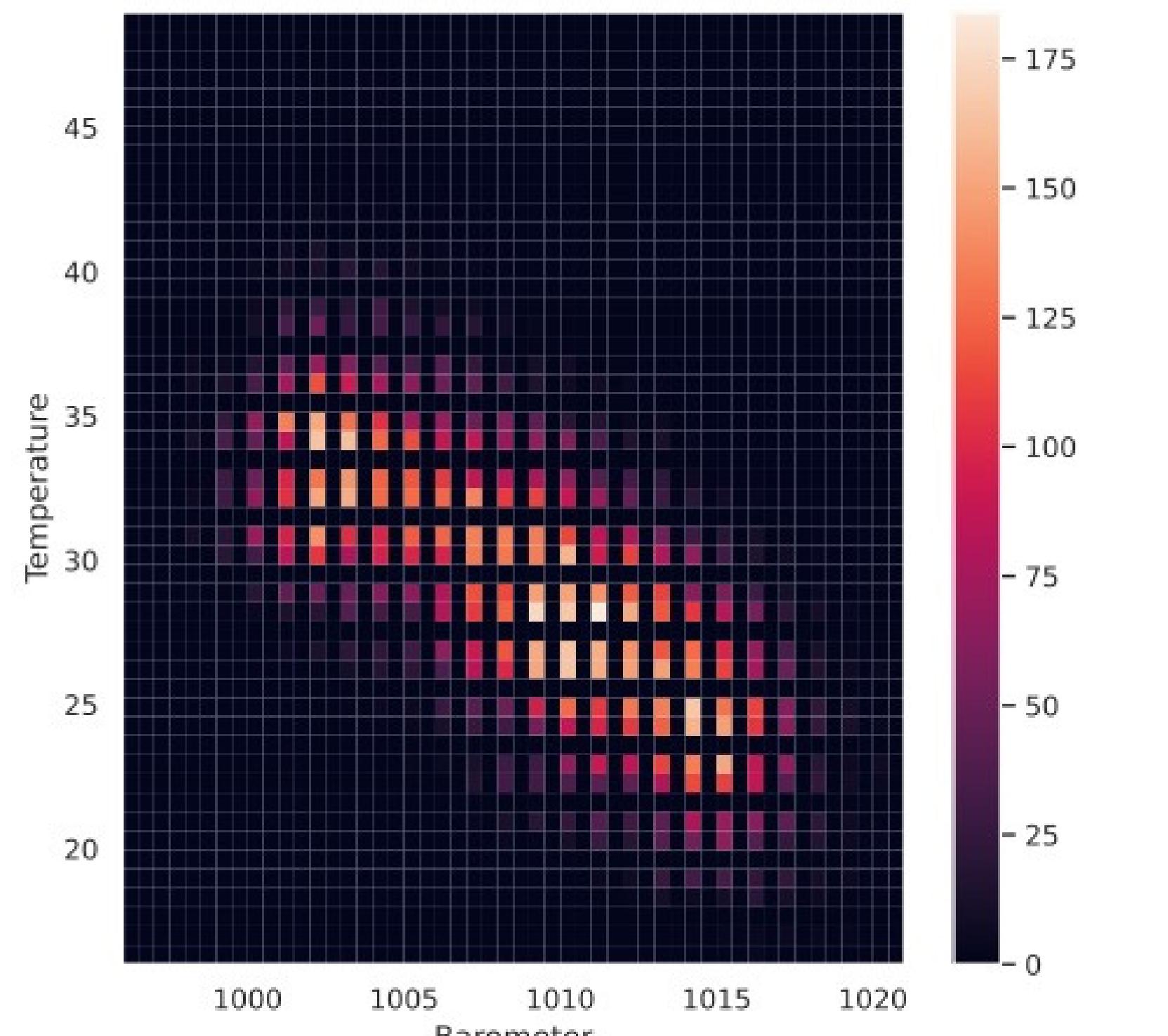
 Daily temperature
in Makkah

Hourly temperature graph

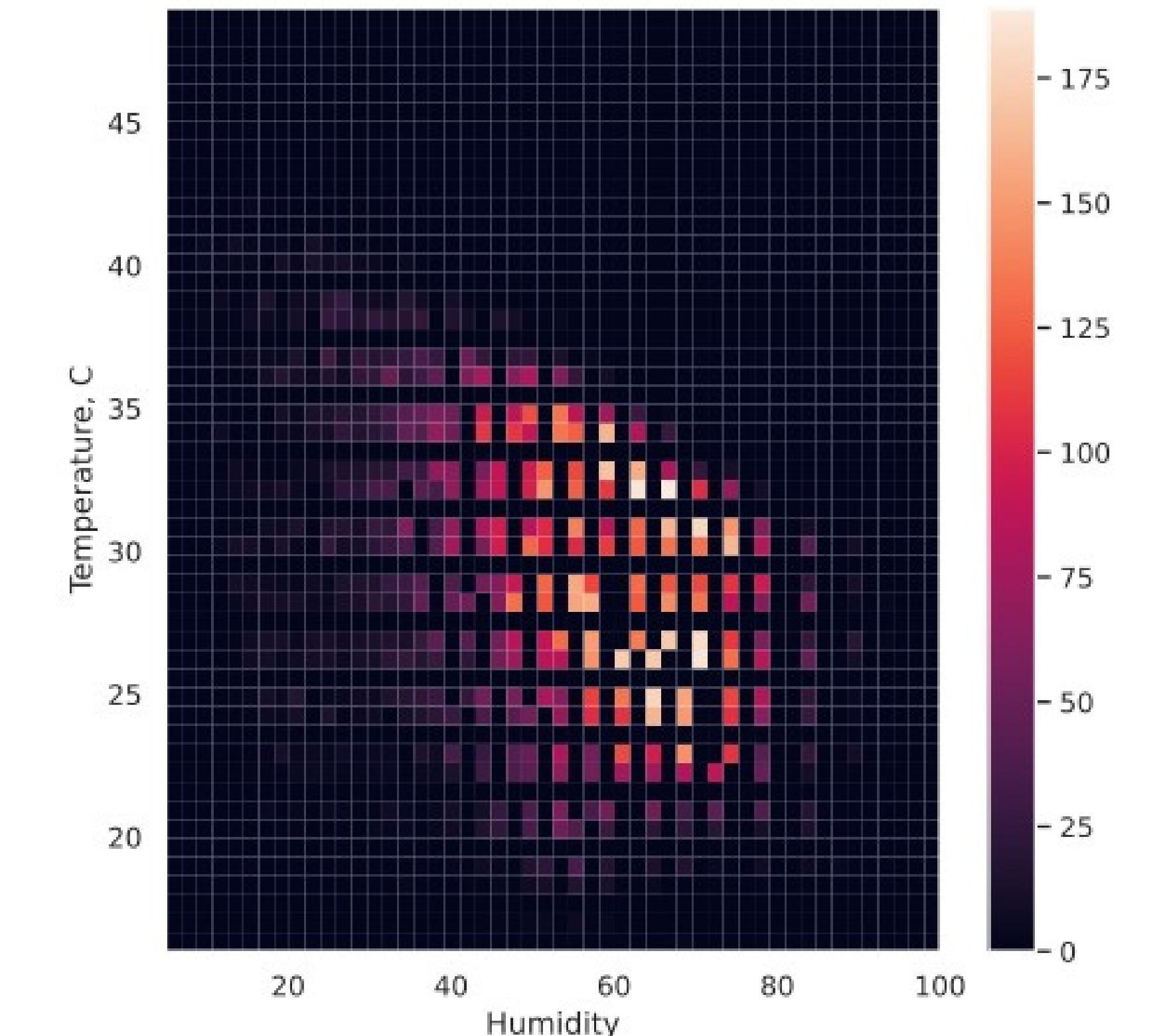


Humidity & temperature in Makkah





Correlation between temperature & Barometer

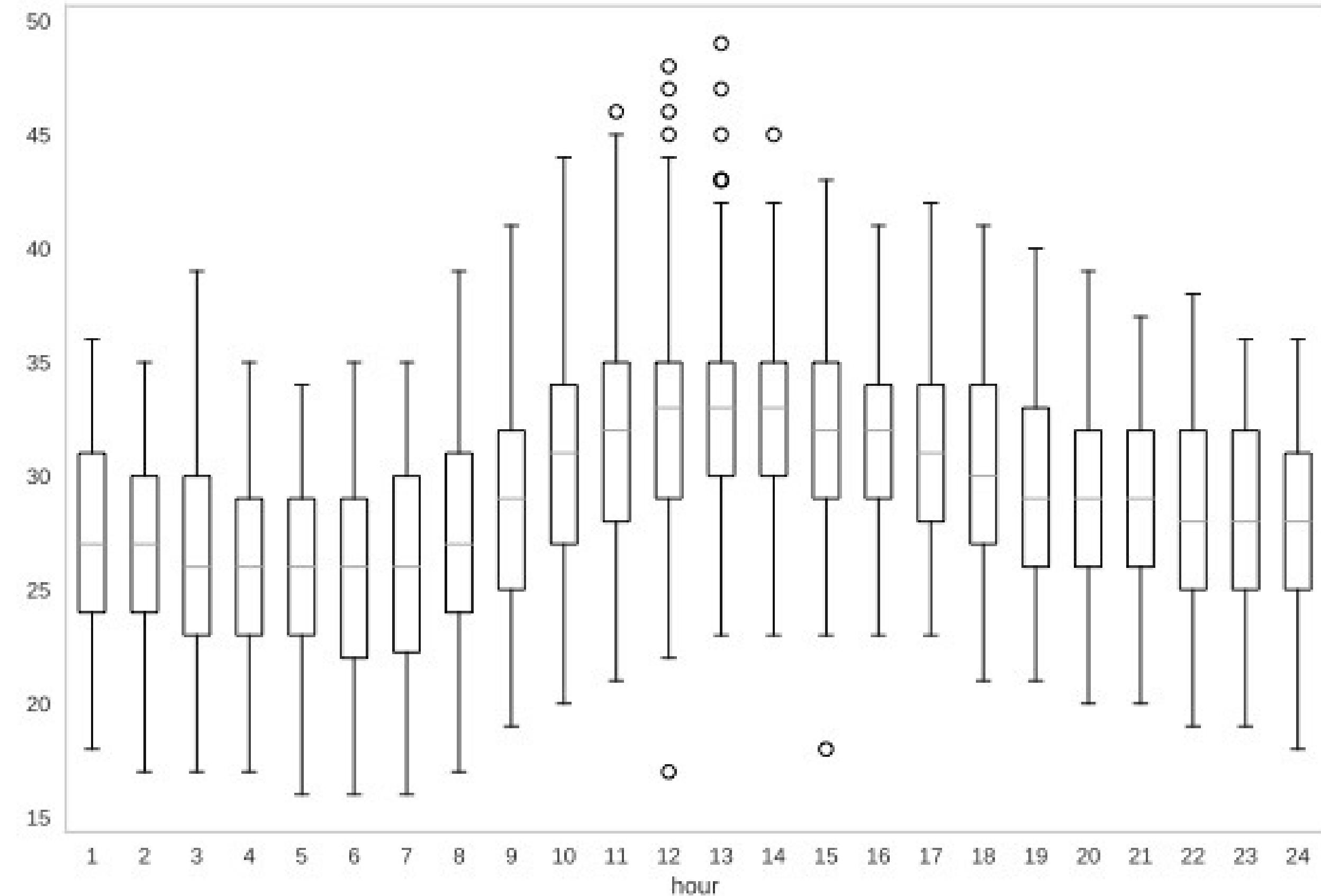


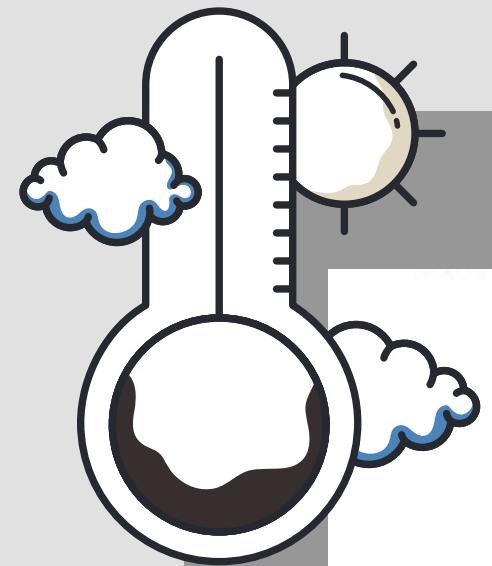
Correlation between temperature & Humidity

Relation between temperature and hours

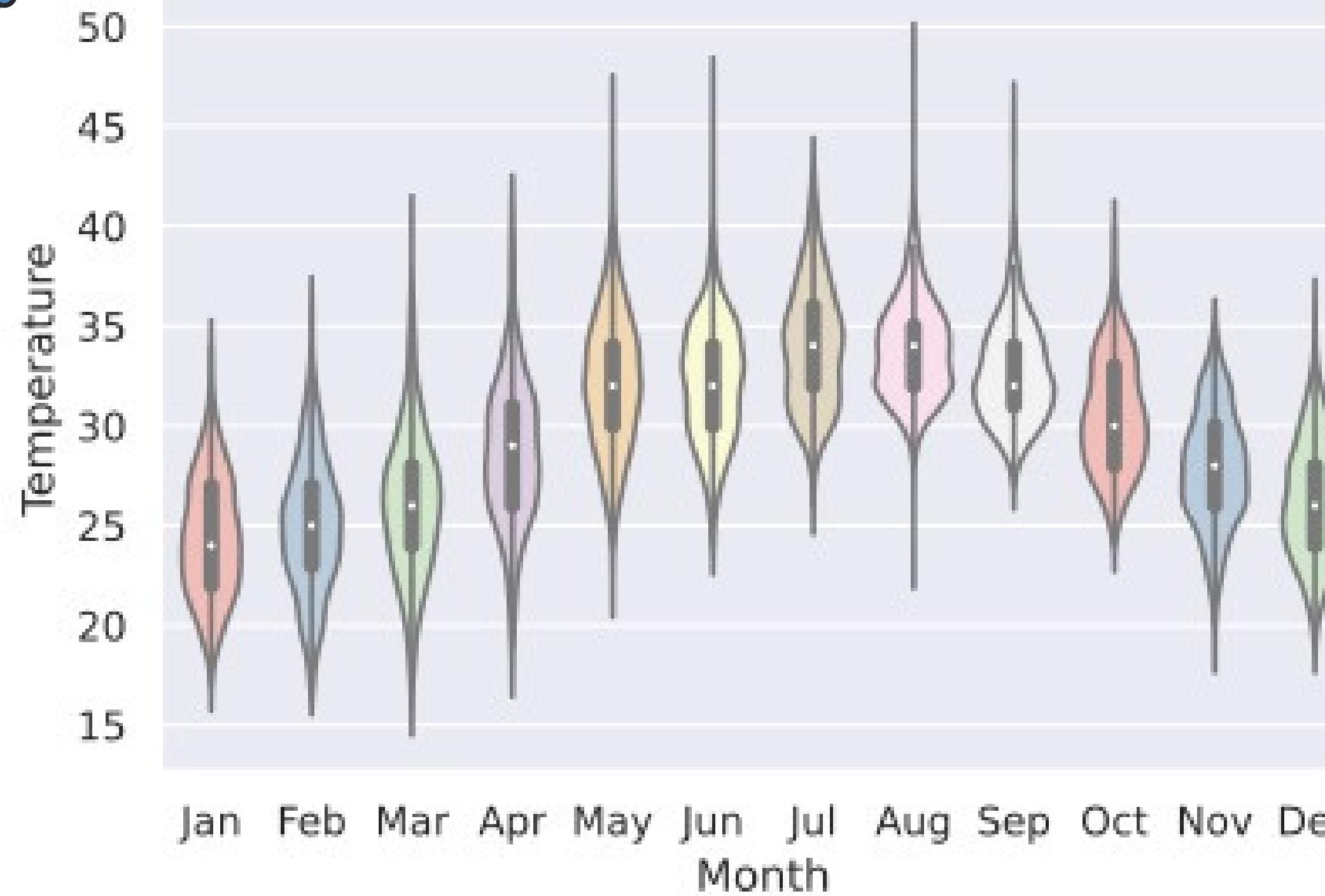
Boxplot grouped by hour

temp





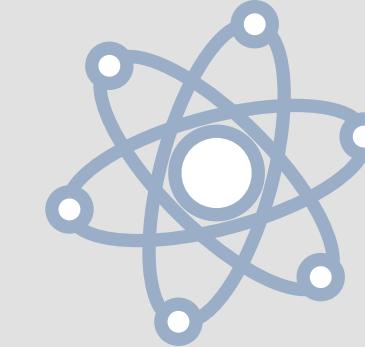
Monthly Temperatures Distribution



Time Series Models



LSTM



LSTM 1

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
n_neurons = 20

{}

RMSE : 0.126512

LSTM 2

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
n_neurons = 50

{}

RMSE: 0.150887

LSTM 3

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
n_neurons = 10

{}

RMSE: 0.122265

LSTM 4

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
n_neurons = 24

{}

RMSE: 0.137903

LSTM Stacked Small & Big

Small

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
LSTM Layers = 2



RMSE: 0.210538

Big

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
LSTM Layers = 4



RMSE: 0.116172

Bi-directional LSTM

Lstm bi

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
n_neurons = 20



RMSE: 0.126762

RMSE: 0.155769



Lstm bi stacked small

n_lag = 24
n_seq = 1
n_batch = 1
n_epoch = 20
LSTM Layers = 2

LSTM LSTM Encoder-Decoder

Lstm encoder decoder 1

n_lag = 24

n_seq = 1

n_batch = 1

n_epoch = 20

n_neurons = 50



RMSE: 0.129345

Lstm encoder decoder 2

n_lag = 24

n_seq = 1

n_batch = 1

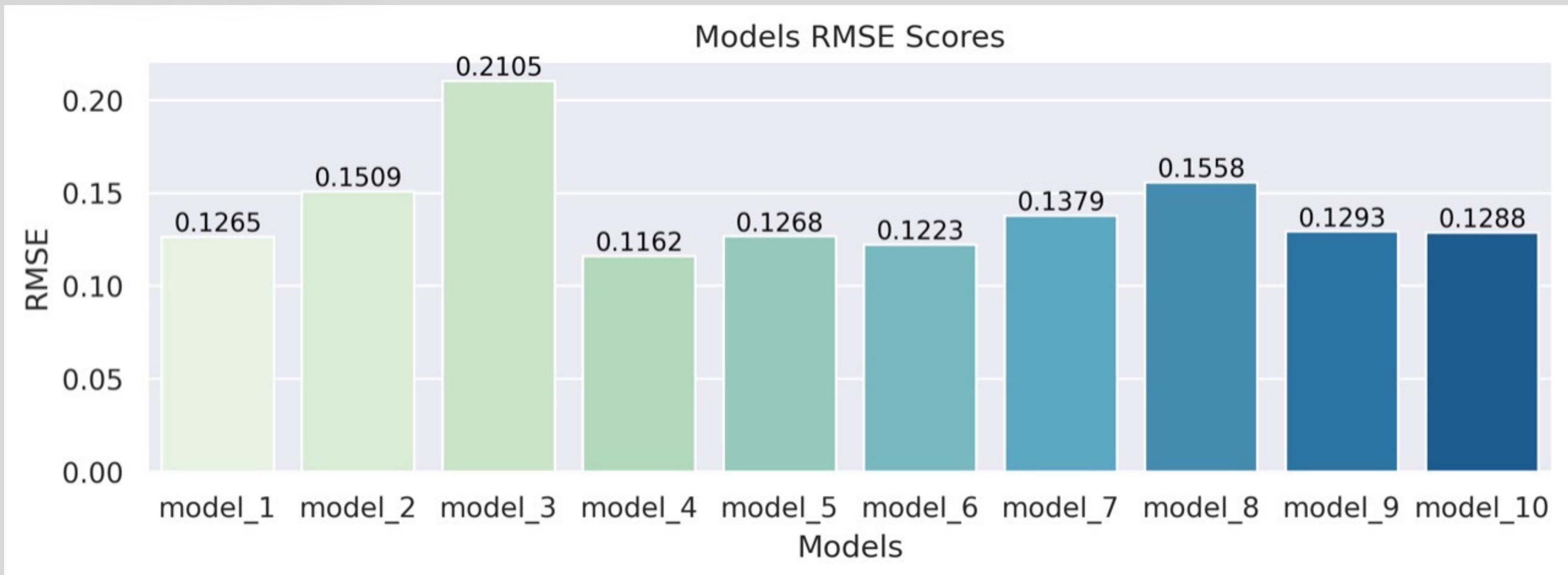
n_epoch = 20

n_neurons = 20



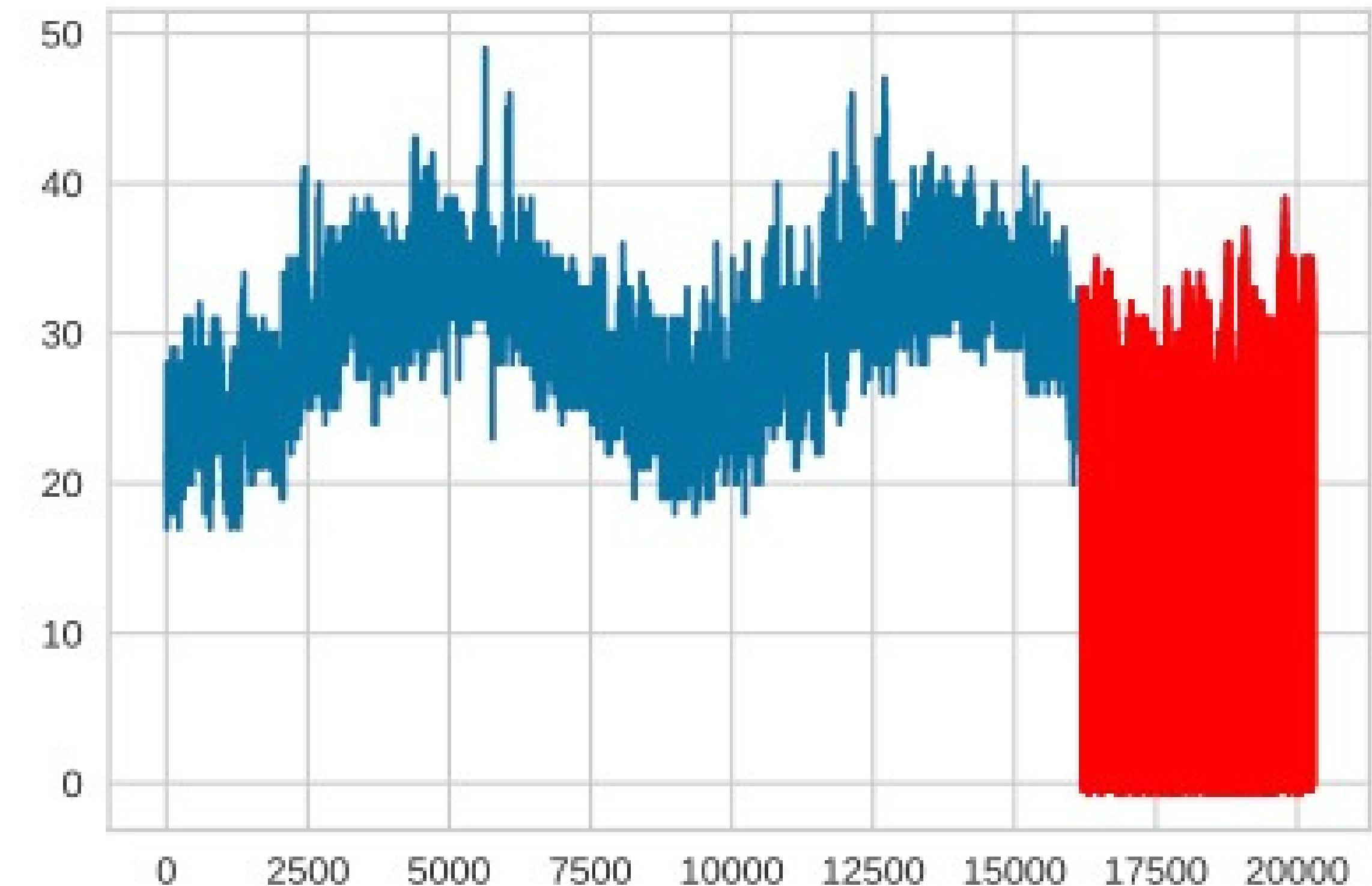
RMSE: 0.128752

Best Model



From above we can say that the best model is model_4
The big stacked LSTM with the lowest RMSE (0.116172).

The entire dataset (Blue)
Forecasts (Red)



Conclusion

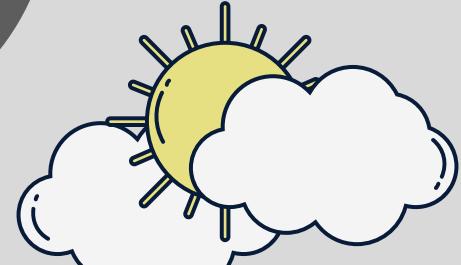
In Future:

Establishing time series models :

- ARIMA
- Exponential Smoothing
- Facebook Prophet
- Apply multi-steps ahead forecasting
- Apply multivariate forecasting like (temperature for Mecca, temperature for Riyadh together).
- Working with more hyperparameters (epochs, optimizer, different past lags).
- Apply different models not tried in this project : CNN-LSTM , MLP.
- Include other variables, such a seasonal indicator or barometer or humidity.
- Try different architectures for the models we have tried .



*thank
you*



Any Questions ?