

part1

October 3, 2025

```
[1]: import pandas as pd
import matplotlib.pyplot as plt
from sklearn.preprocessing import MinMaxScaler
```

Gihub repo: <https://github.com/KristofferHemm/ind320>

Streamlit app: <https://ind320-kristoffer.streamlit.app/>

1 Loading the dataset

```
[2]: df = pd.read_csv('open-meteo-subset.csv')
```

```
[3]: print(f'Shape of the dataset: {df.shape}.')
```

Shape of the dataset: (8760, 6).

```
[4]: df.dtypes
```

```
[4]: time                object
temperature_2m (°C)    float64
precipitation (mm)     float64
wind_speed_10m (m/s)   float64
wind_gusts_10m (m/s)   float64
wind_direction_10m (°) int64
dtype: object
```

```
[5]: df.isna().sum()
```

```
[5]: time                0
temperature_2m (°C)    0
precipitation (mm)     0
wind_speed_10m (m/s)   0
wind_gusts_10m (m/s)   0
wind_direction_10m (°) 0
dtype: int64
```

```
[6]: df.head()
```

```
[6]:
```

	time	temperature_2m (°C)	precipitation (mm)	\
0	2020-01-01T00:00	-2.2	0.1	
1	2020-01-01T01:00	-2.2	0.0	
2	2020-01-01T02:00	-2.3	0.0	
3	2020-01-01T03:00	-2.3	0.0	
4	2020-01-01T04:00	-2.7	0.0	

	wind_speed_10m (m/s)	wind_gusts_10m (m/s)	wind_direction_10m (°)
0	9.6	21.3	284
1	10.6	23.0	282
2	11.0	23.5	284
3	10.6	23.3	284
4	10.6	22.8	284

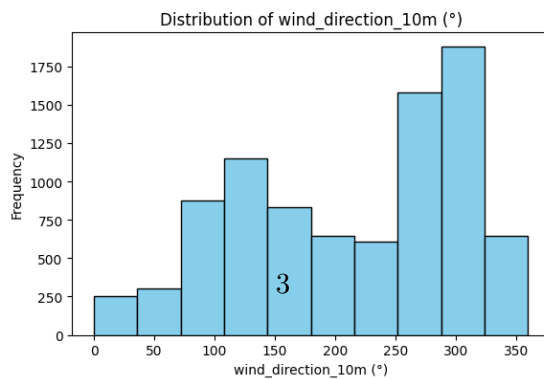
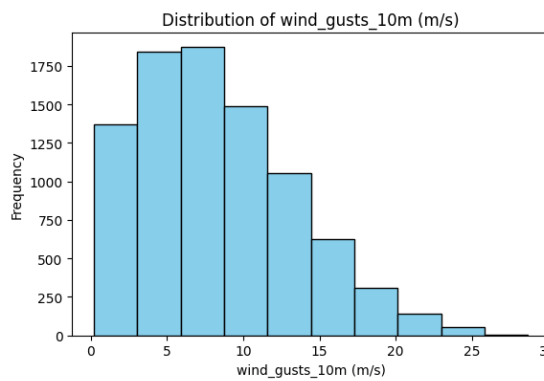
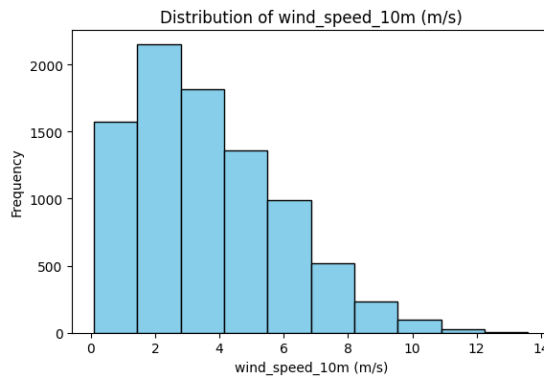
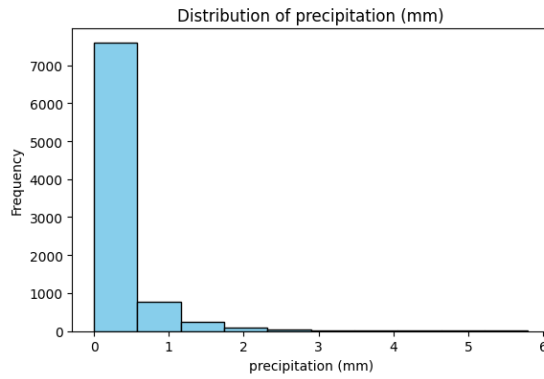
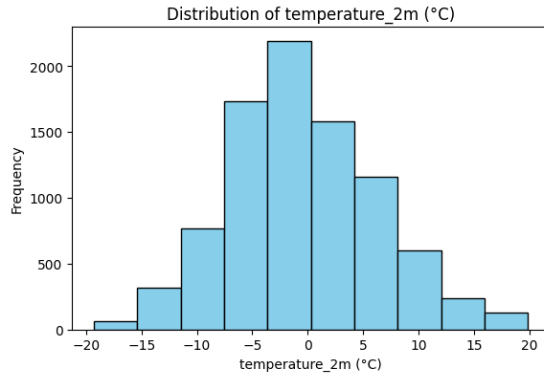
We observe that the dataset consists of 6 columns, 1 column containing time and 5 columns containing weather data.

The temperature, precipitation, wind speed and wind gusts are floats, while wind direction is int. There are no nans in the dataset.

Let's plot the distributions of the columns of the dataset.

```
[7]: df = df.set_index('time')
n_cols = df.shape[1]
fig, axes = plt.subplots(n_cols, 1, figsize=(6, 4 * n_cols))
for i, col in enumerate(df.columns):
    axes[i].hist(df[col], bins=10, color='skyblue', edgecolor='black')
    axes[i].set_title(f'Distribution of {col}')
    axes[i].set_xlabel(col)
    axes[i].set_ylabel('Frequency')

plt.tight_layout()
plt.show()
```



We observe that the temperature distribution is normally distributed, precipitation, wind speed and wind gust all have right tails, and the wind direction has a bimodal distribution.

To plot all columns together we will normalize the data using MinMaxScaler from scikitLearn. We will also drop the time column from the plot as it is uniform and will not add any information to the plot.

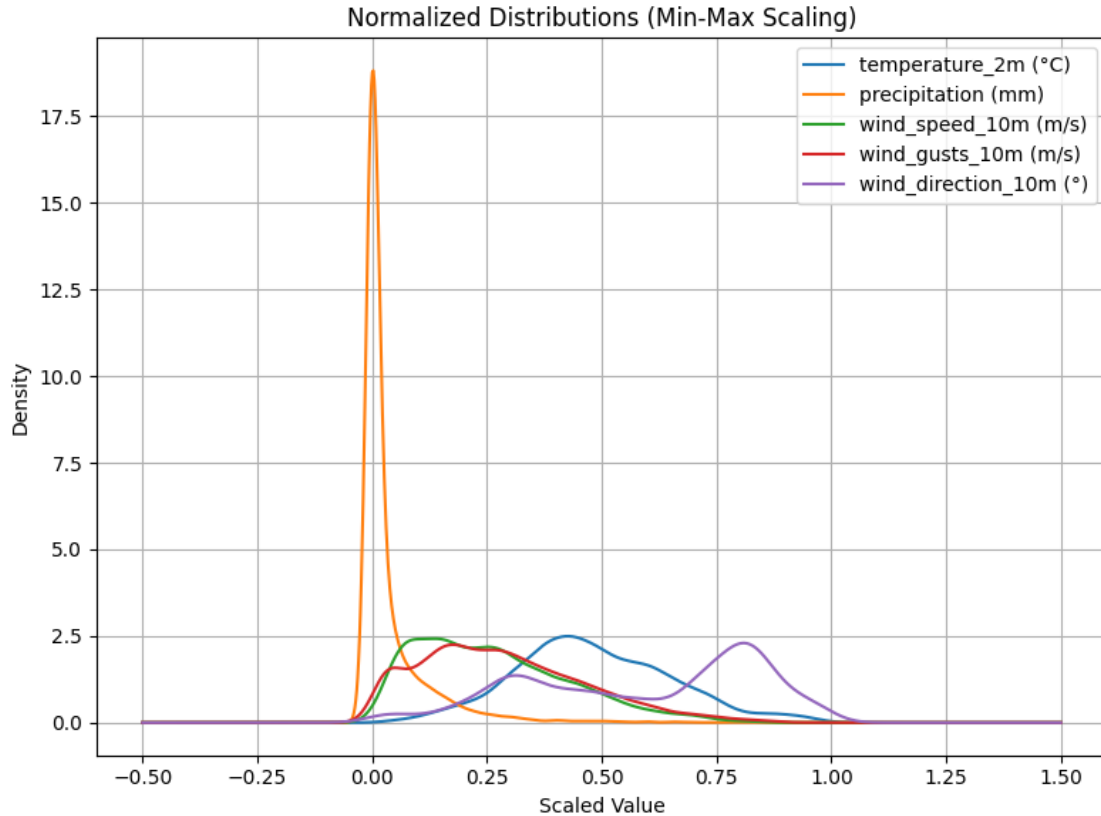
```
[8]: scaler = MinMaxScaler()

df_scaled = pd.DataFrame(scaler.fit_transform(df), columns=df.columns)

# Plot all scaled columns as KDEs
plt.figure(figsize=(8, 6))

for col in df_scaled.columns:
    df_scaled[col].plot(kind='kde', label=col)

plt.title('Normalized Distributions (Min-Max Scaling)')
plt.xlabel('Scaled Value')
plt.ylabel('Density')
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```



1.0.1 Log

The first part of the assignment was pretty straightforward as I have experience in using jupyter notebooks for exploratory data analysis.

For this part I loaded and inspected the data using pandas. Then made histograms for each column using matplotlib. For plotting all the columns together, I used MinMaxScaler from scikit learn and made a line plot using matplotlib.

The biggest challenge I faced in part one was in creating the pdf, as pandoc was not installed on my system. This was easily fixed as it's a common problem when creating pdfs from jupyter notebook.

The second part of the assignment was a bit more challenging as I have not used Streamlit before. I started with creating an app only displaying "hello world" in the browser. Then I created multiple pages for the app using a folder structure and added page navigation. I found that the page navigation didn't work very well with an app with folder structure, so I changed to using functions to define the pages of the app. I then created one python script for each page which I import in the main streamlit_app.py file. For me, this way to structure the app made the most sense. Then I filled the pages with the content as described in the task, spending most time on creating the third page. The last thing I did was to implement the caching of the dataframe. I tried to do this in the streamlit_app.py file but was not able to make this work properly. I then chose to make a script for loading the data with containing a function for loading the csv-file into a dataframe using the @st.caching decorator. I think this will work for caching.

Use of AI: I used ChatGPT for the for-loop creating plots for the individual plots, and for the tip of using MinMaxScaler. In addition, I used ChatGPT for the altair code in the streamlit app.