WEATHER FORECASTING

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01

What is weather?

weather

noun [U]

UK /ˈweð.əʳ/ US /ˈweð.ɚ/

A1

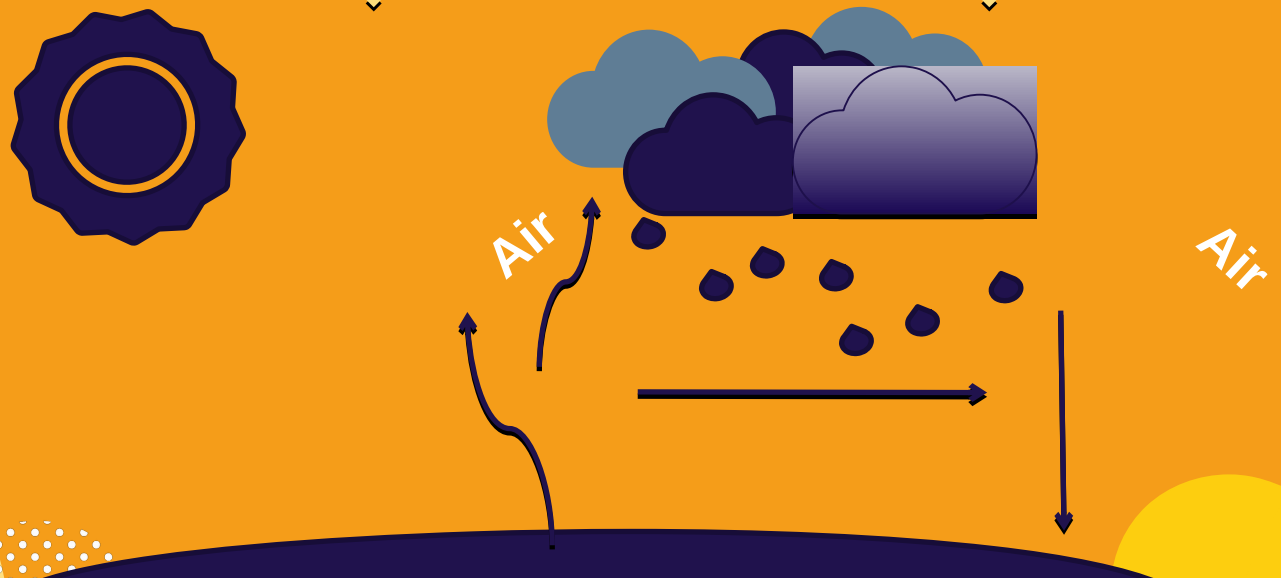
the conditions in the air above the earth such as wind, rain, or temperature, especially at a particular time over a particular area:

- Cambridge Dictionary

What causes weather?

Transfer of energy between:

The Sun	Earth’s surface	Atmosphere



02

Factors that influence weather

02.

Temperature

Pressure

Humidity

Speed of wind

03
How weather can be predicted?

collecting data

satellites

buoys

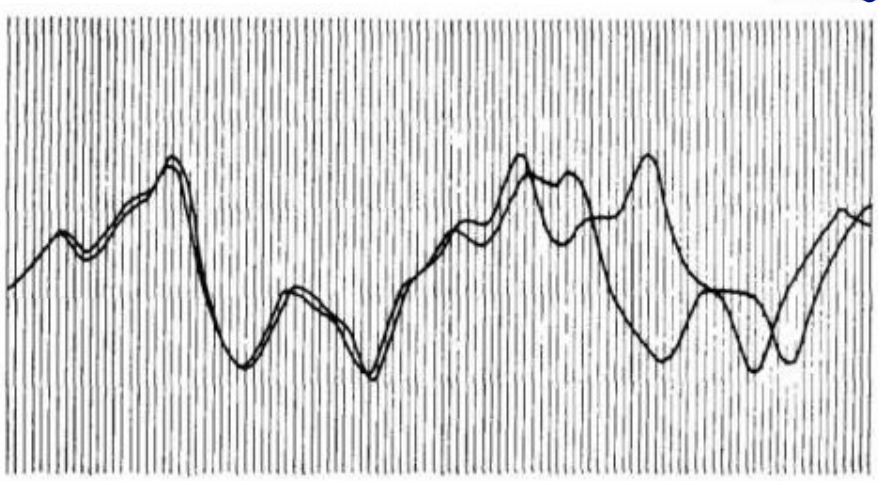
aircraft

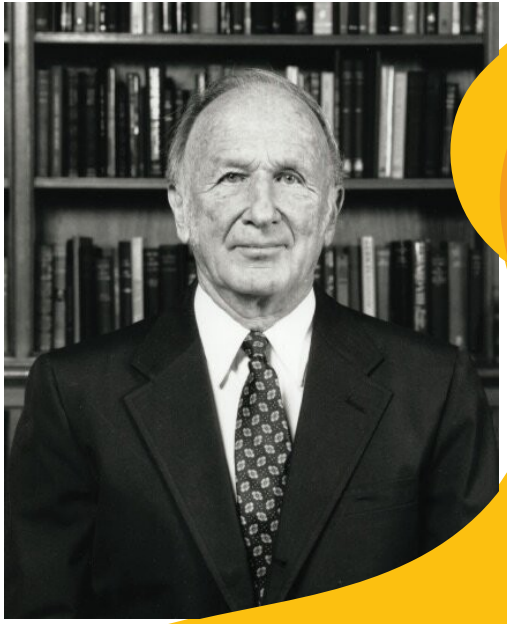
land-based stations

ships

04
why weather forecast always lie?

butterfly effect





Edward Lorenz

Machine Learning Experiment

Temperature, **Humidity**, **Wind speed** and **Pressure** were considered

The data was taken for Basel city from this source:

https://www.meteoblue.com/en/weather/historyclimate/weatherarchive/basel_switzerland_2661604

How it works

```python
# trains model for given dataset grouped by n days
def train_model(dataset, n):
    dataset = to_standard_format(dataset)  # translate into standard format (from 0 to 1 range)
    grouped = group_arrays(dataset, n)  # group dataset by n days

    # prepare datasets for training the model
    x = grouped[:len(dataset) - n]
    target = dataset.values[n:]

    # build and train the model
    regression_model = linear_model.LinearRegression()
    regression_model.fit(x, target)

    return regression_model
```

```python
# finds optimal value for n to pass it to test_model() function
def optimal_n(array, split, value_type="R", limit=120):
    opt_n = 1
    mae = zero_theory_mae(array, split)

    for n in range(1, limit):...

    print(opt_n)
    return opt_n
```

```python
# tests the model and returns its MAE
def test_model(dataset, n, split, value_type="R"):
    standard_dataset = to_standard_format(dataset, value_type)
    grouped = group_arrays(standard_dataset, n)
    regression_model = train_model(standard_dataset, n)
    prediction = to_source_format(regression_model.predict(grouped[split - n:]), value_type, dataset)

    return mean_abs_error(dataset.values[split:], prediction)
```

To see all the code in details, you can check the following repository on GitHub:

https://github.com/Muradmustafayev-03/Weather-Forecast

How accurate it is

Mean Absolute Error for:

Temperature: 1.538 (C)

Humidity: 5.464 (%)

Wind Speed: 3.373 (km/h)

Pressure: 3.173 (hPa)

For zero theory:

Temperature: 1.677 (C)

Humidity: 6.083 (%)

Wind Speed: 4.323 (km/h)

Pressure: 3.575 (hPa)

How to get better result

- Reshape the data and use different parameters for training the model

- Include data for other places to make the model more universal and avoid overfitting

and some more things to mention...

Forecast for tomorrow (in Basel)

Temperature:

Humidity:

Wind Speed:

Pressure:

THANKS!

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