Tutorial VII - Pandas and AI

Programming with Python

NASA GISTEMP Climate Change Analysis

In this exercise, you'll use Pandas to analyze real global temperature anomaly data from NASA, helping to understand trends in climate change over time. Work together with the LLM in your Code Editor to complete the task.

The dataset is provided by the GISS Team, 2024: GISS Surface Temperature Analysis (GISTEMP), version 4. NASA Goddard Institute for Space Studies. Dataset at https://data.giss.nasa.gov/gistemp/.

```
import pandas as pd
import matplotlib.pyplot as plt

# First, we load the NASA GISTEMP dataset for global temperature anomalies.
url = "https://data.giss.nasa.gov/gistemp/tabledata_v4/GLB.Ts+dSST.csv"
temp_anomaly_data = pd.read_csv(url, skiprows=1) # skiprows=1 ensures that the first
 ↪  column is not read as a row index

# Convert all numeric columns (except 'Year') to float, replacing '***' with NaN
numeric_columns = temp_anomaly_data.columns.drop('Year')
temp_anomaly_data[numeric_columns] = temp_anomaly_data[numeric_columns].replace('***',
 ↪  float('nan')).astype(float)

# TODO: a) Display the first 5 rows to learn basic information about the DataFrame. For
 ↪  your work, you only need the 'Year' and and the data from all months. Drop the rest
 ↪  of the columns.
# Your code here

# TODO: b) Calculate and print the average temperature anomaly for each year.
# Hint: To do so, you first need to pd.melt()` the DataFrame to convert months to a
 ↪  single column.
# Your code here

# TODO: c) Find the year with the highest temperature anomaly and the year with the
 ↪  lowest.
# Hint: Use the `idxmax()` and `idxmin()` methods
# Your code here

# TODO: e) Save the melted DataFrame to a Excel file with the name
 ↪  'temp_anomaly_data.xlsx' for next lecture.
# Your code here
```

Create a Game with AI

In this exercise, you'll use Pygame to create a jump and run game. Work together with the LLM in your Code Editor to complete the task. Start by asking the LLM to generate the game code for a simple jump and run game. Then, continue to improve the game together with the LLM step by step. We will present the most interesting games today at the end of the lecture.

That’s it!

You can find the solutions to these exercises online in the associated GitHub repository, but we will also quickly go over them in next week’s tutorial. To access the solutions, click on the Github button on the lower right and search for the folder with today’s lecture and tutorial. Alternatively, you can ask ChatGPT or Claude to explain them to you. Remember, the goal is not just to complete the exercises, but to understand the concepts and improve your programming abilities.