Tutorial VIII - Data Visualization

Programming with Python

Simulation of a random walk for stock prices

In this excercise, you will create a program that is able to simulate a random walk for stock prices. The program should ask the user for the initial stock price, the number of days to simulate and the daily standard deviation of the stock price. Then, the program should simulate the random walk and visualize the stock price over time. Use the `numpy` library to generate random numbers and the `matplotlib` library to visualize the stock price over time.

```
# Simulation of a random walk
# TODO: Create a program that is able to simulate a random walk.
# Your code here
```

Data Analysis Project: Company Performance

In this task, you'll work on a more complex data analysis project using both NumPy and Pandas. You'll analyze company performance data, calculate various metrics, and create visualizations.

```
# TODO: Data Analysis Project: Company Performance
# - Create a Pandas DataFrame with the following columns:
#   'Date', 'Department', 'Sales', 'Expenses', 'Customer_Satisfaction'
# - Generate random data for 100 rows, spanning the last 3 months.
# - Use NumPy to calculate the following metrics:
#   a) Total sales and expenses for each department
#   b) Average customer satisfaction score
#   c) Profit margin (as a percentage) for each department
# - Create a line plot showing daily sales for each department over time.
# - Generate a bar plot comparing the profit margins of different departments.
# - Save the plots as image files.
# - Write a brief report summarizing your findings, including the top-performing department.

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from datetime import datetime, timedelta

# Your code here
```