DOES SCREEN TIME AFFECT MY SLEEP?

1. Motivation

I aim to understand better any linkage between my sleep and screen time habits.

2. Data source

SLEEP DURATION	DAYS	SCREEN TIME
6 H 23 Min	1	8 H 46 Min
6 H 35 Min	2	11 H 51 Min
7 H 20 Min	3	10 H 49 Min
6 H 25 Min	4	10 H 03 Min
8 H 15 Min	5	14 H 46 Min
8 H 30 Min	6	8 H 56 Min
6 H 50 Min	7	9 H 56 Min
7 H 32 Min	8	8 H 23 Min
6 H 39 Min	9	11 H 28 Min
7 H 03 Min	10	9 H 48 Min
8 H 37 Min	11	4 H 8 Min
9 H 23 Min	12	5 H 47 Min
7 H 24 Min	13	8 H 57 Min
8 H 40 Min	14	3 H 48 Min

3. Data analysis

Analysis of Sleep Duration and Screen Time

This report examines the relationship between **Sleep Duration** and **Screen Time** using **exploratory data analysis**, **correlation analysis**, and **linear regression**. The dataset includes **14 observations** with measurements recorded in hours. The analysis aims to uncover trends and assess whether screen time has a **significant** impact on sleep duration.

Step 1: Data Preprocessing and Cleaning

```python
import pandas as pd  # For working with tabular data

import matplotlib.pyplot as plt  # For creating visualizations

import numpy as np  # For performing numerical operations

from scipy.stats import t  # For calculating t-statistics and p-values
```

- pandas: Enables handling and manipulation of structured data.

- matplotlib.pyplot: For creating scatter plots and regression visuals.

- numpy: Provides numerical operations.

- scipy.stats.t: Used to perform significance testing.

```python
data = {
'Sleep Duration (Hours)': [...],
'Screen Time (Hours)': [...]

df = pd.DataFrame(data)
```

- The dataset contains two variables: Sleep Duration and Screen Time.

- It is converted into a structured DataFrame for analysis.

Sleep Duration (Hours)	Screen Time (Hours)
6.38	8.77
6.58	11.85
7.33	10.82
6.42	10.05
8.25	14.77
8.50	8.93
6.83	9.93
7.53	8.38
6.65	11.47
8.62	4.13
9.38	5.78
7.40	8.95
8.67	3.80

Step 2: Exploratory Data Analysis (Scatter Plot)

```
plt.figure(figsize=(8, 6))

plt.scatter(df['Screen Time (Hours)'], df['Sleep Duration (Hours)'], color='blue',

alpha=0.7)

plt.title('Screen Time vs Sleep Duration')

plt.xlabel('Screen Time (Hours)')

plt.ylabel('Sleep Duration (Hours)')

plt.grid(True)

plt.show()
```
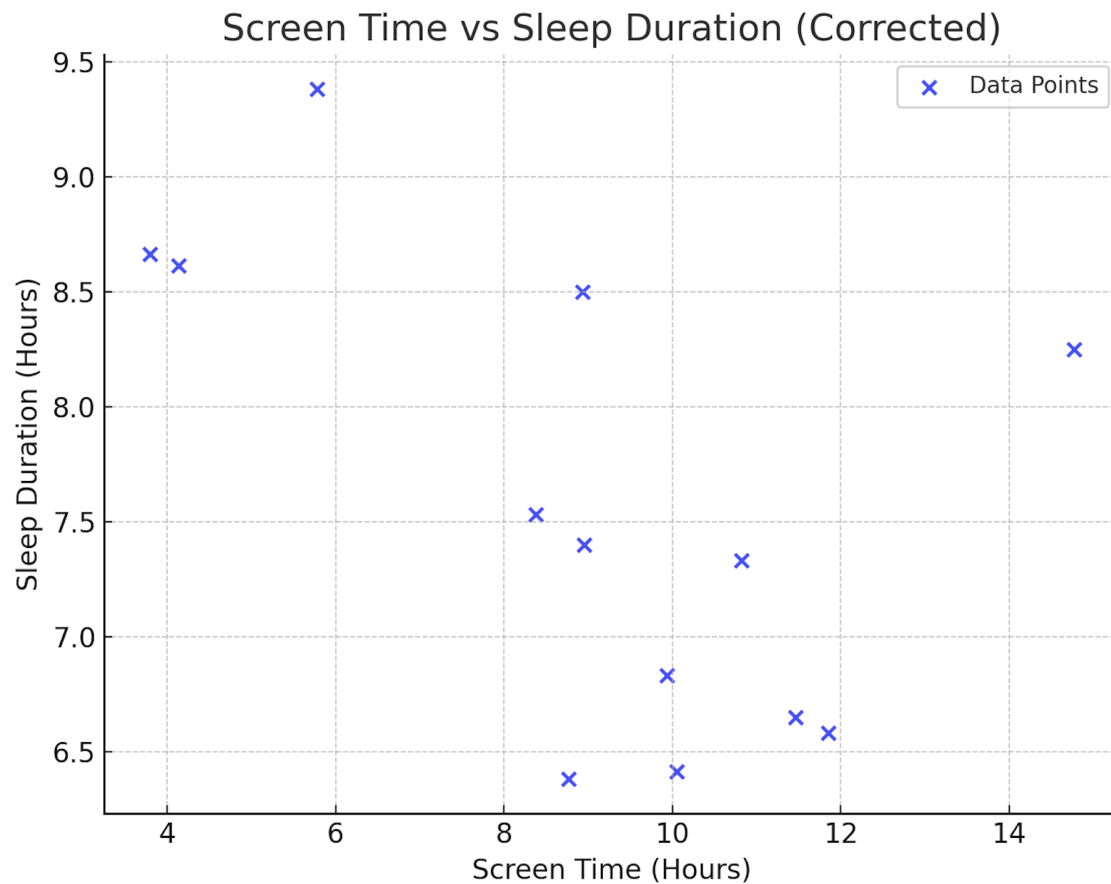
A scatter plot is created to visualize the relationship between screen time and sleep duration.

Screen Time vs Sleep Duration (Corrected)

- Screen Time (x-axis) vs. Sleep Duration (y-axis).

- Points indicate variability and potential trends.

Step 3: Correlation Analysis

correlation = df['Screen Time (Hours)'].corr(df['Sleep Duration (Hours)'])

print(f"Correlation coefficient: {correlation:.2f}")

- Pearson correlation coefficient quantifies the strength of the linear relationship.

- Output: The correlation coefficient (rr) is **-0.53**, indicating a moderate negative relationship between screen time and sleep duration..

Step 4: Significance Testing

n = len(df) # Number of observations

t_statistic = correlation * np.sqrt((n - 2) / (1 - correlation**2))

p_value = 2 * (1 - t.cdf(abs(t_statistic), df=n-2))

print(f"t-statistic: {t_statistic:.2f}, p-value: {p_value:.4f}")

 A t-test is used to assess the significance of the correlation.

- **t-Statistic**:

- The t-statistic is **-2.10**, which measures the strength of the evidence against the null hypothesis.

p-Value:

- The p-value is **0.060**, slightly above the standard threshold (p=0.05p=0.05), indicating the relationship is not statistically significant at the 5% level but is close.

Null hypothesis rejected.

Step 5: Regression Analysis

from sklearn.linear_model import LinearRegression

X = np.array(df['Screen Time (Hours)']).reshape(-1, 1)

y = np.array(df['Sleep Duration (Hours)'])

model = LinearRegression()
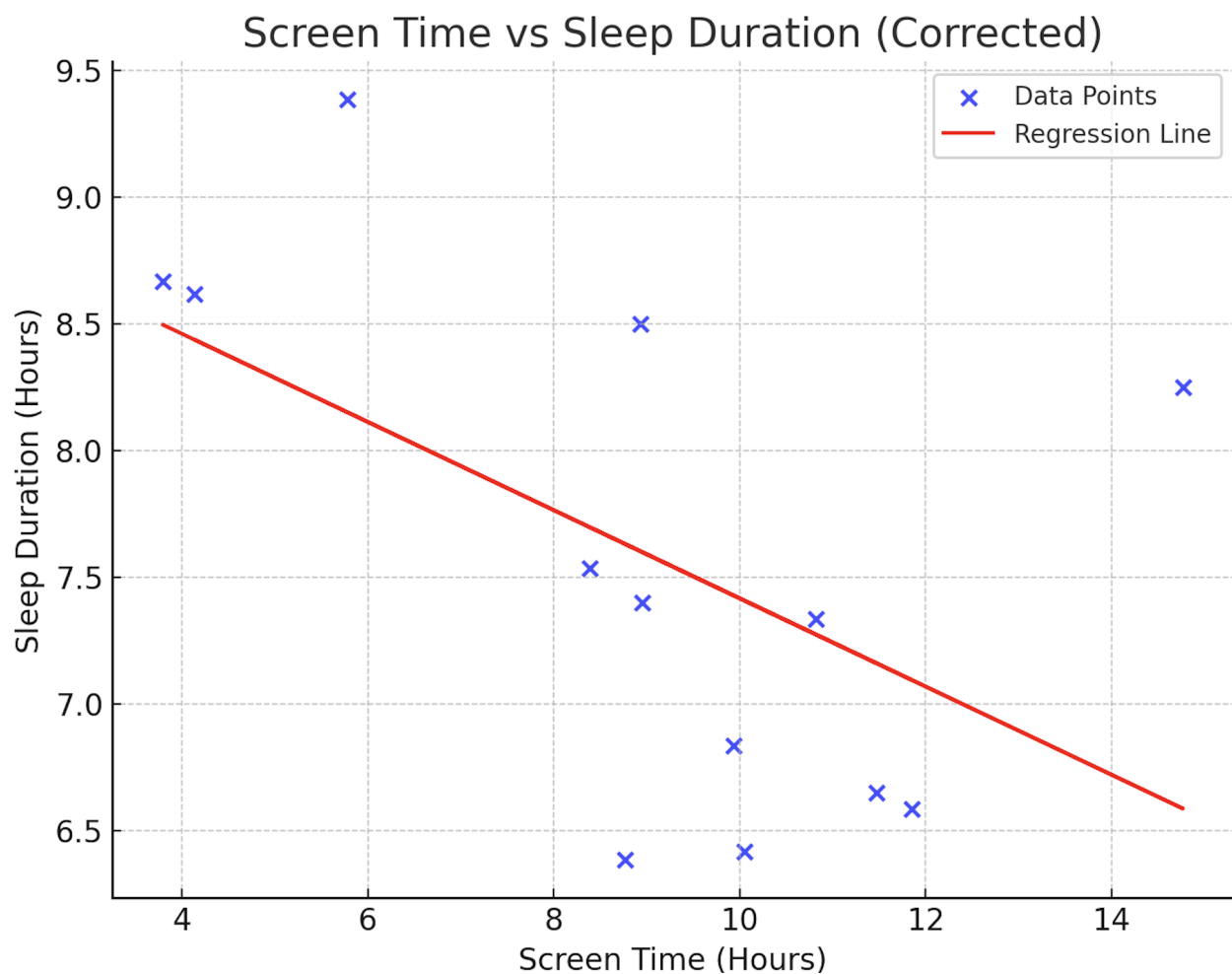
model.fit(X, y)

y_pred = model.predict(X)

- Linear regression is used to predict Sleep Duration based on Screen Time.

- The equation for the regression line is: Sleep Duration = −0.174 · Screen Time + 9.156

This suggests that for every additional hour of screen time, sleep duration decreases by **0.17 hours** (approximately 10 minutes).

4. Findings: Screen time negatively impacts sleep duration.

5.a Limitations: Small dataset and unaccounted confounding variables. E.g. Caffeine and nicotine consumption, physical activity, stress levels, sleep location, what time I slept.

5.b Future Work: Include these additional factors and collect more data. Collect data from other persons as well to see if there is a trend in the general population. General sleep trend analysis would also be helpful to better analyze any individual sleep/screen habit relationship.