

DATA 200
TRIPLE VISION

ANALYZING FACTORS
AFFECTING SLEEP DURATION
AMONG STUDENTS

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INTRODUCTION

- Many students suffer from insufficient sleep.
- Common causes: Screen time, stress, academic pressure, lack of exercise.

Goal

Find out which lifestyle and academic factors influence sleep duration the most.

OBJECTIVES



Apply statistical
and predictive
techniques.

kaggle

Use a real-world
dataset



Identify major
contributors to
sleep duration.



Build a simple
application to
demonstrate
findings.

LITERATURE REVIEW SUMMARY

- STUDY 1: Screen time negatively correlates with sleep duration(Alshoaibi et al., 2023)
- STUDY 2: High academic pressure leads to sleep deprivation(Chang et al., 2021) .
- STUDY 3: Physical activity improves sleep quality and duration(Timati et al., 2024) .

INDUSTRY BACKGROUND

WHAT IS THE INDUSTRY'S HISTORY
AND WHAT ARE ITS USUAL TRENDS?
DO YOU SEE NEW PATTERNS
DEVELOPING? GIVE A PREDICTION
OR OUTLOOK ABOUT WHERE THE
INDUSTRY IS HEADED.

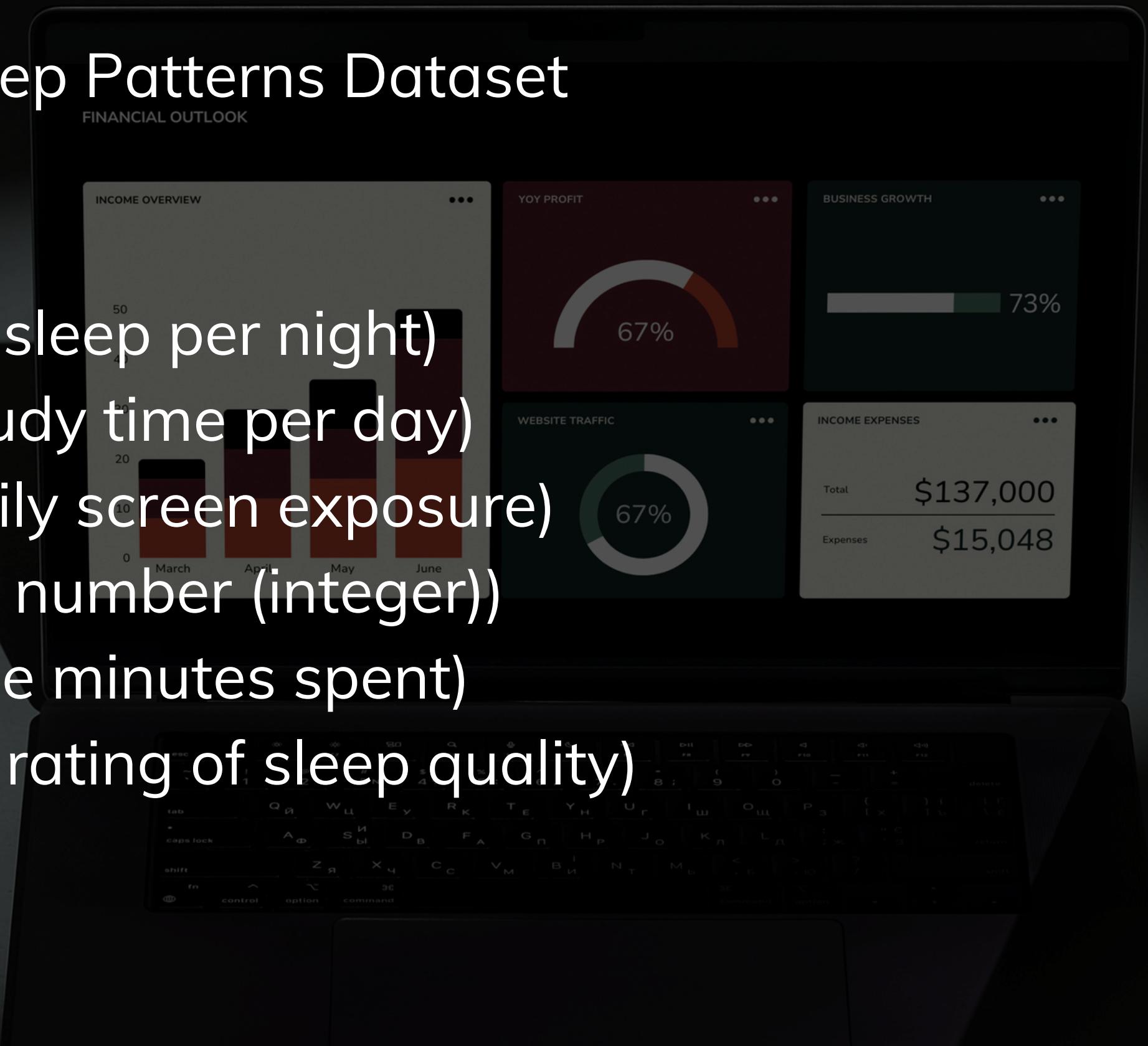


DATASET SELECTION

- Source: Kaggle – Student Sleep Patterns Dataset

- Variables Analyzed:

- sleep_duration (Hours of sleep per night)
- study_hours (Average study time per day)
- screen_time (Average daily screen exposure)
- caffeine_intake (Average number (integer))
- physical_activity (Average minutes spent)
- sleep_quality (Subjective rating of sleep quality)



EXPLORATORY DATA ANALYSIS (EDA)

Sample Size: 500+ students

- Average Sleep Duration: ~6.6 hours

Descriptive Stats Show:

- Screen time ranged from ~1.5 to 12+ hours

Data Cleaning

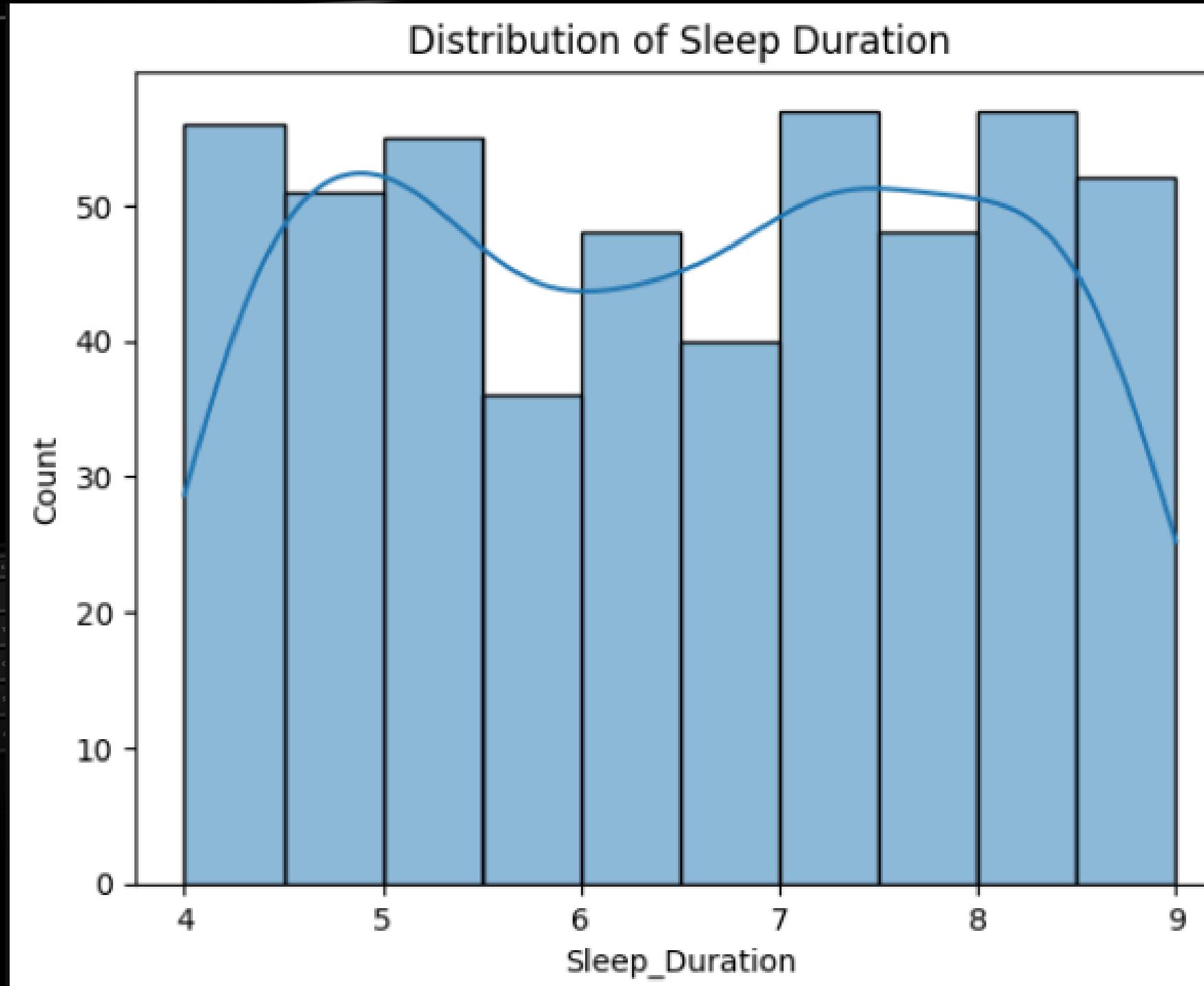
- Removed duplicates
- Handled missing values
- Encoded categorical variables (e.g., gender, university_year)



EXPLORATORY DATA ANALYSIS (EDA)

VISUALIZATIONS

HISTOGRAM OF SLEEP DURATION

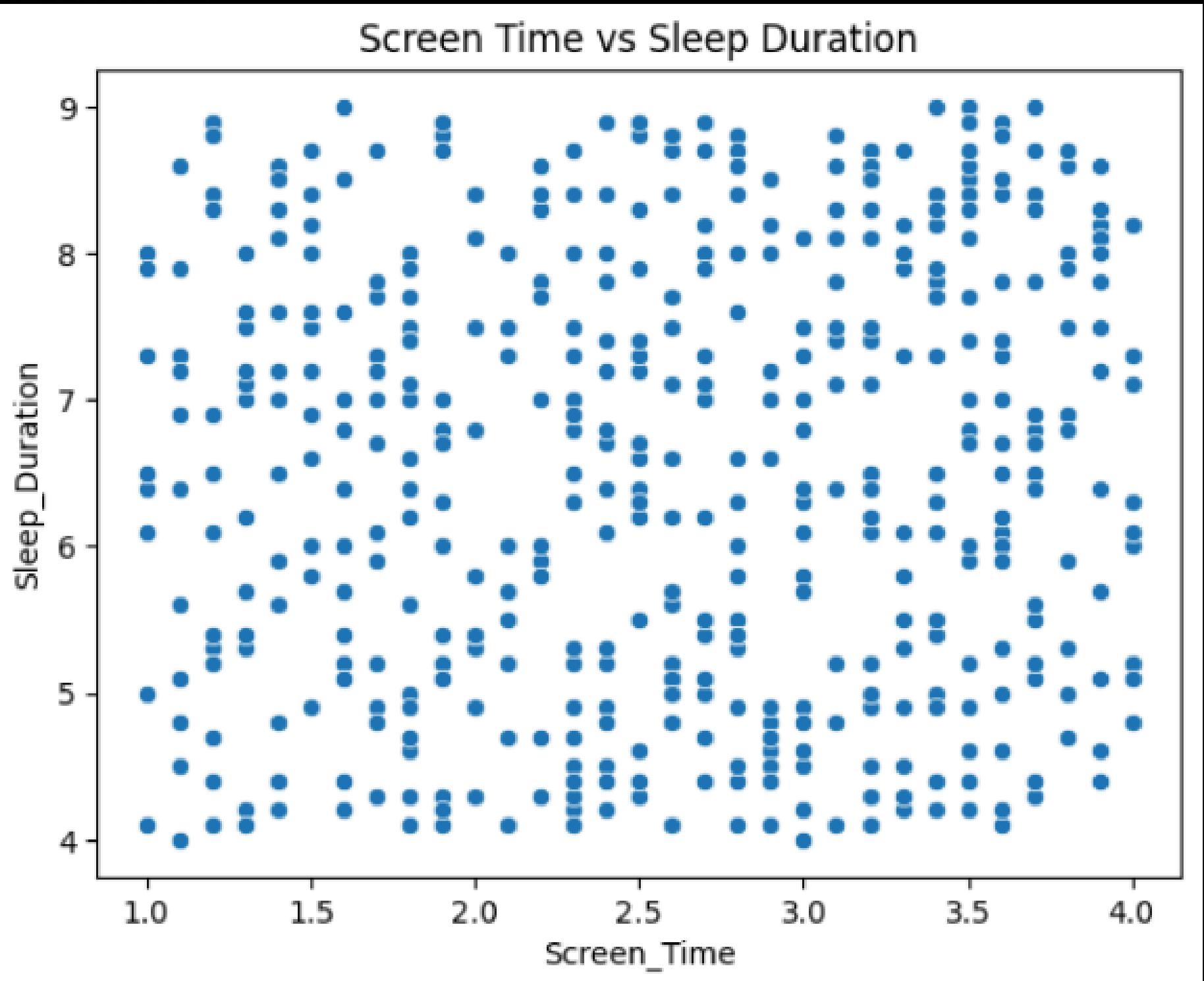
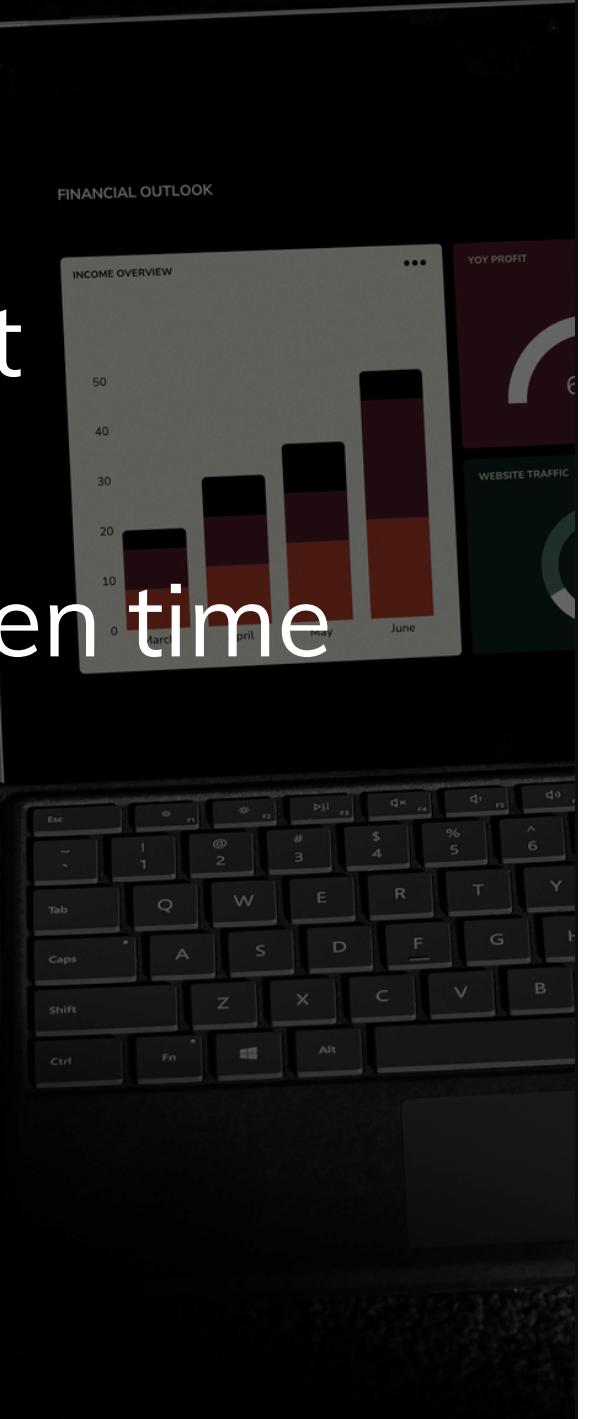


EXPLORATORY DATA ANALYSIS (EDA)

VISUALIZATIONS

SCATTER PLOT (SCREEN TIME VS SLEEP DURATION)

- Each dot = one student
- No clear pattern
- Sleep varies at all screen time levels
- No strong link found

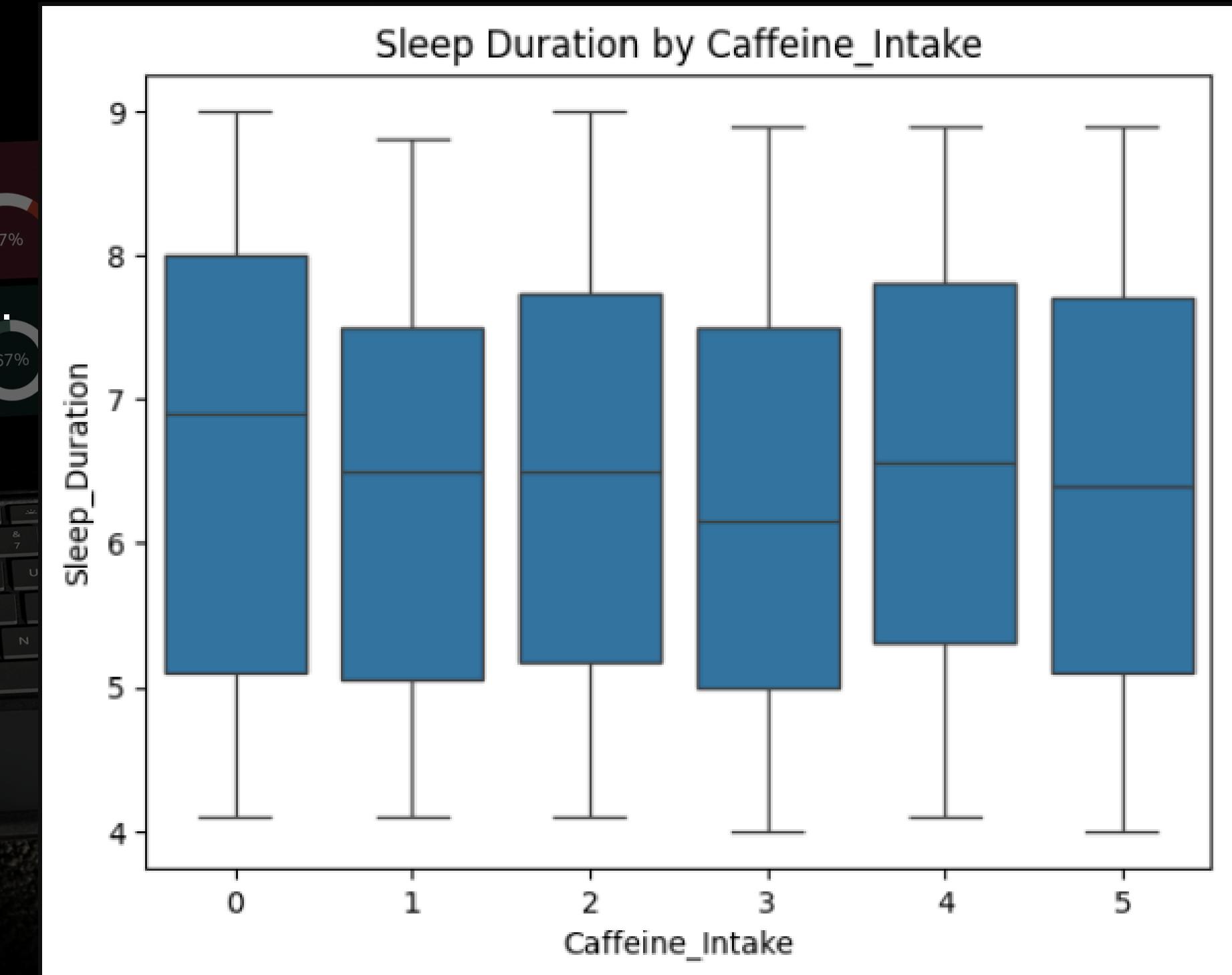


EXPLORATORY DATA ANALYSIS (EDA)

VISUALIZATIONS

BOX PLOT (CAFFEINE VS SLEEP DURATION)

- Compares sleep hours across caffeine levels (0 to 5).
- Highest median sleep: Level 0 (~6.9 hrs).
- Lowest median sleep: Level 3 (~6.1 hrs).
- After level 3, sleep slightly increases or levels off.
- Overall sleep range is similar across all levels (4–9 hrs).



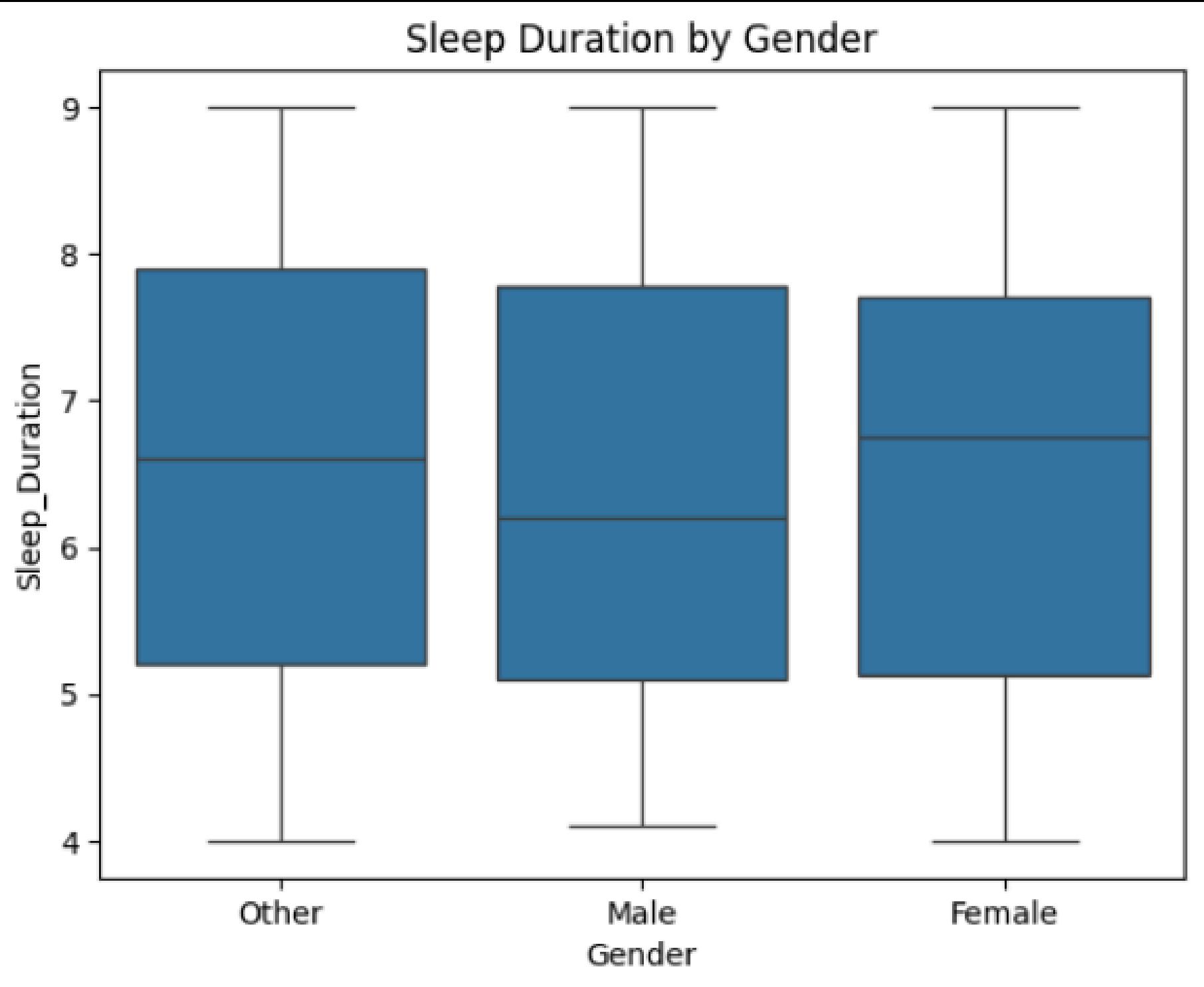
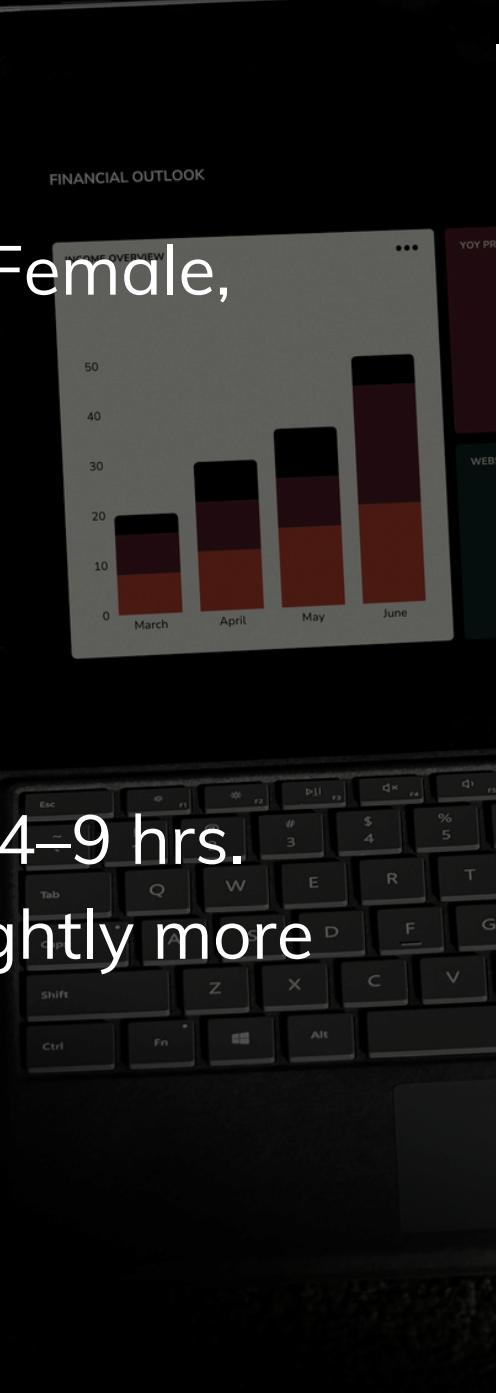
EXPLORATORY DATA ANALYSIS (EDA)

VISUALIZATIONS

BOX PLOT (GENDER VS SLEEP DURATION)

Sleep Duration by Gender

- Shows sleep distribution for Male, Female, and Other.
- Median sleep:
 - Female ~6.8 hrs
 - Other ~6.7 hrs
 - Male ~6.2 hrs
- Range: All genders sleep between 4–9 hrs.
- Insight: Females & Others sleep slightly more than Males.

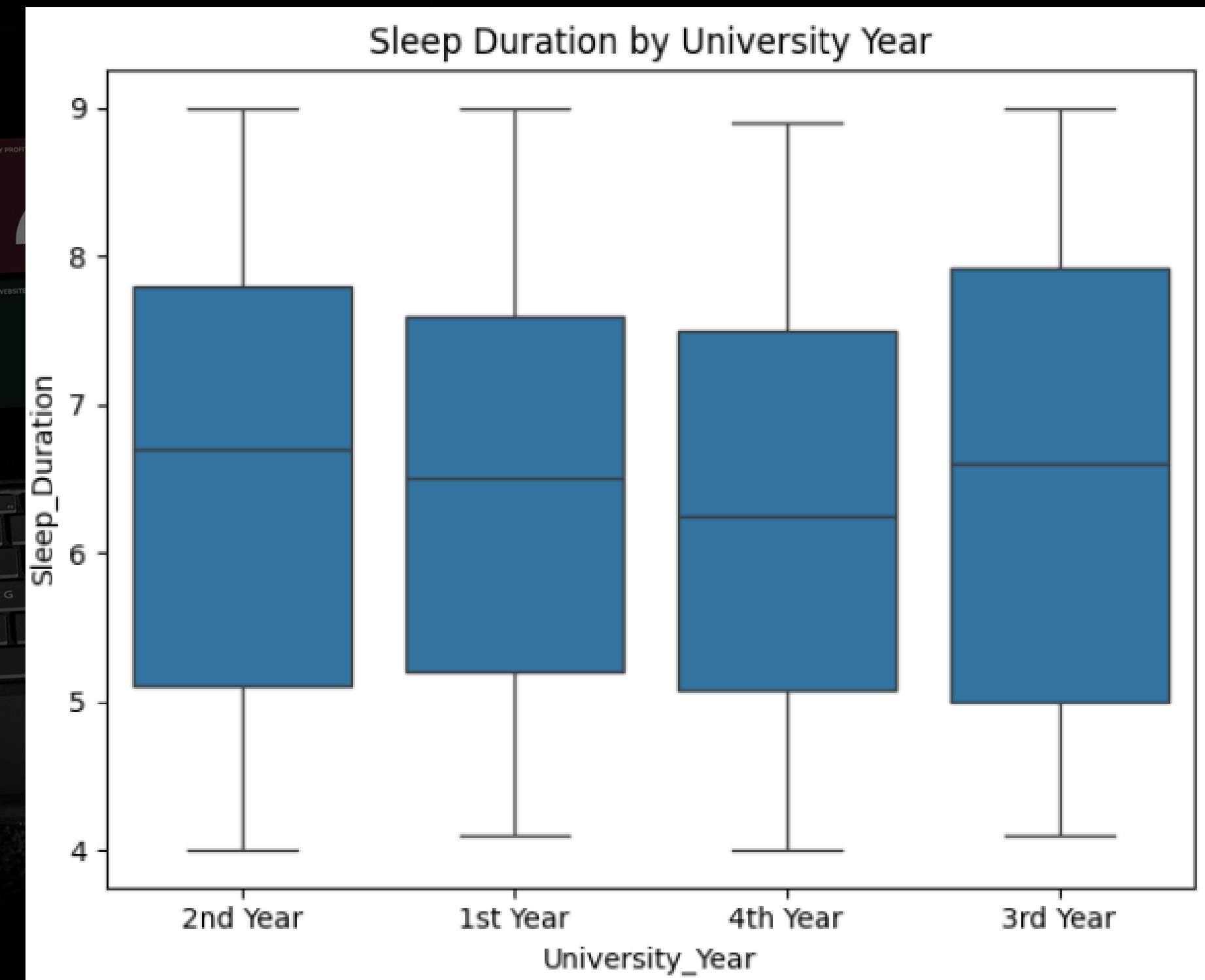


EXPLORATORY DATA ANALYSIS (EDA)

VISUALIZATIONS

BOX PLOT (UNIVERSITY YEAR AND SLEEP DURATION)

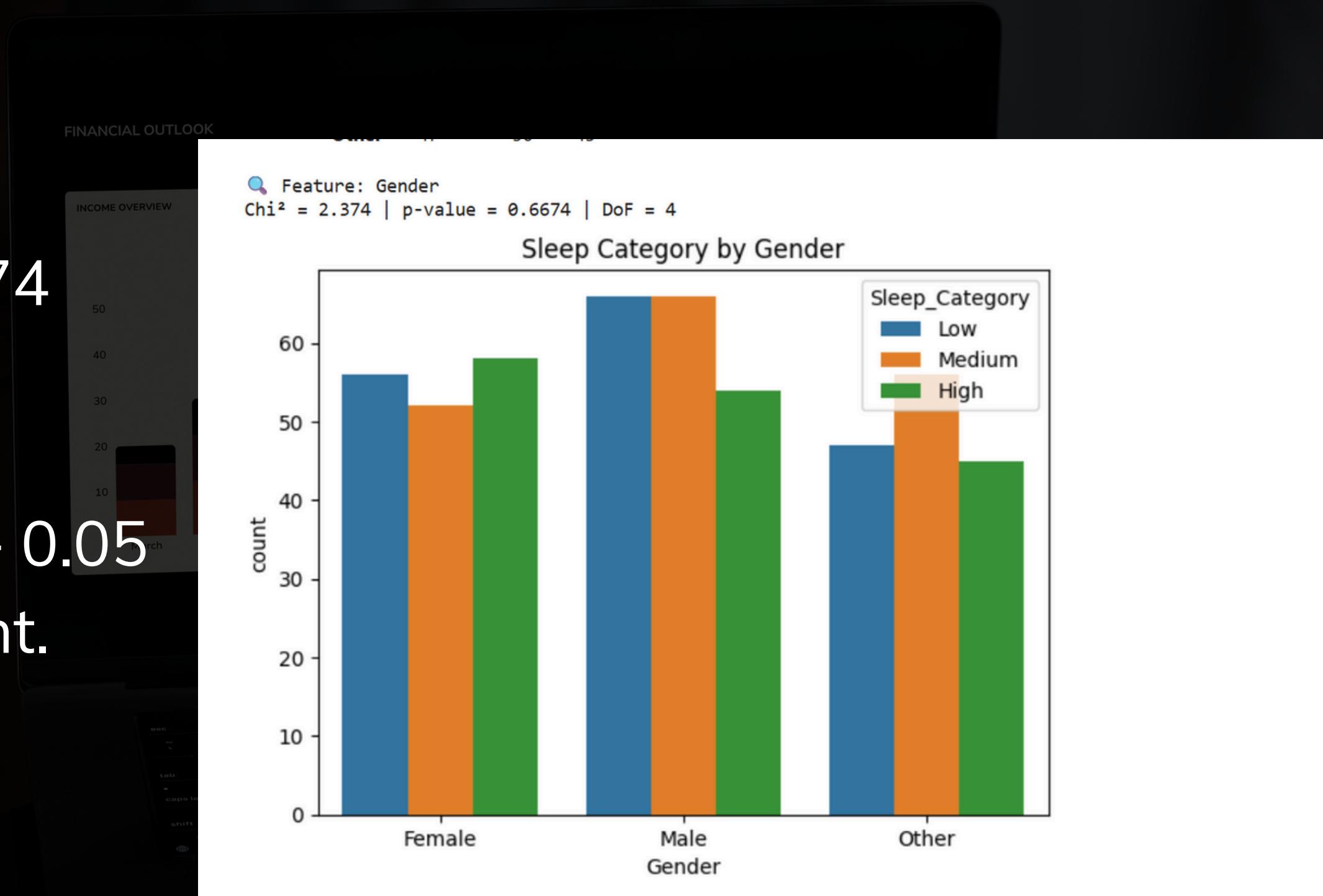
- Shows sleep distribution for each university year.
- 2nd-year students have highest median sleep (~6.7 hrs).
- 4th-year students sleep the least (~6.3 hrs).
- All years have similar range: 4–9 hrs.
- Slight trend of less sleep in later years.



STATISTICAL ANALYSIS

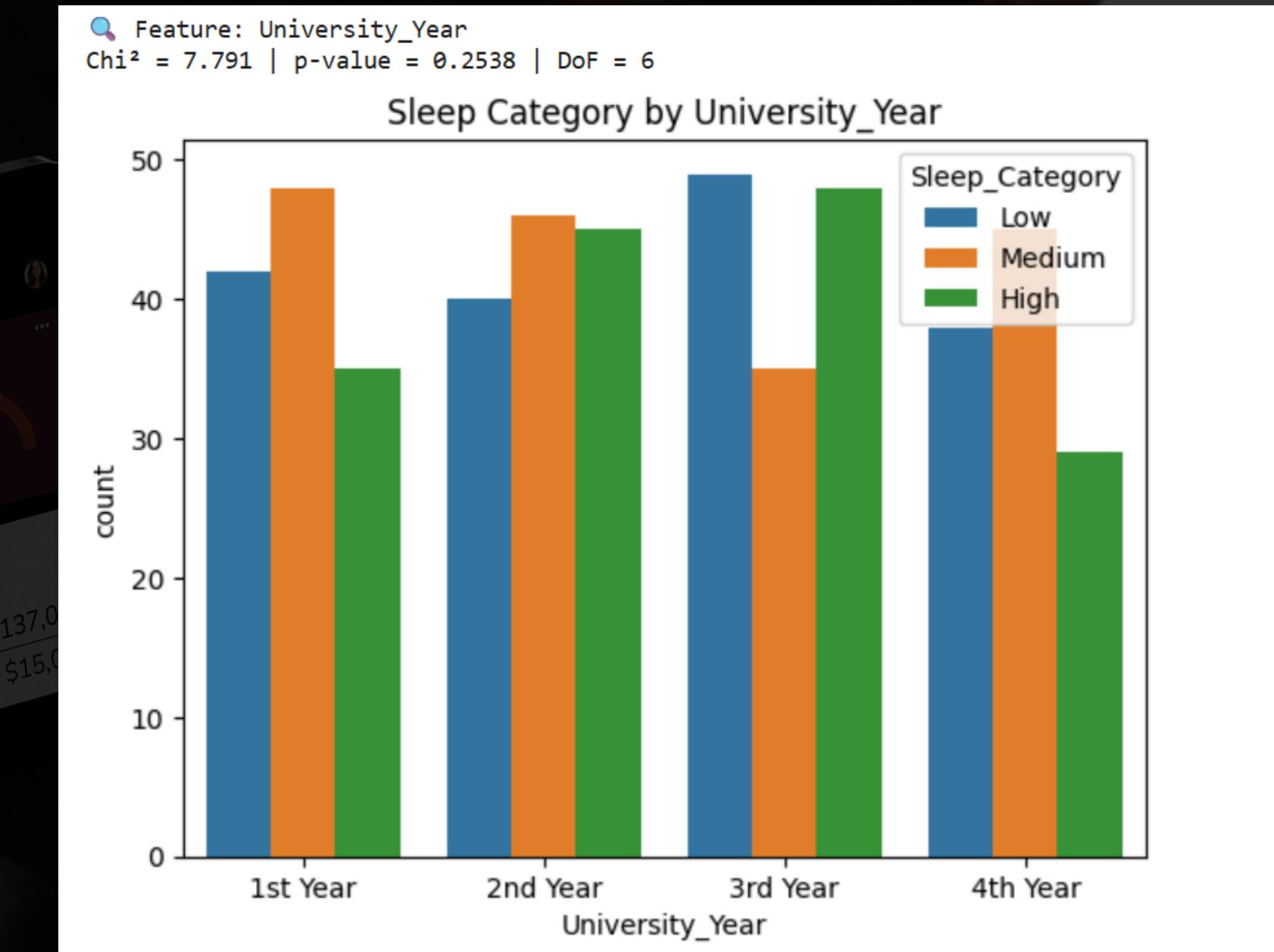
VISUALIZATIONS

- Test Statistic (Chi^2): 2.374
- Degrees of Freedom: 4
- p-value: 0.6674
- Interpretation: $p\text{-value} > 0.05$
- Not statistically significant.



STATISTICAL ANALYSIS & VALIDATION

- Chi-square Test Summary
- Test Statistic (Chi^2): 7.791
- Degrees of Freedom: 6
- p-value: 0.2538
- Interpretation: $p\text{-value} > 0.05$
- → Not statistically significant.



STATISTICAL ANALYSIS & VALIDATION

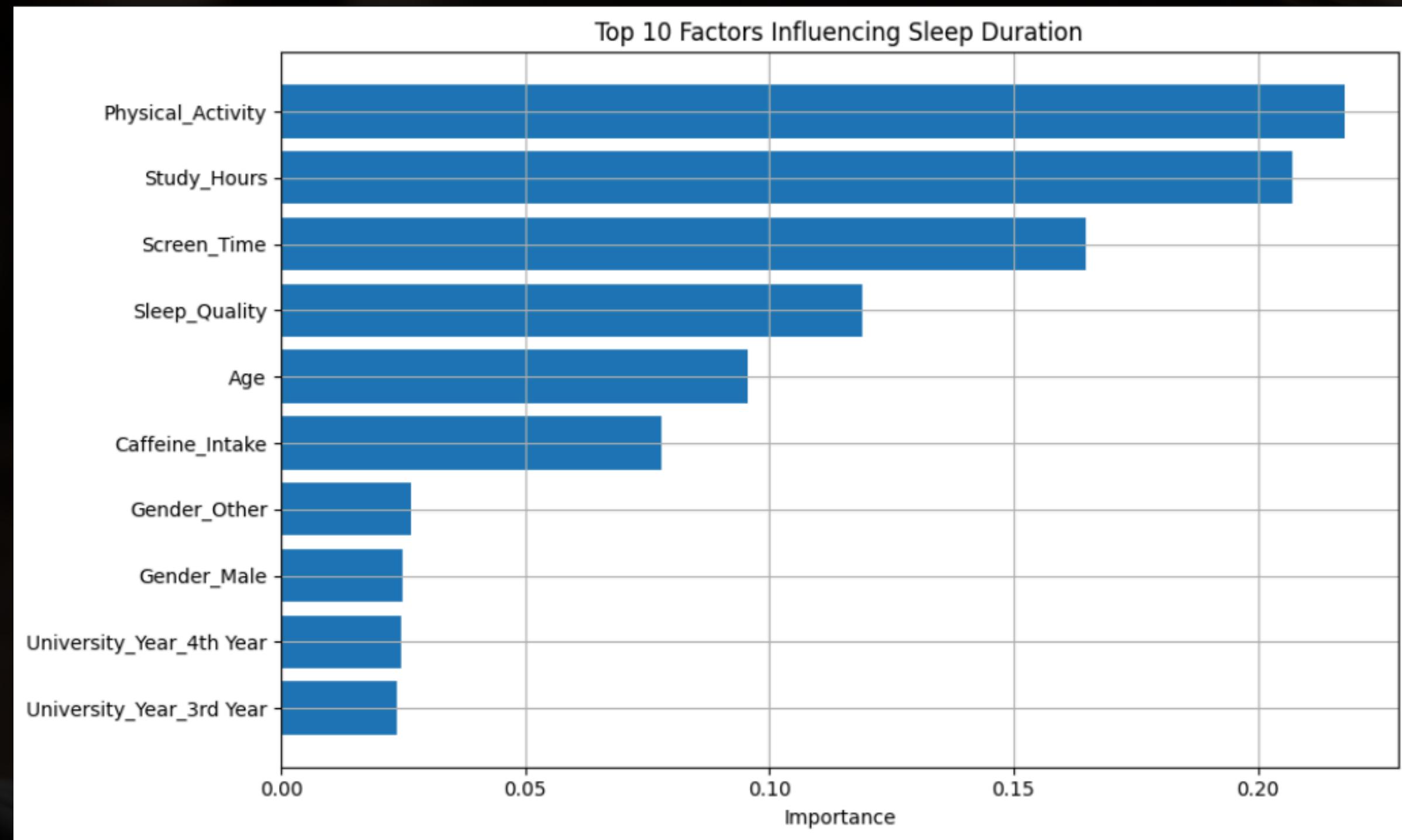
Numeric to Catergory

Sleep_Category	Low	Medium	High
Low	169	0	0
Medium	0	174	0
High	0	0	157

Sleep_Duration – Sleep_Category

STATISTICAL ANALYSIS & VALIDATION

Feature Importance



STATISTICAL ANALYSIS & VALIDATION

Random Forest

Regression modeling helped us:

- Predict sleep duration
- Quantify how much each variable contributes to that prediction
- Reveal the most influential habits/traits tied to student sleep

LIMITATIONS AND IMPROVEMENTS

- Small dataset: The data may not fully represent all students.
- Self-reported answers: Sleep hours and other inputs may not be 100% accurate.
- Use more data: Collect data from more students for better results.
- Add new features: Include stress, mood, bedtime habits, and diet.

OVERALL FINDINGS



APPLICATION DEMONSTRATION



CONCLUSIONS

- Successfully applied statistical techniques to identify key sleep predictors
- Developed a working model with strong predictive power
- Created a **basic application** to raise awareness and provide personalized feedback
- The project shows that simple lifestyle changes can improve sleep

REFERENCES

- ALSHOAIBI, Y., BAFIL, W., & RAHIM, M. (2023). THE EFFECT OF SCREEN USE ON SLEEP QUALITY AMONG ADOLESCENTS IN RIYADH, SAUDI ARABIA. JOURNAL OF FAMILY MEDICINE AND PRIMARY CARE, 12(7), 1379–1388.
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