DAB 304 – Healthcare Analytics

Group 11


Sleep Analysis

Meet the team

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Problem Statement

Sleep constitutes a significant aspect of a healthy lifestyle, occupying roughly a third of our lives.

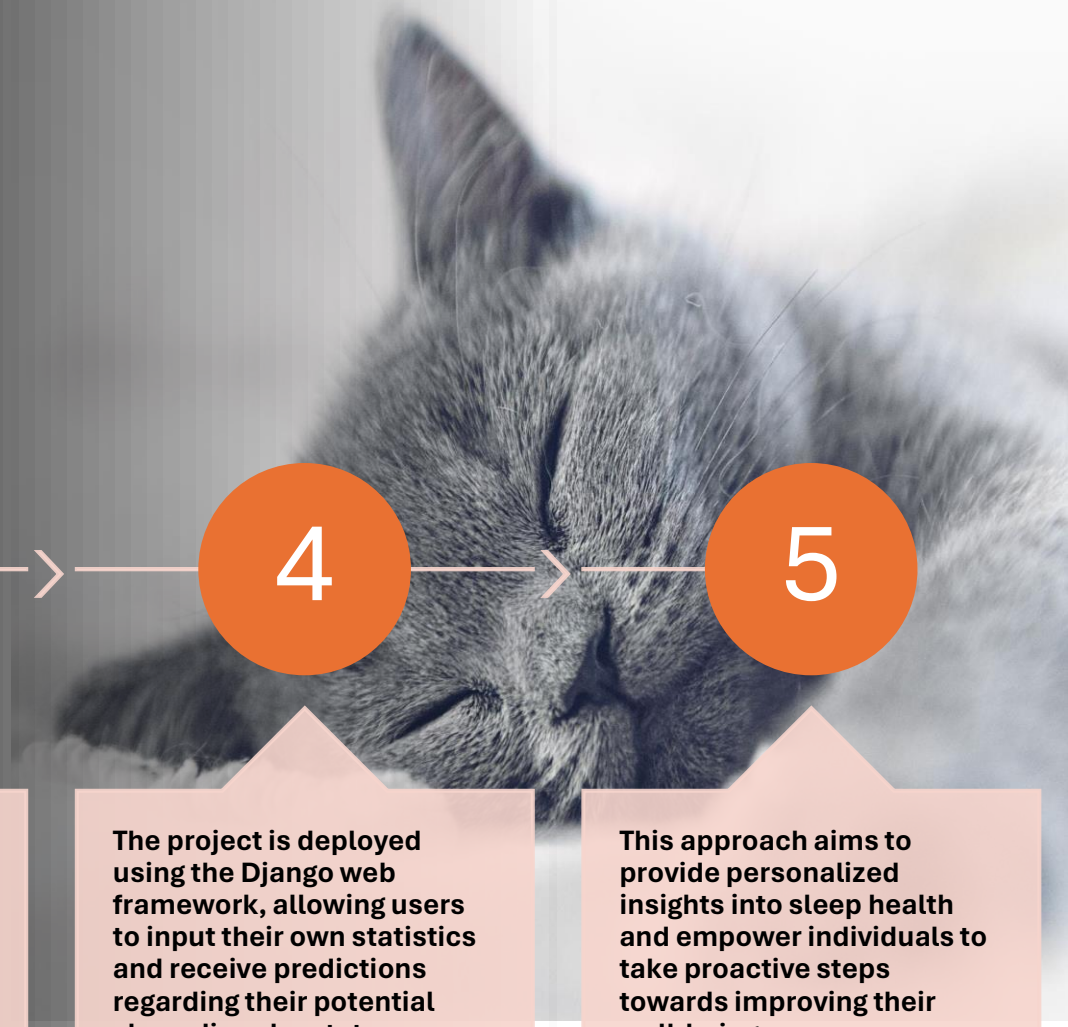
However, a substantial portion of the population, approximately one-third, suffers from insomnia or insufficient sleep.

Sleep deprivation and insomnia have profound impacts on physical and mental health, increasing the risk of conditions such as obesity, diabetes, cardiovascular diseases, and certain cancers.

Cognitive functions, including memory and decision-making abilities, are compromised by inadequate sleep, leading to decreased productivity.

Furthermore, it can put a strain on our relationships and social life. So, it's crucial to build good sleep habits for a happier, healthier life.

Solution



1

Utilizing the Sleep Health and Lifestyle dataset, we're examining various factors to uncover correlations with sleep disorders, specifically insomnia and sleep apnea.

2

The dataset comprises 374 rows and 13 columns, featuring diverse variables such as gender, age, occupation, sleep duration, quality, physical activity, stress levels, BMI, blood pressure, heart rate, daily steps, and the presence or

3

A classifier model has been developed to predict whether an individual is likely to have insomnia or sleep apnea based on their provided data.

4

The project is deployed using the Django web framework, allowing users to input their own statistics and receive predictions regarding their potential sleep disorder status.

5

This approach aims to provide personalized insights into sleep health and empower individuals to take proactive steps towards improving their well-being.

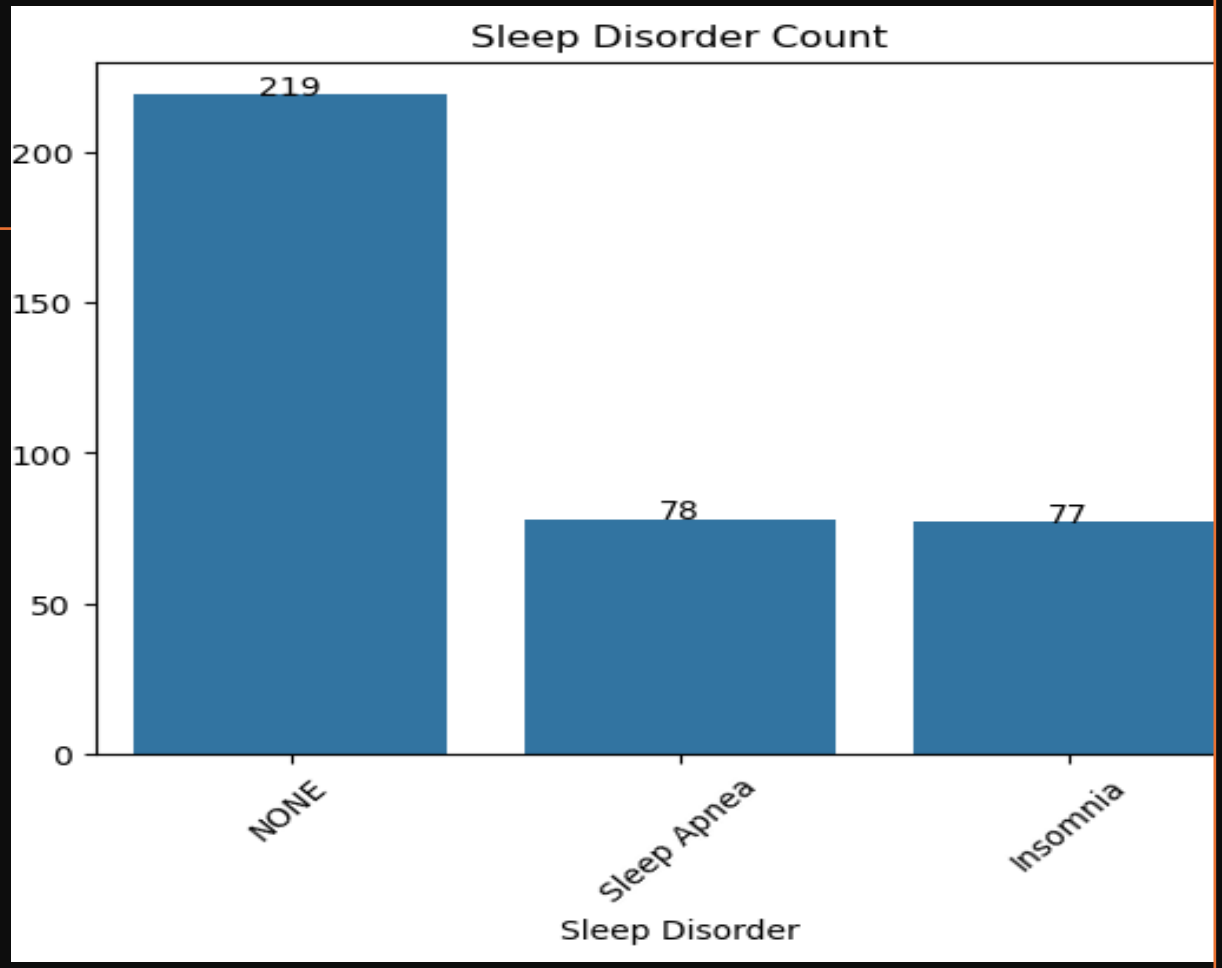
Sleep Disorder Count

Analyzing the data through a bar plot reveals insights into the sleep disorders among the 374 individuals studied:

The majority, comprising 219 individuals, do not exhibit any sleep disorders.

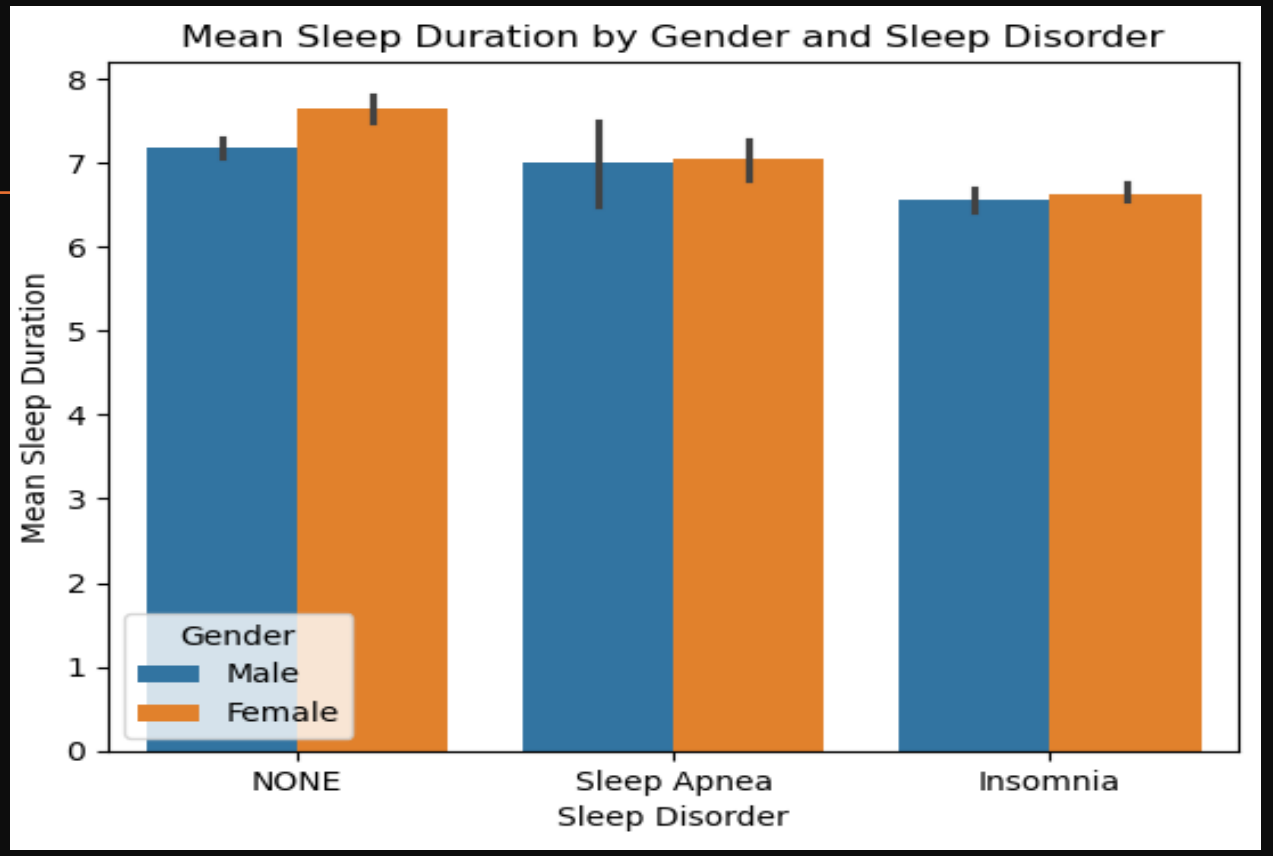
Among the remaining individuals:

- 78 suffer from sleep apnea.
- 77 suffer from insomnia.



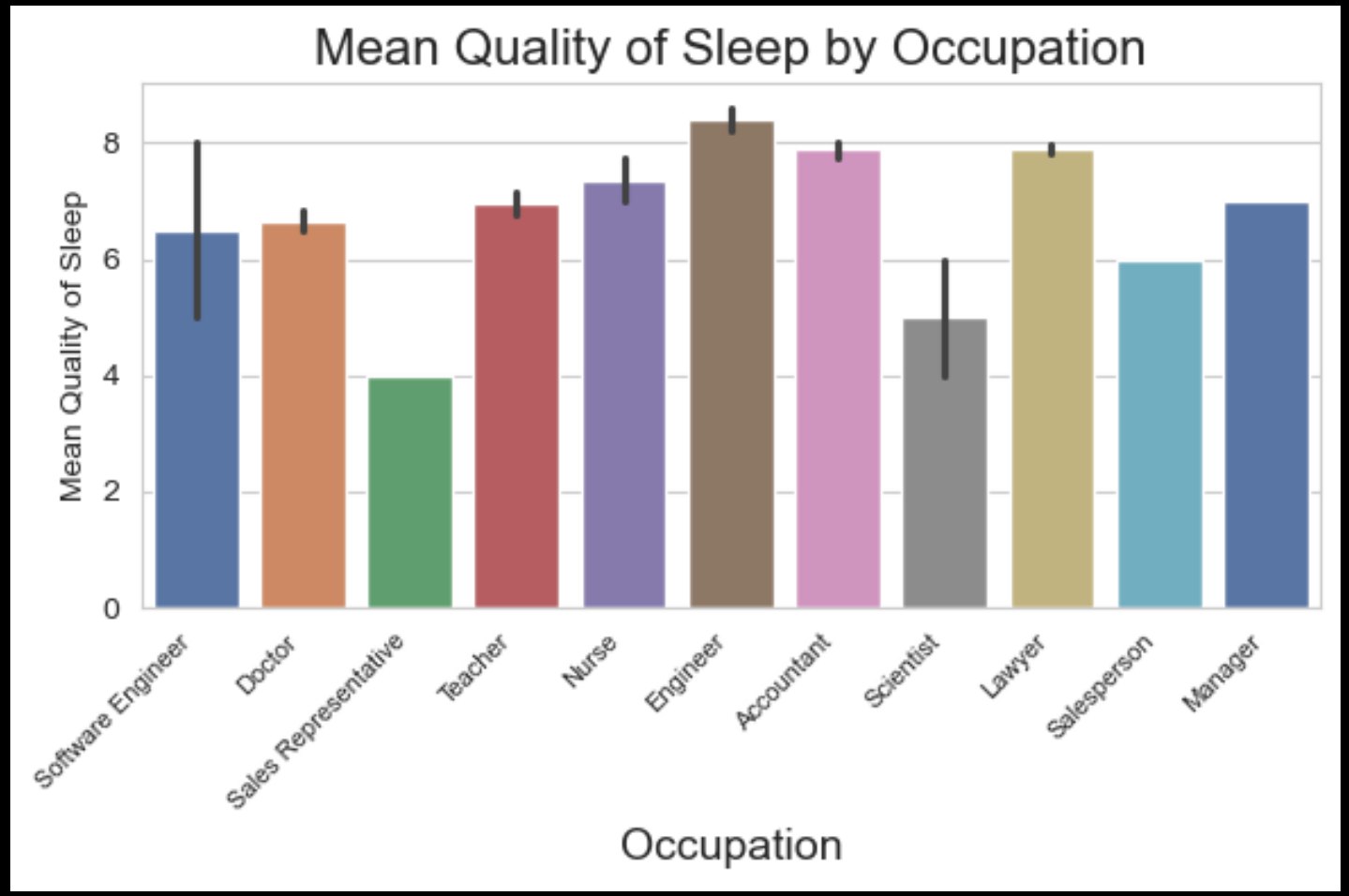
Mean Sleep duration by gender and disorder

- The data indicates that females generally have longer sleep durations than males.
- Individuals without sleep disorders tend to have longer sleep durations compared to those with insomnia or sleep apnea.



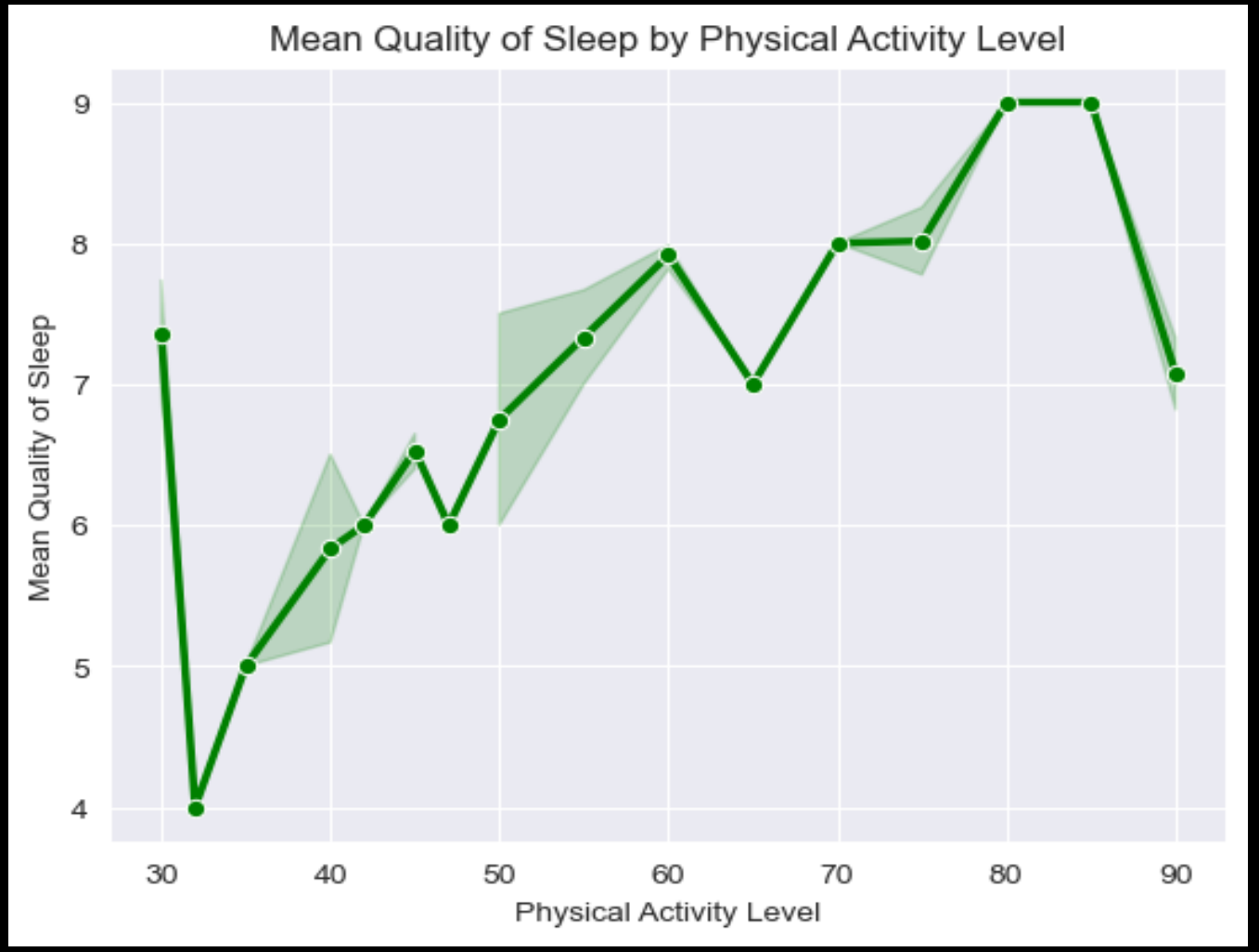
Mean quality of sleep by occupation

- Quality of sleep varies across different occupations.
- Engineers have the highest average sleep quality, while sales representatives and scientists report the lowest.
- Occupational demands likely influence sleep patterns and overall well-being.



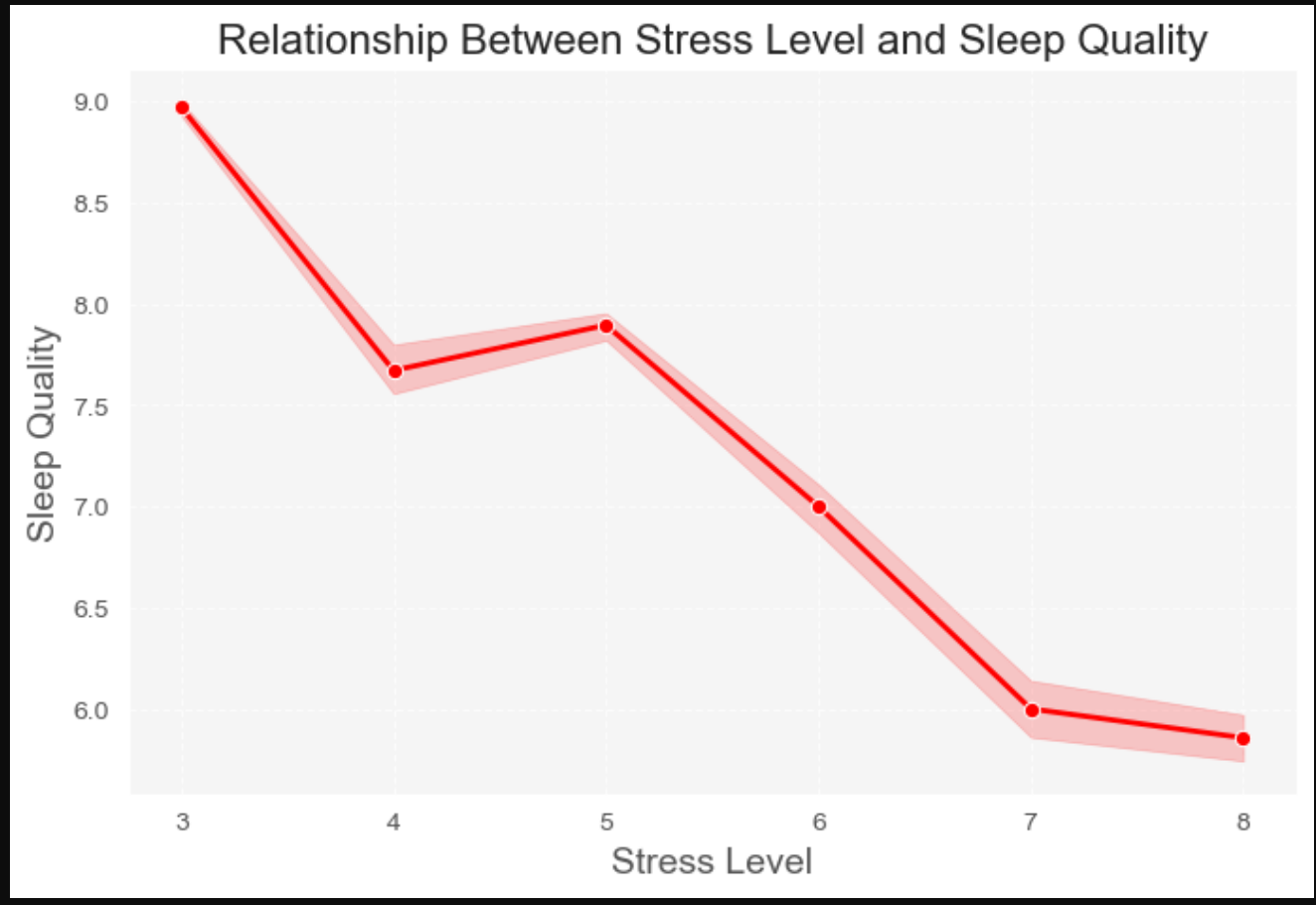
Physical activity v/s mean quality of sleep

- Physical activity level greatly impacts sleep quality.
- Higher activity levels, such as those around 70-90, correlates to better sleep quality, while lower levels of physical activity leads to poor quality of sleep.



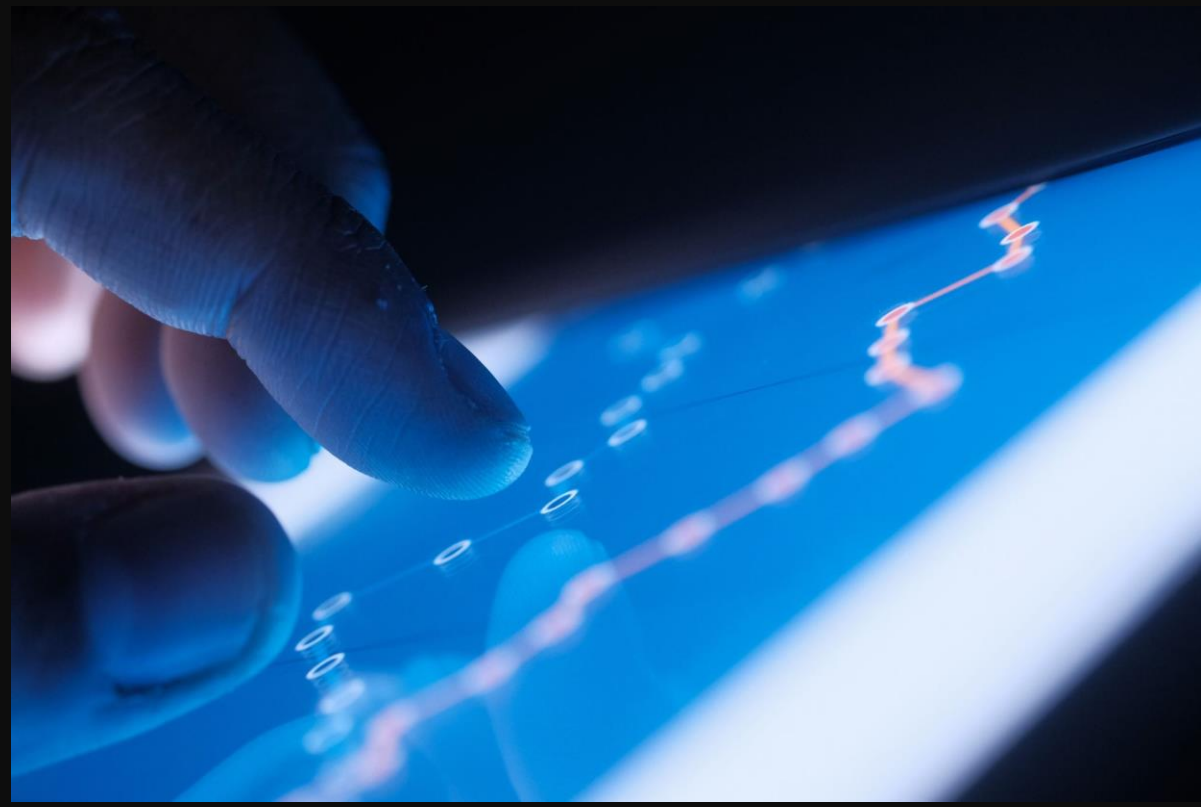
Stress and sleep quality

- There’s a direct relation between the quality of sleep and stress level in an Individual.
- It can be noted from the graph that high stress levels is inversely proportional to sleep quality.



Data preprocessing

- Categorical variables like occupation, gender, BMI, and sleep disorder were converted into numerical representations using LabelEncoder.
- The dataset was split into training and testing sets for model evaluation.
- Feature scaling was applied using the StandardScaler function to ensure consistent scaling across features.
- A pipeline was created to streamline the workflow, managing both the scaling and training processes of the model.



Serial No.	Classifier	Accuracy
1	Random Forest	88.00%
2	Decision Tree	89.33%
3	K-Nearest Neighbors	85.33%

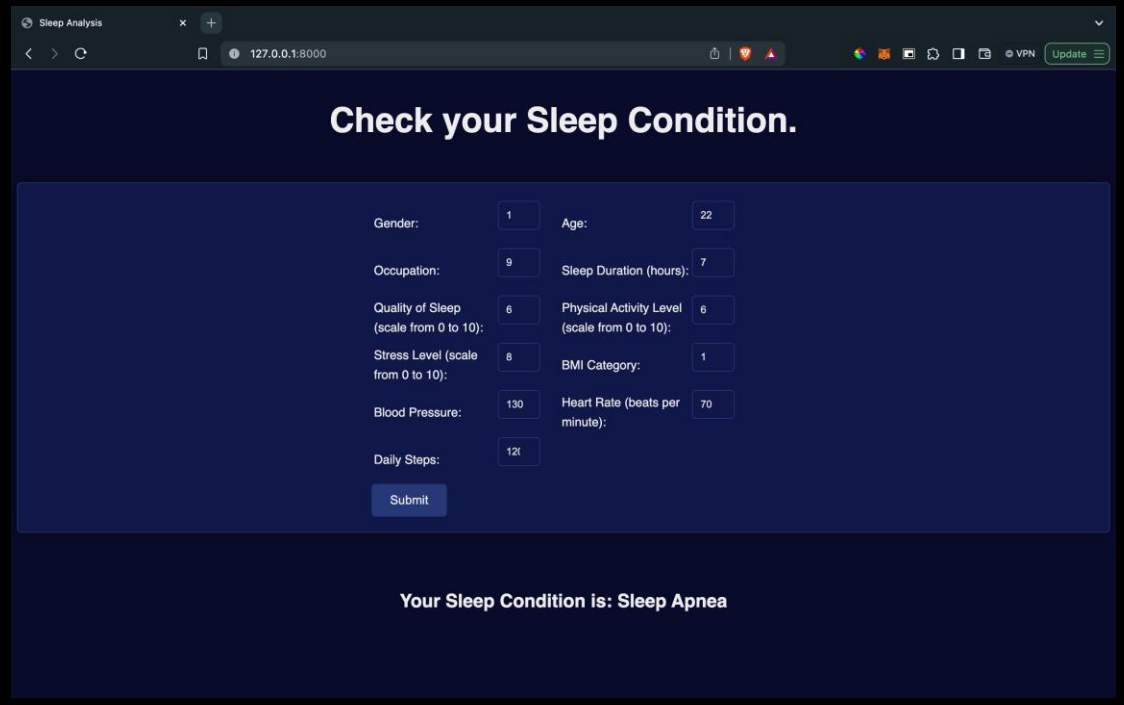
Results

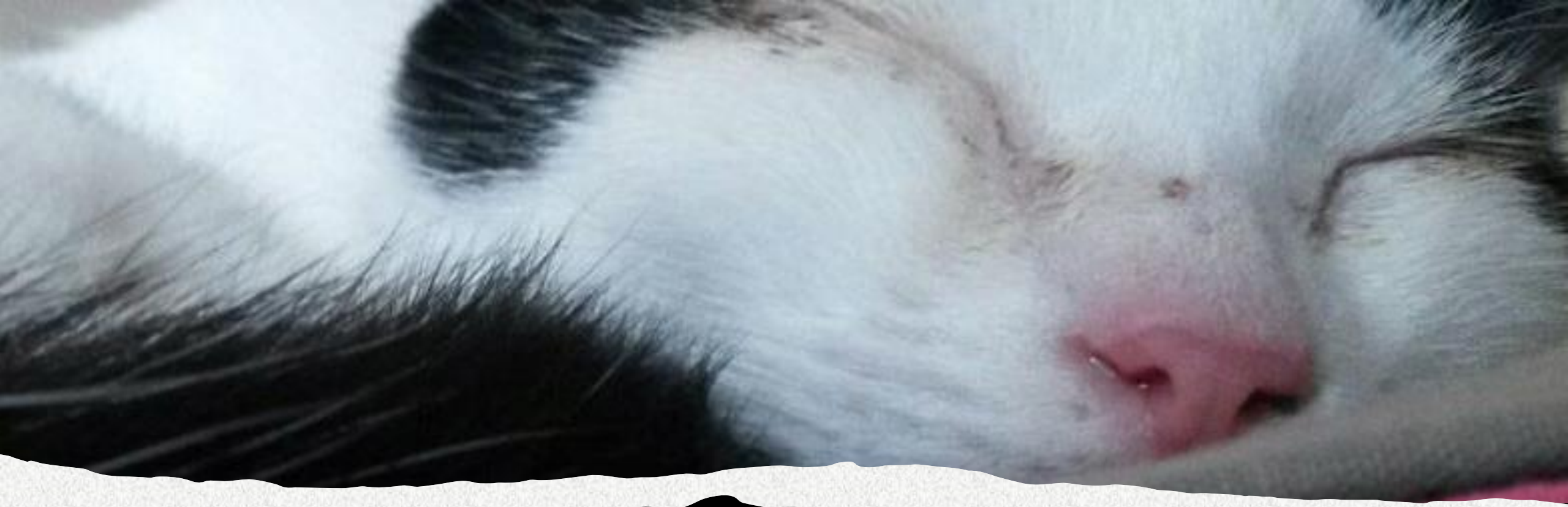
We used three different classifier: Random Forest, Decision Tree, and K-nearest neighbors (KNN) and the following accuracies were achieved.

The Decision tree classifier was found to be most accurate with an accuracy of 89.33%.

Web Deployment

- We successfully deployed the web application using Python's Django web framework.
- This web application allows the user to fill in the information and get a result stating their sleep condition.





Conclusion

- The analysis provides an insightful relation between various factors and the quality of the sleep. By identifying influence of gender, occupation, impact of physical activity, stress, etc., we gain valuable information regarding the diverse nature of sleep health.
- Using this knowledge base, recommendations could be tailored for enhancing the sleep health and well-being across diverse demographic population.

Thank you