

Project Documentation

1. INTRODUCTION

1.1 Project Overview

The project, "Sleep Oracle Anticipating Health and Lifestyle," aims to revolutionise sleep analysis by integrating lifestyle factors. This overview provides a snapshot of the project's significance in enhancing well-being.

1.2 Purpose

The purpose is to develop a comprehensive system that goes beyond traditional sleep analysis. By considering lifestyle factors, the Sleep Oracle provides personalised insights for users to improve sleep patterns and overall health.

2. LITERATURE SURVEY

2.1 Existing problem

Current sleep analysis systems lack a holistic approach, often neglecting crucial lifestyle factors. The literature survey identifies this gap and emphasises the need for a more integrated solution.

2.2 References

References include key works on sleep analysis, health datasets, and systems incorporating lifestyle factors. Notable sources are cited to provide a foundation for the project's development.

2.3 Problem Statement Definition

The problem lies in the inadequacy of existing sleep analysis tools to account for lifestyle variables. The Sleep Oracle seeks to address this by creating a unified system for comprehensive sleep insights.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

The empathy map canvas explores user needs and pain points related to sleep and health. It serves as a foundation for ideation, guiding the development of features that cater to user perspectives.

3.2 Ideation & Brainstorming

Ideation involves collaborative brainstorming to generate innovative features. The team explores solutions considering data accuracy, user engagement, and advanced technologies for a cutting-edge system.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional requirements detail user-centric features like sleep data input, personalized insights, and feedback mechanisms. Each requirement is linked to specific user stories for clarity.

4.2 Non-Functional requirements

Non-functional requirements encompass security measures, scalability, response times, and user interface responsiveness. Compliance with data protection regulations is emphasized.

5. PROJECT DESIGN

5.1 Data Flow Diagrams & User Stories

Data flow diagrams illustrate how information flows through the system. User stories capture specific interactions, detailing how users input data and receive personalized insights.

5.2 Solution Architecture

The high-level architecture includes components like data collection modules, machine learning algorithms, and a user-friendly interface. Integration points between these modules are outlined for clarity.

6. PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture

Technical architecture details technologies chosen for the backend, frontend, and database. Considerations include data encryption, API integration, and system dependencies.

6.2 Sprint Planning & Estimation

Sprint planning involves breaking down features into tasks, estimating effort, and prioritizing based on user value. This iterative process ensures continuous delivery of valuable increments.

6.3 Sprint Delivery Schedule

A detailed schedule outlines deliverables for each sprint, including feature implementation, testing, and user acceptance.

7. CODING & SOLUTIONING

(Explain the features added in the project along with code)

7.1 Feature 1

This feature includes a seamless interface for users to input sleep-related data. Code snippets demonstrate form validation, data submission, and integration with backend services.

7.2 Feature 2

Personalized Insight Generation

The code for personalized insight generation showcases the integration of machine learning models, considering sleep metrics and lifestyle factors. Visualization techniques may be highlighted.

7.3 Database Schema

The database schema outlines the organization of sleep-related data, ensuring efficiency in storage and retrieval. It includes tables for user profiles, sleep records, and

analysis results.

8. PERFORMANCE TESTING

8.1 Performance Metrics

Performance testing metrics include accuracy, confusion matrix, and classification report. Scalability tests ensure the system can handle increasing loads.

9. RESULTS

9.1 Output Screenshots

Screenshots exhibit the system's output, featuring personalized insights presented in a user-friendly interface. Examples showcase various scenarios, including different lifestyle inputs.

Logistic Regression:

✓
0s

[76] accuracy

0.6666666666666666

✓
0s

[77] confusion_matrix(y_test,y_pred)

```
array([[ 7, 13,  0],
       [ 3, 37,  1],
       [ 0,  8,  6]])
```

✓
0s

[78] print(classification_rep)

	precision	recall	f1-score	support
0	0.70	0.35	0.47	20
1	0.64	0.90	0.75	41
2	0.86	0.43	0.57	14
accuracy			0.67	75
macro avg	0.73	0.56	0.60	75
weighted avg	0.70	0.67	0.64	75

XGB Boost:

✓
0s [85] accuracy_score(y_test,y_pred1)

0.9066666666666666

✓
0s [86] confusion_matrix(y_test,y_pred1)

array([[16, 2, 2],
 [1, 40, 0],
 [1, 1, 12]])

✓
0s [87] print(classification_report(y_test,y_pred1))

	precision	recall	f1-score	support
0	0.89	0.80	0.84	20
1	0.93	0.98	0.95	41
2	0.86	0.86	0.86	14
accuracy			0.91	75
macro avg	0.89	0.88	0.88	75
weighted avg	0.91	0.91	0.91	75

Decision Tree:

```
[90] accuracy_tree = accuracy_score(y_test, y_pred_tree)
print("Decision Tree Accuracy:", accuracy_tree)
```

Decision Tree Accuracy: 0.9066666666666666

```
[91] classification_report_tree = classification_report(y_test, y_pred_tree)
print("Decision Tree Classification Report:\n", classification_report_tree)
```

Decision Tree Classification Report:

	precision	recall	f1-score	support
0	0.89	0.80	0.84	20
1	0.93	0.98	0.95	41
2	0.86	0.86	0.86	14
accuracy			0.91	75
macro avg	0.89	0.88	0.88	75
weighted avg	0.91	0.91	0.91	75

```
confusion_matrix(y_test, y_pred_tree)
```

```
array([[16,  2,  2],
       [ 1, 40,  0],
       [ 1,  1, 12]])
```

Random forest:

✓ [110] print(f"Accuracy: {accuracy}")

Accuracy: 0.9066666666666666

✓ [111] print("Confusion Matrix:")
print(conf_matrix)

Confusion Matrix:
[[16 2 2]
 [1 40 0]
 [1 1 12]]

✓ [112] print("Classification Report:")
print(classification_rep)

➡ Classification Report:

	precision	recall	f1-score	support
0	0.89	0.80	0.84	20
1	0.93	0.98	0.95	41
2	0.86	0.86	0.86	14
accuracy			0.91	75
macro avg	0.89	0.88	0.88	75
weighted avg	0.91	0.91	0.91	75

Random Forest (Hyper Parameter Tuning)


```
✓ [109] print(f"Accuracy: {accuracy}")
0s
Accuracy: 0.9066666666666666

✓ [110] print("Confusion Matrix:")
0s print(conf_matrix)

Confusion Matrix:
[[16  2  2]
 [ 1 40  0]
 [ 1  1 12]]

✓ [111] print("Classification Report:")
0s print(classification_rep)

Classification Report:
              precision    recall  f1-score   support

     0       0.89       0.80       0.84         20
     1       0.93       0.98       0.95         41
     2       0.86       0.86       0.86         14

 accuracy          0.91
 macro avg         0.89
weighted avg         0.91
```

Website:

Sleep Disorder Prediction

Gender :

Enter 1 for male and 0 for female

Age :

Enter age in years only

Occupation :

Sleep Duration :

Enter Sleep duration in hours

Physical activity level :

Enter in minutes/day

Stress level :

BMI Category :

Enter 1 for Overweight and 0 for Normal

Blood Pressure :

systolic

Heart Rate :

beats per minute(bpm)

Daily Steps :

Predict

Sleep Disorder Prediction

Gender :

Age :

Occupation :

Sleep Duration :

Physical activity level :

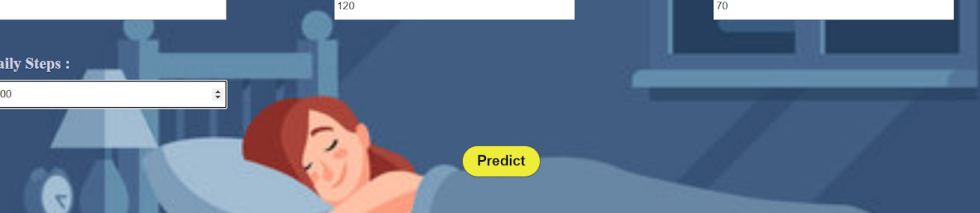
Stress level :

BMI Category :

Blood Pressure :

Heart Rate :

Daily Steps :



Sleep Disorder Prediction

Gender :

Age :

Occupation :

Sleep Duration :

Physical activity level :

Stress level :

BMI Category :

Blood Pressure :

Heart Rate :

Daily Steps :



Person have Sleep Apnea

10. ADVANTAGES & DISADVANTAGES

Advantages highlight the system's accuracy in personalized insights, improved user well-being, and potential integration with wearable devices.

Disadvantages may include system dependencies and potential privacy concerns.

11. CONCLUSION

The conclusion summarizes achievements, emphasizing how the Sleep Oracle identifies the problem. It discusses user feedback and system improvements over the development lifecycle.

12. FUTURE SCOPE

The future scope envisions enhancements such as incorporating additional health metrics, expanding user engagement strategies, and potential collaborations with healthcare professionals.

13. APPENDIX

Source Code :

<https://colab.research.google.com/drive/1jrdVnvxsV31cWNeAgGr6D5tbY9saghqh?usp=sharing>

<https://colab.research.google.com/drive/13rGA5s5Fil2JcbqU5fHVWZ5QuT-8Og0f?usp=sharing>

GitHub & Project Demo Link :

GitHub:

<https://github.com/smartinternz02/Sl-GuidedProject-611515-1698735855>

Project Demo Link:

https://drive.google.com/file/d/15ThCYQeUl_33AwwiXotbJFX2TbxPG2C_/view?usp=sharing