

Sleep analysis project plan

This is a project plan for Sleep analysis that discusses relevant literature, the dataset used, suggestions for methods, and the main objectives of the work itself. The data will be analyzed using Python and explore the relationship between various factors, such as sleeping time and sleep patterns, and possibly other outer factors including activity level and habits.

1 Relevant literature

Some relevant scientific articles used in this project will assess the importance of sleep and various factors determining its quality.

Worley (2018) confirms the relationship between inadequate sleep and a wide range of disorders, such as hypertension, obesity and type-2 diabetes, cardiovascular disease, impaired immune functioning, and more. Furthermore, Worley implies that sleep is the most effective if it is continuous and uninterrupted. This raises the importance of factors such as the ideal time to begin and end the sleep cycle (sleeping time) but also cognitive factors such as stress might be considered.

Palmer et al. (2024) show promising new insights with various factors and study setups analyzing sleep deprivation and its effects on cognitive and physical functions with over 50 years of experimental research, increasing this article's credibility. The article contents are worth considering in this project. Among various topics, the article assesses the risk of biased data analysis due to incomplete data and randomization. Furthermore, the effects of age and sex are even considered, giving a possible approach to this project.

Zamani et al. (2024) perform a sleep quality prediction using data gathered with sleep monitoring wearable devices. The article provides detailed steps for sleep data analysis including data preprocessing, variable and parameter adjustments, and performance validation. This article will be useful when computing the predictive model for the data used in this project.

2 Dataset Description

The data used in this project is from Kaggle Data Science Company acquired between 2015-2022. The data is personalized data collected via the iOS Sleep Cycle application. Although the data is only from one individual, the dataset

consists of nearly 2000 rows corresponding to 887 days of sleep in the case of this data. The individual is a male in his late 30's or late 40's.

The data includes various variables including the individual's starting and ending time of the sleep, sleep quality, and activity level. The quality of the data is personalized, and incomplete since it exhibits missing values and personal notes, making the data preprocessing a critical component for a good prediction. Furthermore, it is worth considering that the data was extracted with a wearable device, which does not have the same credibility as the cutting-edge measuring devices used in medicine.

3 Objectives for the project

The main objective of this project is to determine the key variables distinguishing good and poor sleep quality. Furthermore, it is desirable to find a connection not only between generally known factors such as sleeping time and sleep quality but also with personal habits such as activity levels, dietary intake, and stress levels as well. It would be preferable to explore these connections via multiple models to get different points of view.

References

- Worley S. L. (2018). The Extraordinary Importance of Sleep: The Detrimental Effects of Inadequate Sleep on Health and Public Safety Drive an Explosion of Sleep Research. *P & T : a peer-reviewed journal for formulary management*, 43(12), 758–763.
- Palmer, C. A., Bower, J. L., Cho, K. W., Clementi, M. A., Lau, S., Oosterhoff, B., & Alfano, C. A. (2024). Sleep loss and emotion: A systematic review and meta-analysis of over 50 years of experimental research. *Psychological bulletin*, 150(4), 440.
- Zamani, A. S., Hashim, A. H. A., Akhtar, M. M., Samdani, F., Siddiqui, A. T., Alluhayb, A., ... & Ahmad, N. (2023). The prediction of sleep quality using wearable-assisted smart health monitoring systems based on statistical data. *Journal of King Saud University-Science*, 35(9), 102927.