

# **Stress Detection Project Proposal**

**Group #2**

**AI4ALL**

**4/3/2023**

## **Team members**

Leena Abdelrahman, Emily Xu, Ethar Hussein, Yash Jain, Shravani Mhatre, Ruei-yuan Tu, Lily Sheng, Hongkun Zeng

## **Topic of Interest and Summary**

### **Stress Detection**

We are interested in this topic because as college students, we are almost always stressed due to how much work we have. Because of this, we are interested in seeing the different methods we can use to detect our stress level.

Managing stress is an essential skill that can help maintain a good balance between work life and personal life. For example, according to the Office of Disease Prevention and Health Promotion, learning how to manage stress can decrease the likelihood of getting certain diseases such as depression, while having unchecked stress can manifest in issues with one's physical health such as with sleep (Office of Disease Prevention and Health Promotion). Thus providing more exigency for the topic of stress detection in our everyday lives. If we are able to identify more ways to detect stress, we can drastically reduce the chances of these health problems. Additionally, understanding stress will lead to better efficiency in our work, greater productivity, and contentment in our education.

### **Objectives (Goals)**

We hope to find relationships between certain factors and symptoms, such as heart rate, and stress levels to better understand what are good indicators for the degree of stress.

## **Methodology**

### **Data Acquisition/Preprocessing:**

We chose our dataset from Kaggle and we will be using it to conduct our study.

In order to clean up our data set our first step will be to use data preprocessing in order to take our raw data to ensure that the data is completely accurate and consistent. By performing data preprocessing our data analysis will be a smoother process.

We split our data into a training set and a test set. Our training set will be used to help train our machine-learning model since we already know the output. For our test set, it would be a portion of the data that we left unfamiliar to the model and this will allow us to test our model for accuracy.

We would then use a feature scaling technique to standardize our data thus putting our variables in the same range so no variable can dominate the other variables in our data set and this would be the final stage of our preprocessing steps.

### **Modeling:**

We will be using a linear regression model in order to find the relationship between factors such as heart rate and sleeping conditions to stress levels. This machine learning model will allow us to predict future trends in data to help gauge the stress level of an individual and its impact on their health and potentially their school and work-life balance.

### **Deployment:**

We plan to have visuals such as bar charts and plots to help highlight key data points and trends in our data.

### **Deliverables:**

For this section of our project, we plan to create a presentation that summarizes our findings and insights. Our presentation will begin with the main objectives of our project proposal as a whole and then provide context for our analysis. We would include key visualizations to help effectively communicate our project to the reader. We plan to make it very visually appealing and easy to follow.

## **Plan for Technical Components**

We plan to use google collaborate as our primary tool for the technical component of the project. Google Collab allows for collaborative coding in Python and provides our team a platform to work together in a centralized environment.

Python will be our main language for the project

Some important python libraries/packages we will be utilizing to help create our linear regression are scikit-learn, Numpy, pandas, matplotlib.pyplot.

## **Project Timeline:**

We are breaking down the project into smaller pieces with a deadline of what we would like to get done every week.

### **Week of 4/3/2023:**

Finish the data preprocessing portion and finish creating our machine learning model linear regression.

### **Week of 4/10/2023:**

Finish coding all visualizations of our data such as all bar charts, plots, diagrams etc. Start working on the presentation and split it up between each group member.

### **Week of 4/17/2023:**

Finish polishing up the presentation and see if there are any further steps the team could take to improve our project.

### **Week of 4/24/2023:**

Deliverables should be done.

## **Contingency Plan**

If members of the team are unable to continue with the project, we would re-delegate roles to the members that are able to continue as evenly as possible.

Each week we will divide the project evenly based on our groups corresponding strengths in order to get the project done in the most efficient and timely manner. If a group member is struggling we would make sure to either re-delegate roles or have another team member assist them in their portion.

## Citations

### Citation 1:

[Human Stress Detection In and Through Sleep | Kaggle](#)

L. Rachakonda, A. K. Bapatla, S. P. Mohanty, and E. Kougianos, "SaYoPillow: Blockchain-Integrated Privacy-Assured IoMT Framework for Stress Management Considering Sleeping Habits", IEEE Transactions on Consumer Electronics (TCE), Vol. 67, No. 1, Feb 2021, pp. 20-29.

L. Rachakonda, S. P. Mohanty, E. Kougianos, K. Karunakaran, and M. Ganapathiraju, "Smart-Pillow: An IoT based Device for Stress Detection Considering Sleeping Habits", in Proceedings of the 4th IEEE International Symposium on Smart Electronic Systems (iSES), 2018, pp. 161--166.]

### Citation 2:

[Heart Rate Prediction to Monitor Stress Level | Kaggle](#)

### Citation 3:

"Manage Stress." *Manage Stress - MyHealthfinder*, Office of Disease Prevention and Health Promotion, 2 Apr. 2023,

<https://health.gov/myhealthfinder/health-conditions/heart-health/manage-stress#:~:text=Preventing%20and%20managing%20long%2Dterm,which%20tasks%20to%20do%20first>

### Citation 4:

Han, Kuem Sun, et al. "Stress and Sleep Disorder." *Experimental Neurobiology*, U.S. National Library of Medicine, Dec. 2012, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3538178/>.