**Exploring and Modeling**

**on Mental Health Data**

**: Insights from Kaggle Data Analysis**

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**Introduction**

According to Johns Hopkins, 1 in 4 American adults suffers from a diagnosable mental disorder in a given year. A statistic that proves mental health challenges are becoming more visible across different sectors, affecting individuals in diverse ways. We chose this topic to try and use our data science skills for good. The first step to developing effective support systems is to understand the factors that contribute to mental stress. This research will explore mental health data using various classification models to identify key factors influencing mental health outcomes. Specifically, we will examine how variables such as mood swings, family history, treatment status, occupations, and time spent indoors affect mental health. By analyzing these factors through data models, we hope to uncover patterns that can help improve mental health management and prevention strategies.

This study seeks to address the following key question and additional questions:

***Initial Research Question:***

How can we develop models to assess mental stress, and which factors are most influential in predicting mental health outcomes?

***Additional Research Questions:***

Question 1: What are the top five factors contributing to the escalation of stress levels in individuals?

Question 2: Does a family history of mental health issues influence whether individuals seek treatment for mental stress?

Question 3: What specific factors contribute to the increase in stress among students?

**Research Methods**

To achieve these objectives, we will perform the following tasks:

***Task 1. Data Acquisition and Preparation***

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The dataset used in this study is available on Kaggle at this ([link](https://www.kaggle.com/datasets/bhavikjikadara/mental-health-dataset)). It contains 292,364 observations with 17 variables. The data’s original source is Ourworldindata.org. The method of collection is via survey.

***Task 2. Exploratory Data Analysis and Data Visualization***

We will conduct exploratory data analysis to identify key trends, relationships, and distributions in the dataset.

***Task 3. Modeling and Evaluation***

Various classification models will be employed, including Logistic Regression, SVM, KNN, and Random Forest, to assess the impact of identified factors on mental health outcomes.

**Results**

**Question 3: What contributes to the growing stress among students?**

In our dataset, students had the second-highest proportion of survey responses that indicated experiencing feelings of growing stress. To add to this, we found this would be an interesting question to gain insight into since we’re students. By first doing EDA and statistical testing, we found growing stress was not statistically independent from our growing stress target variable. After discovering so, we moved forward to try and observe any correlation between growing stress and other variables for the students in our dataset. To our surprise, our variables had a weak correlation between growing stress and our other variables. The strongest correlation is -0.14 between “changes\_habits” and our target variable. So moving forward in trying to answer this question, we used logistic regression modeling.

The model didn’t perform very well. With an accuracy of 61% and a AUC of 0.62, it left much to be desired. The confusion matrix revealed the model was eager to predict a student reporting growing stress when students didn’t report growing stress. The model’s shortcomings can be proof of the lack of predictive power our current variables give us just for students. It could be possible that if the data included variables more tailored for students, we’d have a logistic regression model with stronger predictive power. Variables like academic performance or financial strife could provide key insight in predicting whether or not a student is experiencing growing stress. The model did, however, leave us with more revealing coefficients.

From this, we conclude days indoors, gender, mood swings, and social weakness being the top five factors that impact growing stress for students. Of these variables, only changes habits and gender had an inverse relationship with growing stress.

**Conclusions**

In conclusion, the top five factors contributing to growing stress across all occupations include Mental Health History, Days Indoors, Work Interest, Mood Swings, and Changes in Habits. For students, the primary stressors are Changes in Habits, Days Indoors, Gender, Mood Swings, and Social Weakness. Individuals with a family history of mental health issues may be more likely to recognize their symptoms or seek treatment. To mitigate stress, it is important across all sectors to spend more time outdoors, acknowledge stress when experiencing changes in habits or frequent mood swings, and seek treatment when symptoms arise. The negative relationship between growing stress and treatment underscores the critical need to address stress proactively.

**Recommendations**

**References**

Johns Hopkins Medicine. (2024). *Mental health disorder statistics*. John Hopkins Medicine. https://www.hopkinsmedicine.org/health/wellness-and-prevention/mental-health-disorder-statistics

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Our World in Data. (2024). *Our World in Data*. Our World in Data. https://ourworldindata.org/

Git Repository: [**github**](https://github.com/sairachanak/6103-Team7.git)