

Mental Health Analysis using Machine Learning

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Why Mental health

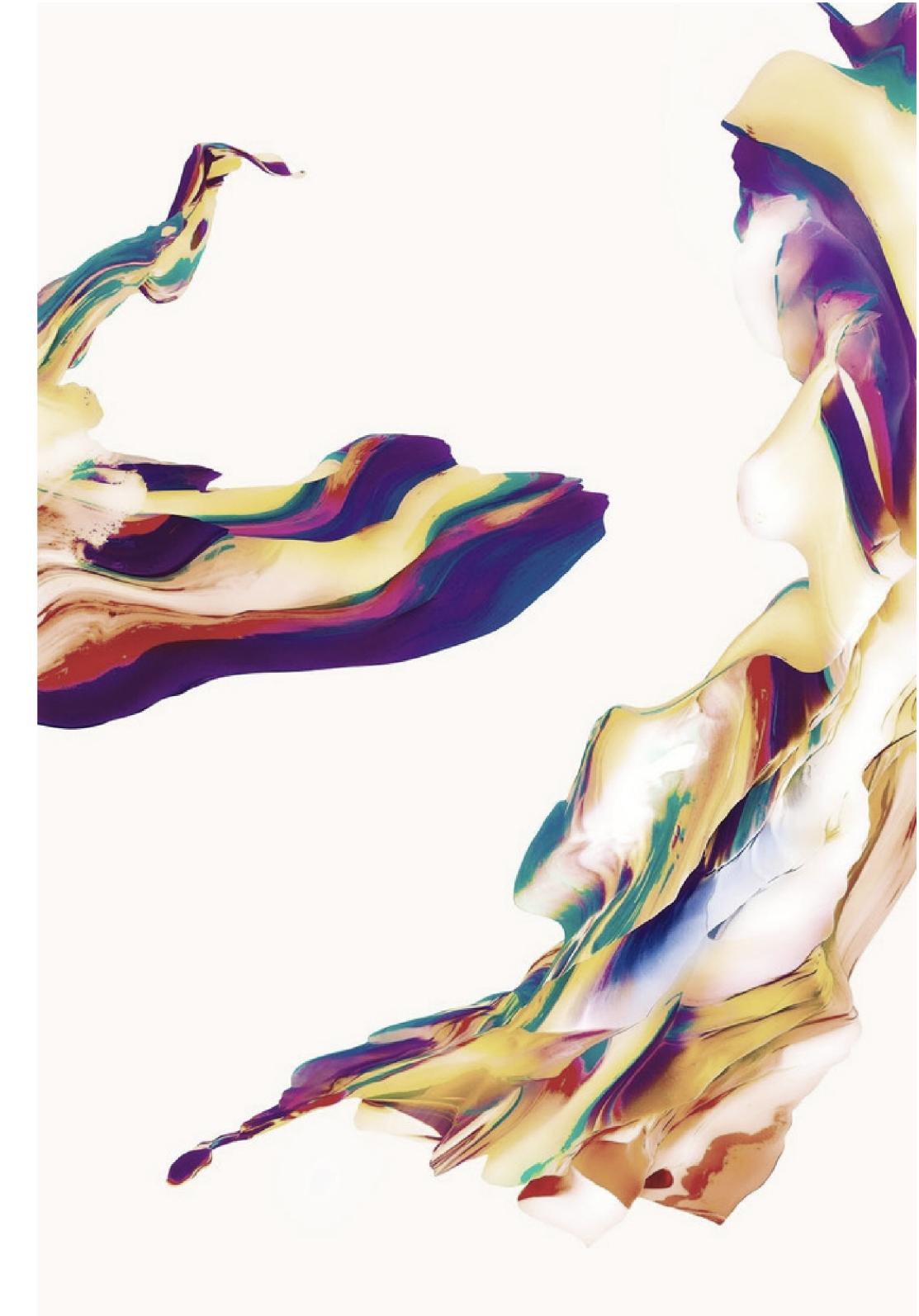
Humans are getting more ambitious by nature, and they seek every chance to advance professionally. Anxiety, depression, stress , frustration and dissatisfaction has become so frequent that many individuals feel them to be part and parcel of professional life.

According to the World Health Organization (WHO), depression is the most common mental condition, affecting more than 300 million people worldwide, and the magnitude of the problem has prompted many health experts to concentrate their efforts in this area. Differentiating anxiety, sadness, and stress is difficult for computers, hence a proper learning algorithm is essential for an accurate diagnosis.

A healthy individual, according to WHO, has a healthy mind as well as physical fitness.

Motivation

- As a result of modern lifestyles, Many people are suffering from various forms of psychological health problems. Anxiety, depression, and stress all have certain characteristics. Generally, psychiatrists measure anxiety, depression, and stress using questionnaires such as the DASS42 and DASS21, since people who suffer from anxiety, depression, or stress are typically unwilling to share their symptoms . Therefore, we thought that with the help of machine learning we can ease the process
- As a result, this study took the initiative to utilise machine learning to predict severity levels. The DASS-21 test aids in the reliable diagnosis of depression, anxiety, and stress in potential patients and thus can be used as features to train models.



Problem statement

Using the Depression, Anxiety, and Stress Scales (DASS-21) questionnaire in order to predict anxiety, depression, and stress using various classification algorithms.

Let the Mind Talk ❤️ | Survey Form

Please take into account the subsequent info before deciding to participate in the study.

PURPOSE: Evaluate the effects of the COVID-19 epidemic on our mental abilities and clarify the locus of distress.

DIVISION OF THE SURVEY: We would start the survey by knowing you better, where you would be asked to provide some demographic information about yourself. Following that, you will be asked to complete a questionnaire based on a shortened version of a survey known as "DASS 42." Being prominently known for its reliability, DASS becomes well-suited in assessing symptoms of prevalent mental health issues. Eventually, you'd be asked to fill out a personality questionnaire.

Participation will take roughly 10-15 minutes.

RISKS: There are no identified risks associated with participating in the study.

CONFIDENTIALITY: Your participation throughout the study will be kept completely confidential. The findings may indeed be published in a research article, so you could request a copy once it is available.

PARTICIPATION AND WITHDRAWAL: Your involvement in the study is entirely voluntary, and you are free to leave at any moment. If you get uneasy at any given point during the study, you could leave by closing your browser window. However, after your responses have been submitted, you will have a two-day timeframe to retract your participation. This is due to the difficulty of extracting individual data from the pool after data analysis begins.

WHO IS CONDUCTING THIS STUDY: Snehalraj Chugh, Prajakta Chaudhari, Janhavi Chavan, and Harshit Srivastava are the researchers on this project.

CONTACT: If there are any questions, comments, or suggestions about this study, please kindly reach us at let.the.mind.talk@gmail.com.

Tools used

- Jupyter Notebook
- Python Programming Language
- Sklearn libraries
- Plotly
- Matplotlib

Algorithms

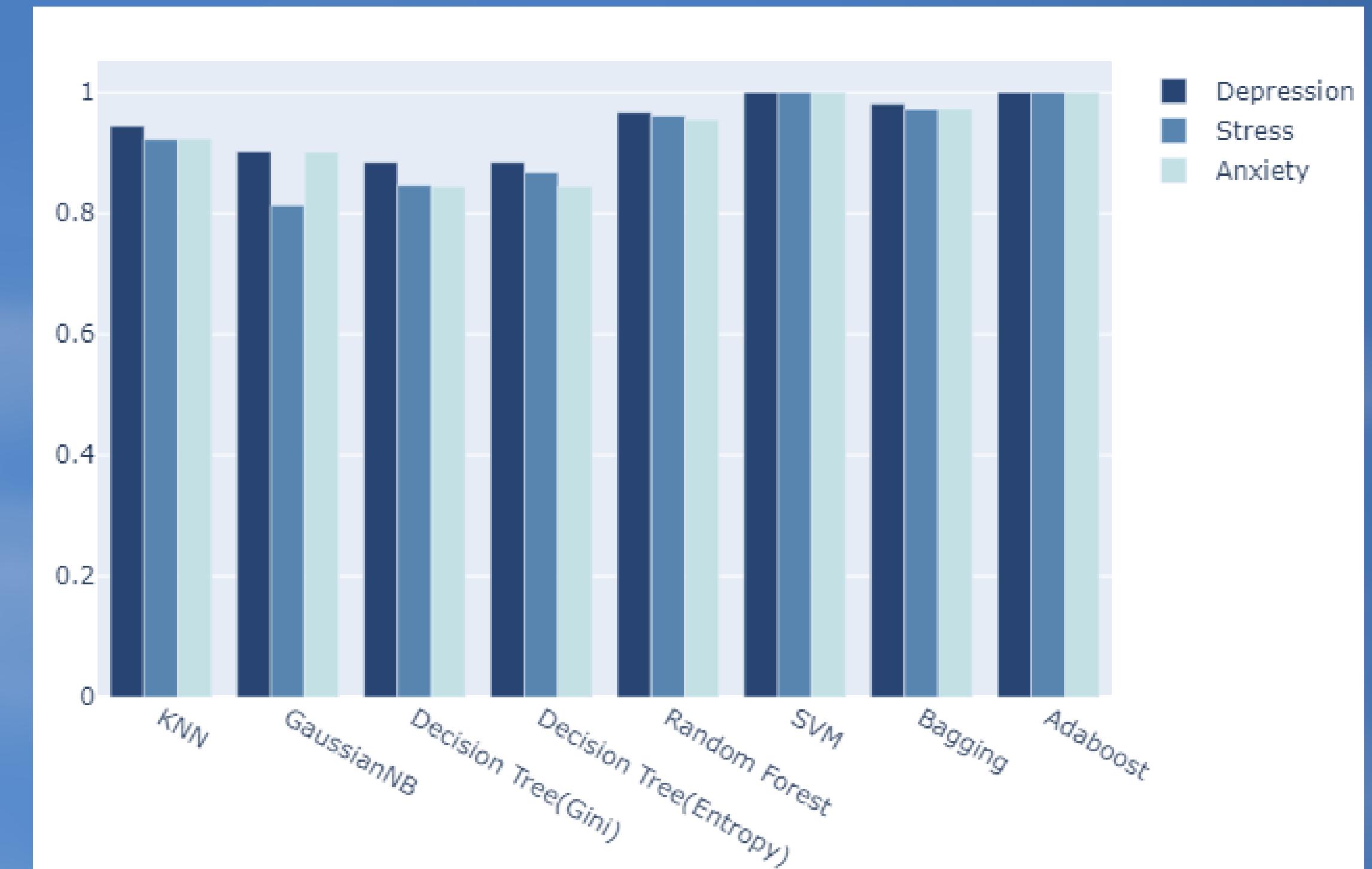
- KNN
- Naive Bayes
- Decision Tree
- Random Forest
- SVM
- VotingClassifier
- Adaboost with SVM base

Methodology

- We started by using a kaggle dataset depression-anxiety- stress-scales-responses , which were the DASS 42 form's responses of people around the globe.
- It featured a total set of 40000+ rows which we employed as our backend to train and find which machine learning model performs the best.
- The rows were filtered according to requirement.
- The unnecessary columns were dropped to maintain a dataset only with the essential features.
- We mapped the DASS42 to DASS21 to reduce the no. of questions,
- After the study and comprehension of the dataset, we utilised the best algorithms for the dataset which we developed by sending out the google form and obtaining 200+ responses.
- After classification, it aided us in evaluating the levels of depression, anxiety & stress of a candidate.
- This also worked well for aiding in visualizations.

Accuracy graph

Classification models were trained on the Kaggle dataset to generate models for each algorithm so that the best algorithm can be later applied for predicting mental health levels in the survey we conducted using google forms.



SVM classification report

Depression Classification Report for SVM:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	1911
1	1.00	1.00	1.00	868
2	1.00	1.00	1.00	1794
3	1.00	1.00	1.00	1206
4	1.00	1.00	1.00	2761
accuracy			1.00	8540
macro avg	1.00	1.00	1.00	8540
weighted avg	1.00	1.00	1.00	8540

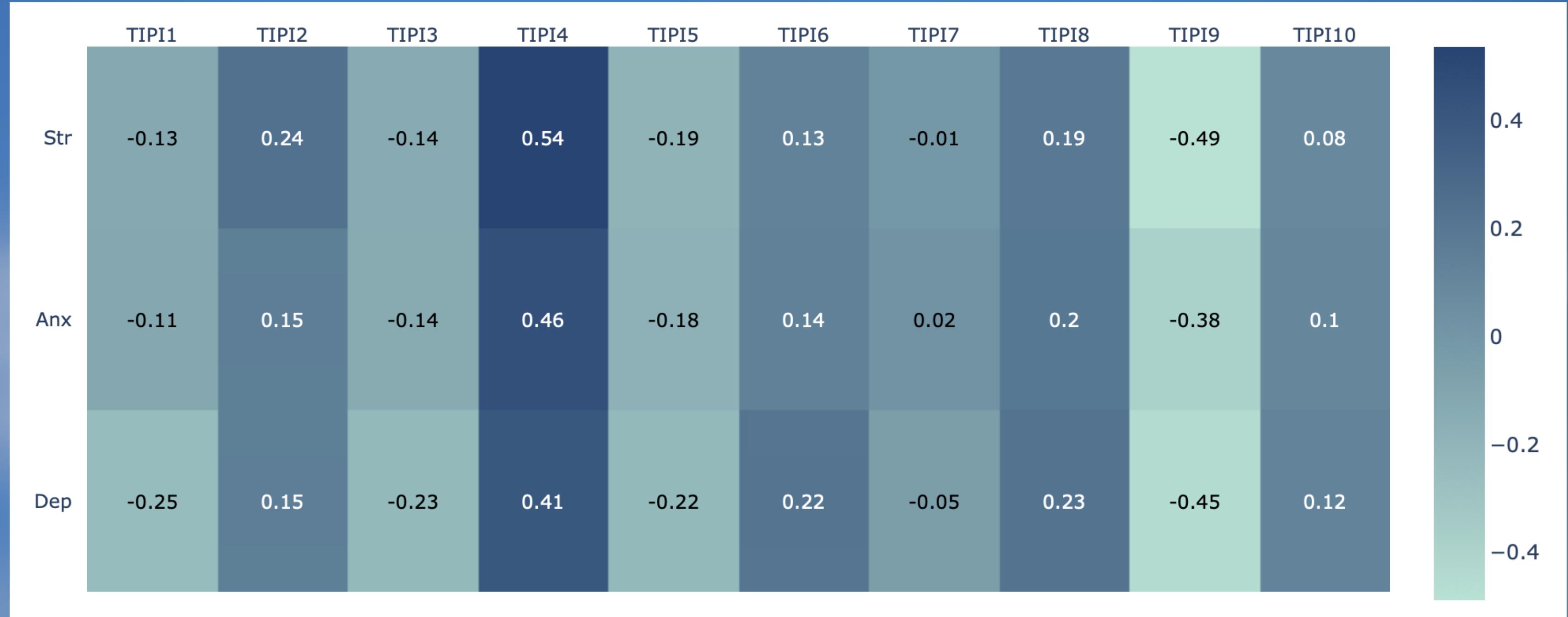
Stress Classification Report for SVM:

	precision	recall	f1-score	support
0	0.95	0.99	0.97	2957
1	0.83	0.83	0.83	1085
2	0.87	0.85	0.86	1546
3	0.93	0.90	0.92	1742
4	0.98	0.96	0.97	1210
accuracy				0.92
macro avg			0.91	0.91
weighted avg			0.92	0.92

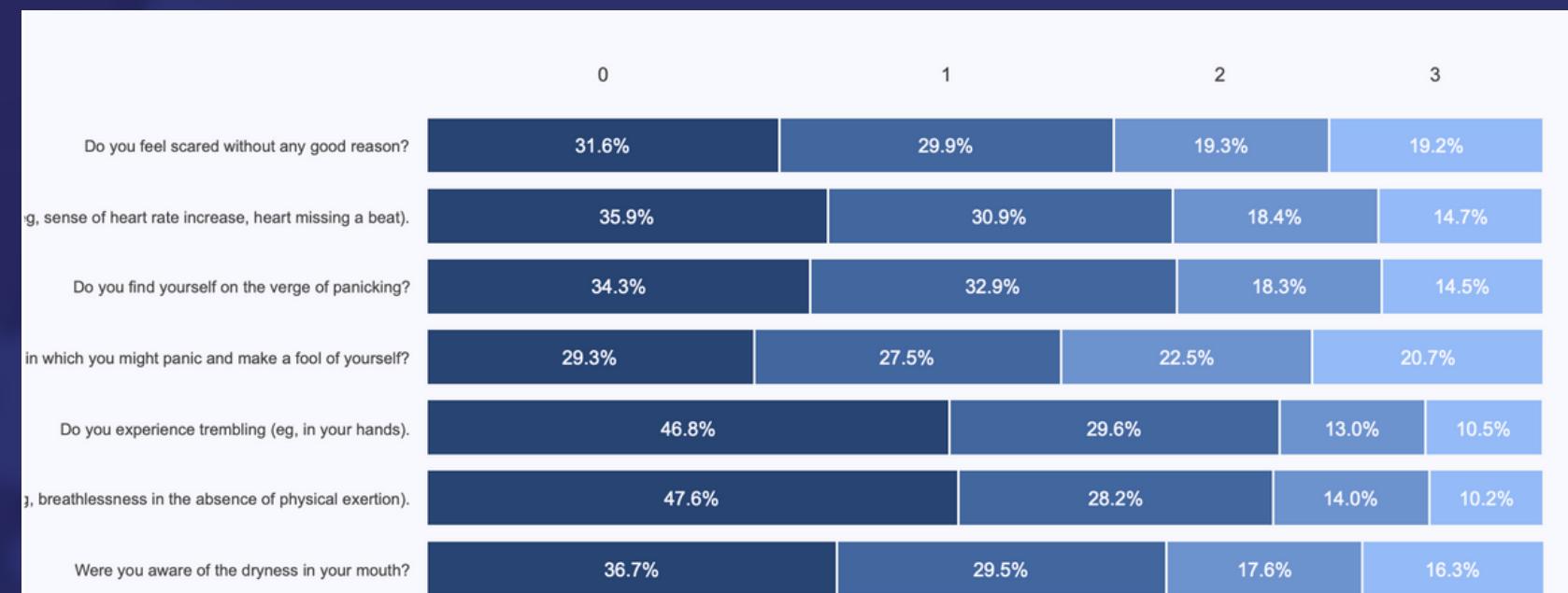
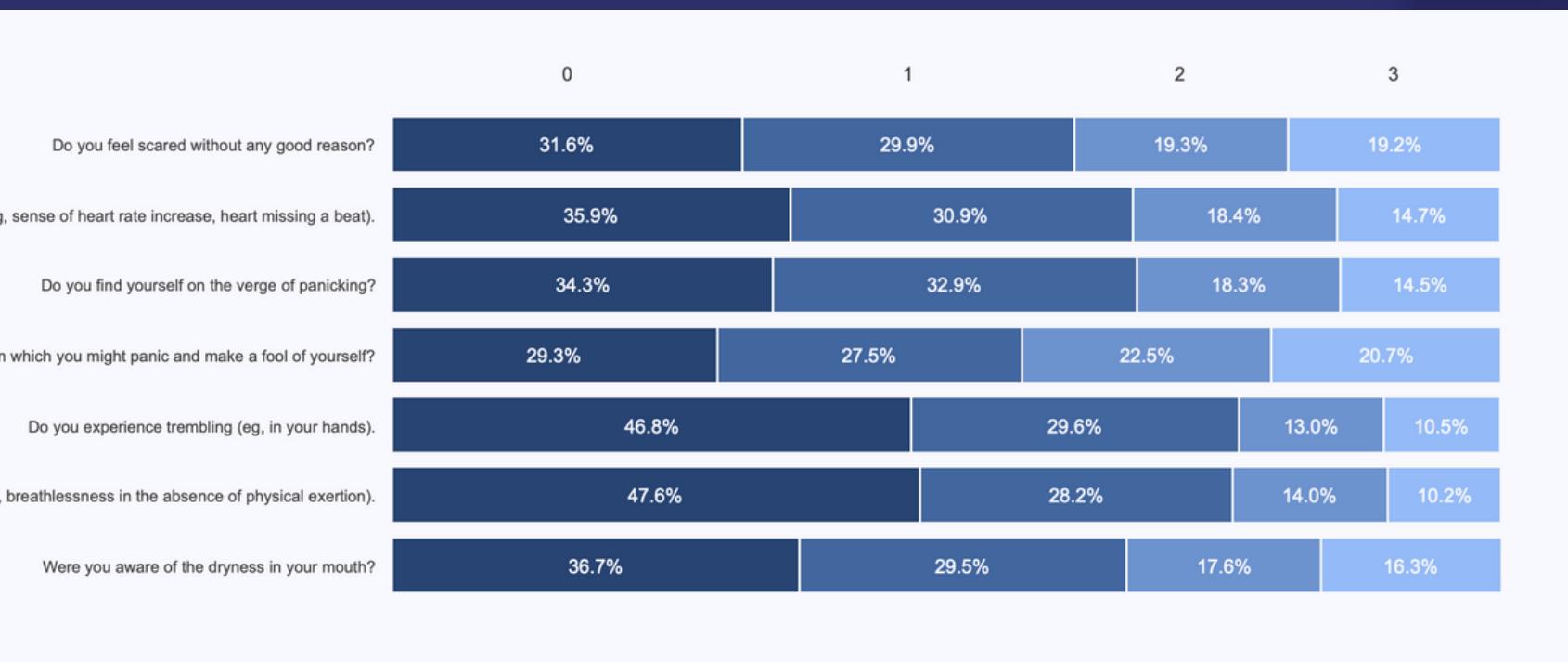
Anxiety Classification Report for SVM:

	precision	recall	f1-score	support
0	1.00	1.00	1.00	2084
1	1.00	1.00	1.00	594
2	1.00	1.00	1.00	1652
3	1.00	1.00	1.00	1030
4	1.00	1.00	1.00	3180
accuracy			1.00	8540
macro avg	1.00	1.00	1.00	8540
weighted avg	1.00	1.00	1.00	8540

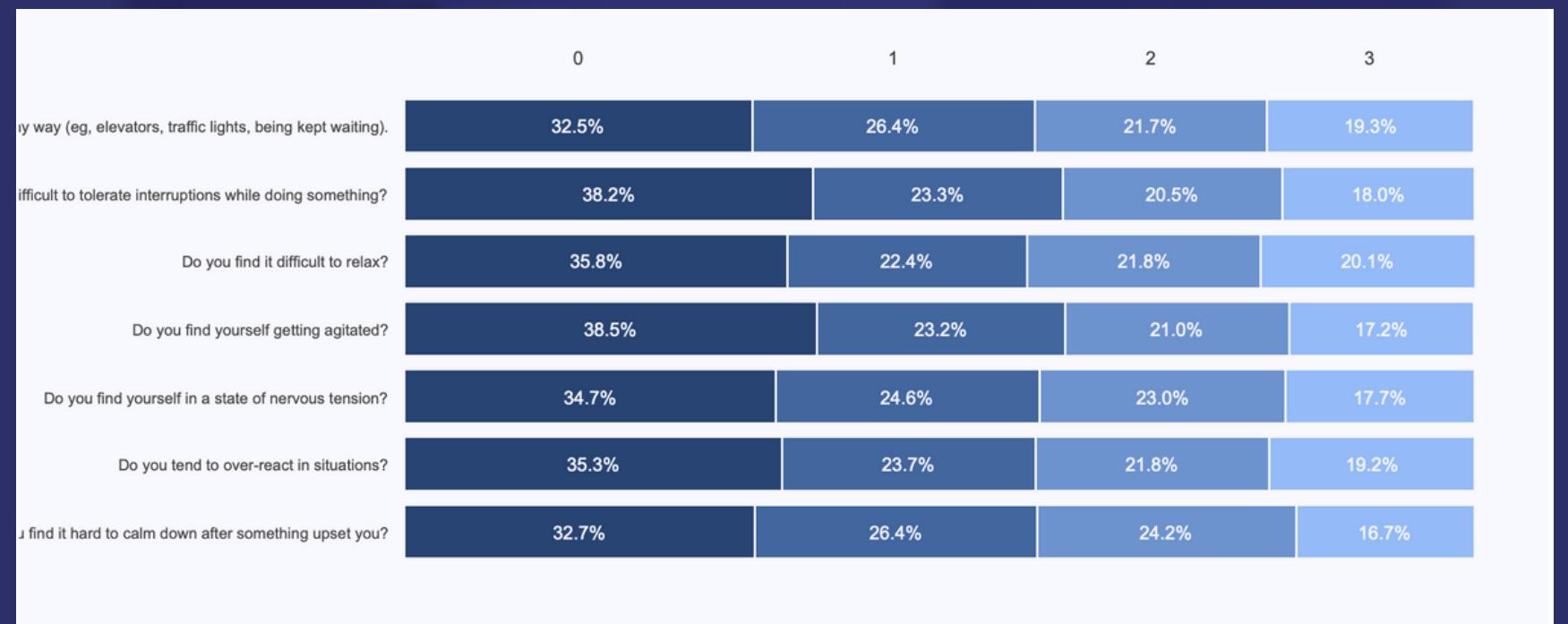
Correlation HeatMap



Bar Percentage Chart



Stress

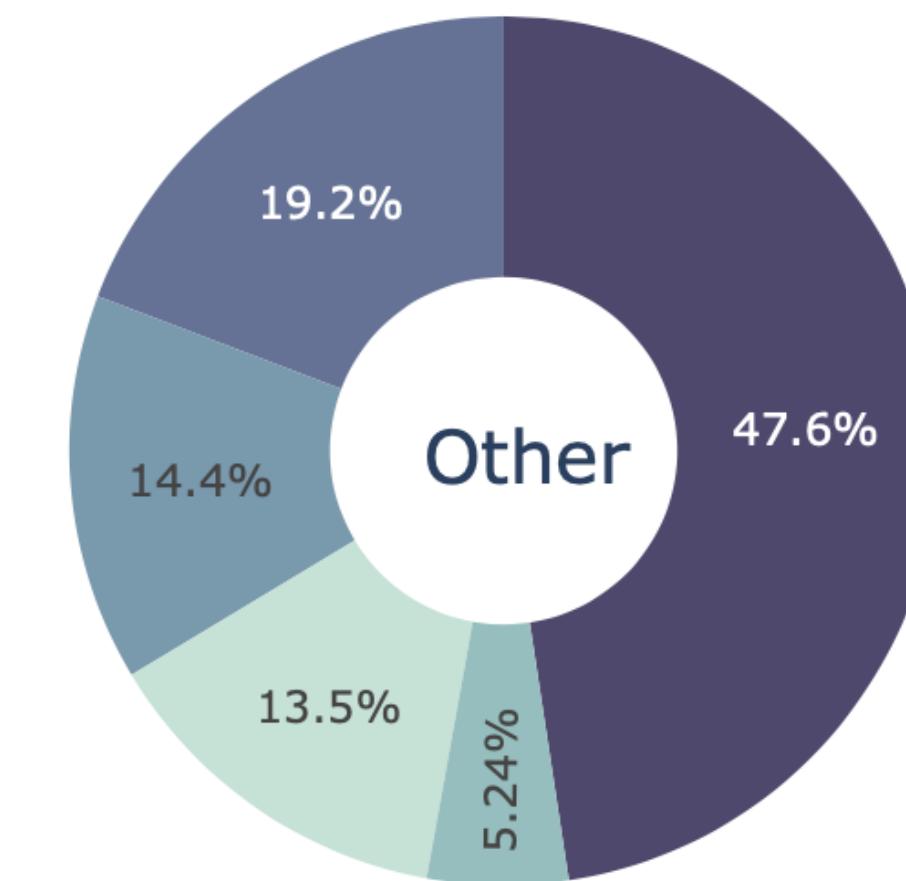
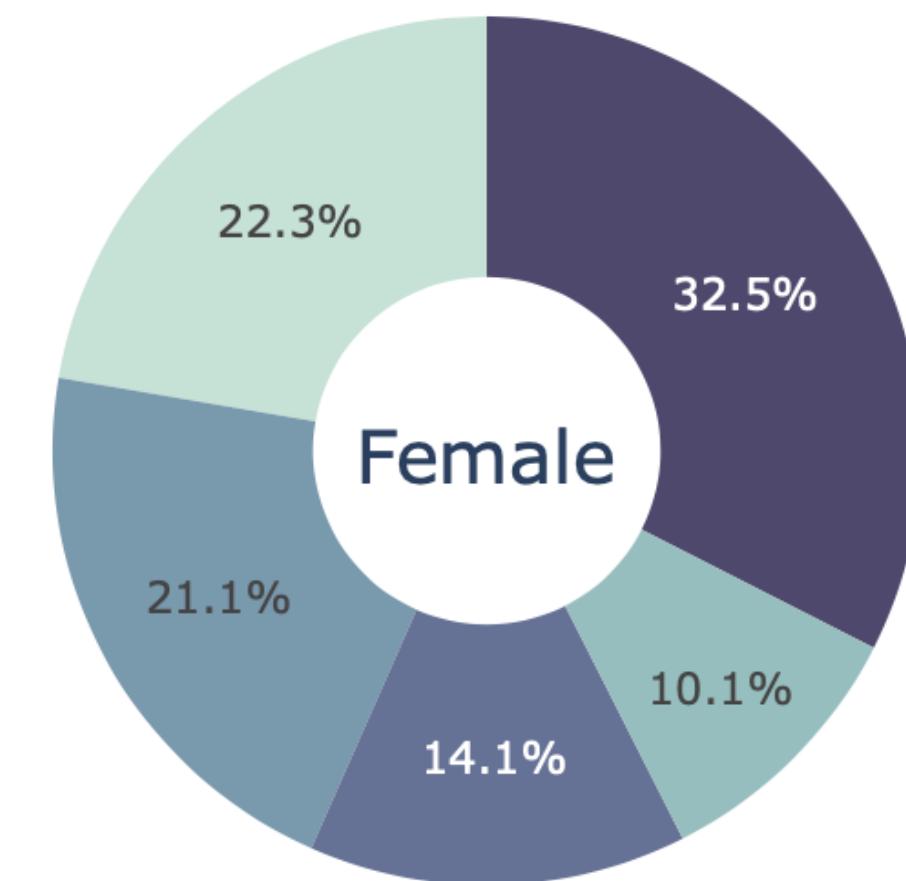
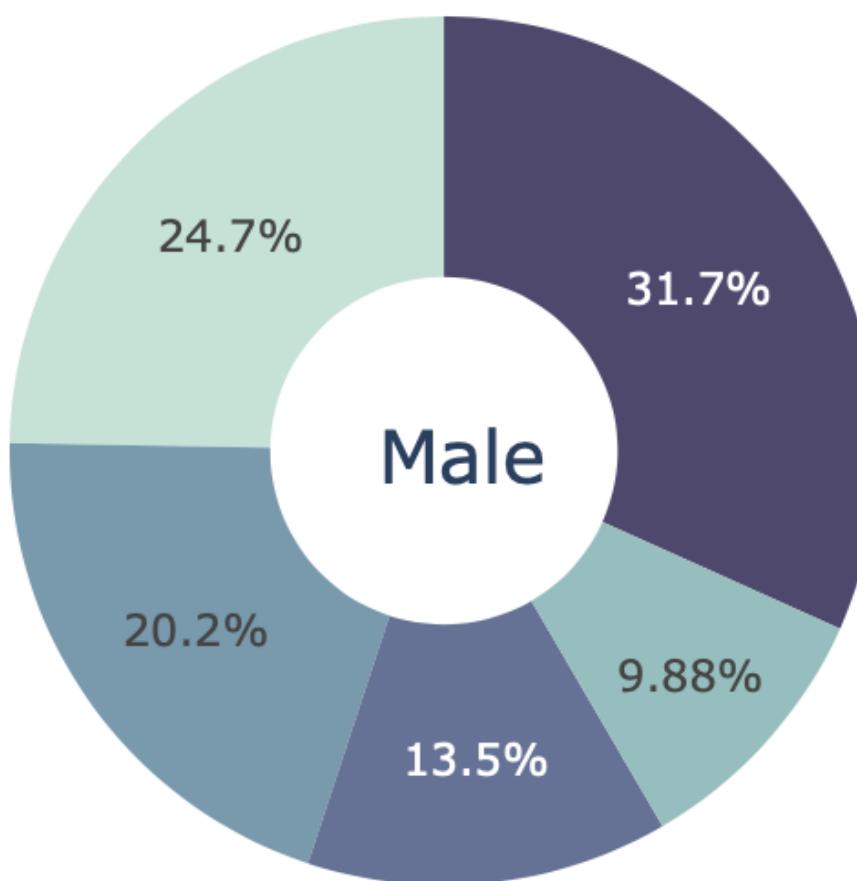


Anxiety

Depression

Gender Wise Depression Donut Chart

Proportion of Depression score gender wise



4
0
2
3
1

Conclusions

We used 7 machine learning models to predict five severity levels of anxiety, depression, and stress. The models were KNN, Decision Tree, Naive Bayes, Random Forest, SVM, and 2 ensemble algorithms. Adaboost and SVM approach gave 100% accuracy for depression, anxiety, and stress.

References

- Dataset : <https://www.kaggle.com/lucasgreenwell/depression-anxiety-stress-scales-responses>
- <https://doi.org/10.1016/j.procs.2020.03.442>
- <https://doi.org/10.1016/j.procs.2020.04.213>

Thank You.