**Mental Health Project**

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**Introduction:**

Mental health is becoming increasingly a frequent concern in our society, affecting individuals of all demographics. The intricacies of mental health challenges often result in delayed or inadequate intervention, leading to deteriorated conditions and reduced overall well-being. Identifying those in need of mental health treatment remains an overwhelming task, with current systems relying on self-reporting or observable symptoms, often missing early signs and indicators.

**Importance of solving the problem:**

Addressing this problem is of great importance for several reasons:

* **Early Intervention:** Early detection of mental health issues allows for timely intervention, preventing the escalation of conditions and improving treatment outcomes. Machine learning offers the potential to recognize common patterns that might escape human observation, helping in early identification.
* **Personalized Treatment:** Tailoring mental health interventions based on individual characteristics is crucial for effectiveness. Machine learning models can analyze many variables to provide personalized treatment plans, optimizing the allocation of mental health resources.
* **Resource Optimization:** Effective allocation of mental health resources is essential for providing adequate support to those in need. By properly identifying individuals requiring treatment, resources can be directed where they are most needed, maximizing the impact on overall community well-being.

**Pitch to Stakeholders:**

* **Opening:** Hello all esteemed stakeholders. Today, I present to you a critical issue that demands our attention and collective action – the challenge of properly identifying individuals in our community who require mental health treatment.
* **Problem Justification:** In our current environment, mental health concerns often go undetected until they reach critical stages. The consequences are severe – prolonged suffering for individuals, increased societal burdens, and diminished workplace productivity. Traditional identification methods are limited, relying heavily on self-reporting or overt symptoms, leaving a considerable portion of those in need without timely intervention.
* **Importance of solving the problem:** Imagine a scenario where we can proactively identify individuals at risk, provide early intervention, and deliver personalized mental health support. This is an achievable reality through the implementation of machine learning in mental health assessment.
* **Solution Overview:** My proposed solution involves leveraging machine learning algorithms to analyze a number of factors, enabling us to predict, with high accuracy, whether an individual requires mental health treatment. Early detection, personalized treatment plans, and optimized resource allocation are the key to our approach.
* **Call to Action:** I urge you to consider the profound impact our initiative can have on the well-being of our community. By investing in this project, we not only enhance the lives of individuals but also contribute to a more robust and helpful society. Let us leverage technology for the betterment of mental health in our community.
* **Closing:** Thank you for your time and consideration. I am confident that, with your support, we can make significant improvements in revolutionizing our approach to mental health and truly make a difference in the lives of those who are in need.

**The data for this project is obtained from the Kaggle website.**

*https://www.kaggle.com/code/kairosart/machine-learning-for-mental-health-1*

**The Organized and Detailed Summary of Milestones 1-3:**

From the analysis of the graphs attached as a PDF with the code attached in the term project section along with this Word document, we can summarize the project as

**Exploratory Data Analysis:**

1. Teenage individuals have more mental health problems.

A graph of a number of blue bars

Description automatically generated

1. The number of Males who took treatment is slightly more than the number of females who took treatment.

A blue and orange rectangular bars

Description automatically generated

1. From the above graph, we can conclude that males ages 66 and above do not have mental health issues.

A graph of mental health condition

Description automatically generated

1. Individuals with a family history of mental health issues are more susceptible to mental health conditions.

A graph of a number of people

Description automatically generated with medium confidence

**Data Preparation is done by:**

* Dropping the features such as ‘comments’, ’state’, ’country’, and ’Timestamp’ which are not important.
* Performed data cleaning by checking the missing data.
* Replacing missing age with mean value.
* Cleaning the ‘gender’ value.
* Replacing "NaN" string to 'NO' for the ‘self\_employed' column.
* Replacing "NaN" string to "Don't know" for the work\_interfere column.

**Model Building and Evaluation is done by:**

* Scaling and fitting the ‘age’ feature.
* Splitting the data into training and test tests.
* Evaluating the classification Models (Here I used 3 models: (Logistic Regression, KNeighbors Classifier, and Random Forests).
* Created a confusion matrix, histogram of predicted probabilities and ROC curve for treatment classifiers for each of the three models.
* Plotted the success methods in a single chart to see which model has the best accuracy. Here Random Forest model has the highest accuracy which is shown in the below chart.

**A graph of a graph showing different types of methods

Description automatically generated with medium confidence**

**Conclusion:**

* **Analysis/Model Building Insights:**

The analysis and model-building process have provided important insights into the predictive capabilities of our machine-learning model. The model exhibits promising accuracy in identifying individuals in our community who may require mental health treatment. The features incorporated, ranging from age, gender, and family history data, contribute to a comprehensive understanding of the complex dynamics associated with mental health.

* **Model Deployment readiness:**

While the model shows significant promise, caution must be taken before deployment. Further validation and improvement are necessary to ensure the robustness and generalizability of the model across diverse populations. Additionally, ongoing monitoring and updates are essential to adapt to changing patterns and improve the model's accuracy over time.

* **Recommendations**:

**Validation and Testing**: Conduct thorough validation exercises using diverse datasets to assess the model's performance across different demographics. This will enhance confidence in its reliability and applicability.

**Ethical Considerations:** Prioritize ethical considerations, including privacy protection and bias reduction, to ensure responsible deployment of the model within our community.

**Collaborate with Health Care Professionals**: Engage with mental healthcare professionals to integrate the model seamlessly into existing healthcare systems. The collaboration will enhance the model's functionality by aligning it with clinical expertise and practice.

* **Potential challenges and additional activities:**

**Data Quality and Bias:** Address potential biases in the training data to prevent the model from increasing current discrepancies. Continuous efforts to improve data quality are crucial.

**Interpretability:** Enhance the interpretability of the model's decisions to build trust among stakeholders and end-users. Understanding the model's reasoning is important for effective implementation.

**User Feeback Integration:** Establish mechanisms for collecting and integrating user feedback into the model's refinement process. This iterative approach ensures ongoing improvement and user satisfaction.

**Long-Term Monitoring:** Develop a strategy for long-term monitoring of the model's performance post-deployment. Implementing feedback loops and regular updates will help maintain its effectiveness over time.

**Community Engagement:** Actively involve the community in the deployment process. Transparent communication and education about the model's purpose and limitations will foster acceptance and trust.

In conclusion, the analysis and model-building phase have set a solid foundation for a transformative approach to mental health intervention. However, careful and methodical steps are necessary before deployment. By addressing potential challenges and seizing additional opportunities, we can ensure the responsible implementation of this technology, making a positive impact on mental health within our community.