

# **Machine Learning Based Psychological Well Being Platform**

Lalkrishna Vinayak Joshi

**Abstract:-** A technology company helping patients to take care of their mental health by daily inquiring into patient's behaviors with questionnaires. Frequently collected data then can be used to the patient's advantage when patients report uneasiness, data will be provided to machine learning algorithms, which can help in diagnosis of mental health conditions and a preliminary machine learning based report will be generated. Based on this, If the patients are not already assigned to a psychiatrist then an appropriate psychiatrist can be suggested to the patients to treat the condition(s). Machine Learning algorithms will not only be used for predicting disorders but also for treatment prediction.

## **1.0 Problem Statement**

In many parts of the world, people even while suffering from mental illness do not know how to transcend it. That's not all, even if a patient goes to a psychiatrist it takes a lot of time to detect the problem and sometimes psychiatrists can also be wrong about the conclusion they reach based on the patient's data.

### **What is psychology ?**

Psychology is a scientific study of mental processes, thoughts, emotions and behavior. Psychology seeks to understand how people feel, think and interact with their environment. Some of the problems addressed by psychology include mental health issues such as bipolar disorder, anxiety, depression and schizophrenia. The field of psychology also deals with cognitive processes, social behavior, development psychology and is closely related to neuroscience.

## **What does it mean for someone to be psychologically well?**

A person being psychologically well refers to a state of optimal mental and emotional health where one can effectively cope with life problems, experience positive emotions, maintain satisfying relationships. There are several key components which encompasses psychological well being of a person such as emotional resilience, self awareness, positive relationships, respect for others, autonomy and few others.

## **2.0 Market/Customer/Business Need Assessment**

- Initially, based on a preliminary report generated by a machine learning algorithm we can help patients to get an appropriate psychiatrist for their specific needs.
- For a patient to receive actual treatment, it takes a significant portion of time since first when the patient has visited a psychiatrist. because a good amount of time goes in studying the patient's data and coming to a conclusion about the disease. Learning Algorithms can make this process efficient, hence reducing time required to detect disease.
- Patients sometimes seek a second opinion before deciding whether to opt for prescribed treatment by the psychiatrist or not. Treatment prediction functionality might be able to provide assurance to a patient about the prescribed treatment and help him/her make a decision.

## **3.0 Target Specifications and Characterization**

### **3.1 Target Specifications**

- To help patients search for an appropriate psychiatrist based on problems suggested by learning algorithms.
- Help psychiatrists analyze patient's data more efficiently by providing them functionality of disease prediction models.
- Assist psychiatrist in making decisions about treatment needed.

- Patients too can take a look at results given by disease prediction algorithm and treatment prediction algorithm to make informed decisions.
- Reduce the overall time required for the whole process.

### **3.2 Customer Characteristics**

- Person suffering from mental illnesses such as bipolar disorder, schizophrenia, anxiety and depression.
- People having social behavior problems such as problems while interacting with others and behaving in groups.
- Humans who find growth and development difficult.
- Even people who do not have major problems can seek help from a psychiatrist for improving social functioning, thinking patterns, sleep quality, functioning in daily life, stress management etc.

## **4.0 External Search**

- [https://www.annualreviews.org/doi/full/10.1146/annurev-clinpsy-032816-045037#\\_i2](https://www.annualreviews.org/doi/full/10.1146/annurev-clinpsy-032816-045037#_i2)
- <https://compass.onlinelibrary.wiley.com/doi/full/10.1111/spc3.12579>
- <https://www.redalyc.org/journal/2990/299067861001/html/>

## **5.0 Benchmarking alternate products**

1. <https://www.cass.ai/x2ai-home>
2. <https://www.talkspace.com/assessments>
3. <https://woebothealth.com/our-solutions/>

Though our solution is very similar to the once mentioned above, there are ways to make it significantly differ from existing products and services, few are mentioned below:-

- Incorporate virtual reality technology to create immersive and interactive environments
- Offering a platform in multiple languages to cater to a diverse user base and ensuring accessibility for people from various linguistic backgrounds.
- Providing AI Enhanced Psychoeducation, creating an extensive library of AI-curated educational content on mental health, psychotherapy techniques and coping strategies to empower patients with knowledge.

## **6.0 Applicable Regulations**

- The idea is to collect patient's data frequently for prognosis, so we are bound to get lots of vital data. It becomes extremely important on how we store and manage the data.
- As there are psychiatrists involved, we shall need to share the data with this 3rd party.

## **7.0 Applicable Constraints**

- We hope to collect patient data frequently by asking them to fill questionnaires on a regular basis, so patients may not comply with it.
- Patients may refuse to trust the preliminary report generated by the learning algorithm.
- If the learning algorithm indeed generates wrong report then we might assign patient to a psychiatrist who may not quite satiate patient's actual needs

## **8.0 Business Model**

We offer Machine Learning based solutions for patients' psychological well being. The idea is to provide patients with the proven methods in the field of psychology with capabilities of learning algorithms, hence providing effective treatment.

Our customers will be of two types. One is people seeking mental health support and other will be psychiatrists seeking to augment their capabilities with learning algorithms. We can create web and mobile applications for both kinds of customers as means to interact and deploy our learning algorithms.

For revenue generation, we can have a Subscription Model, a monthly fee will be charged from patients for prognosis. And when a patient is assigned to the psychiatrist we can charge 30% of total fees which the patient will be paying at the end of the treatment. (30% because psychiatrists will also be using our machine learning models)

## **9.0 Concept Development**

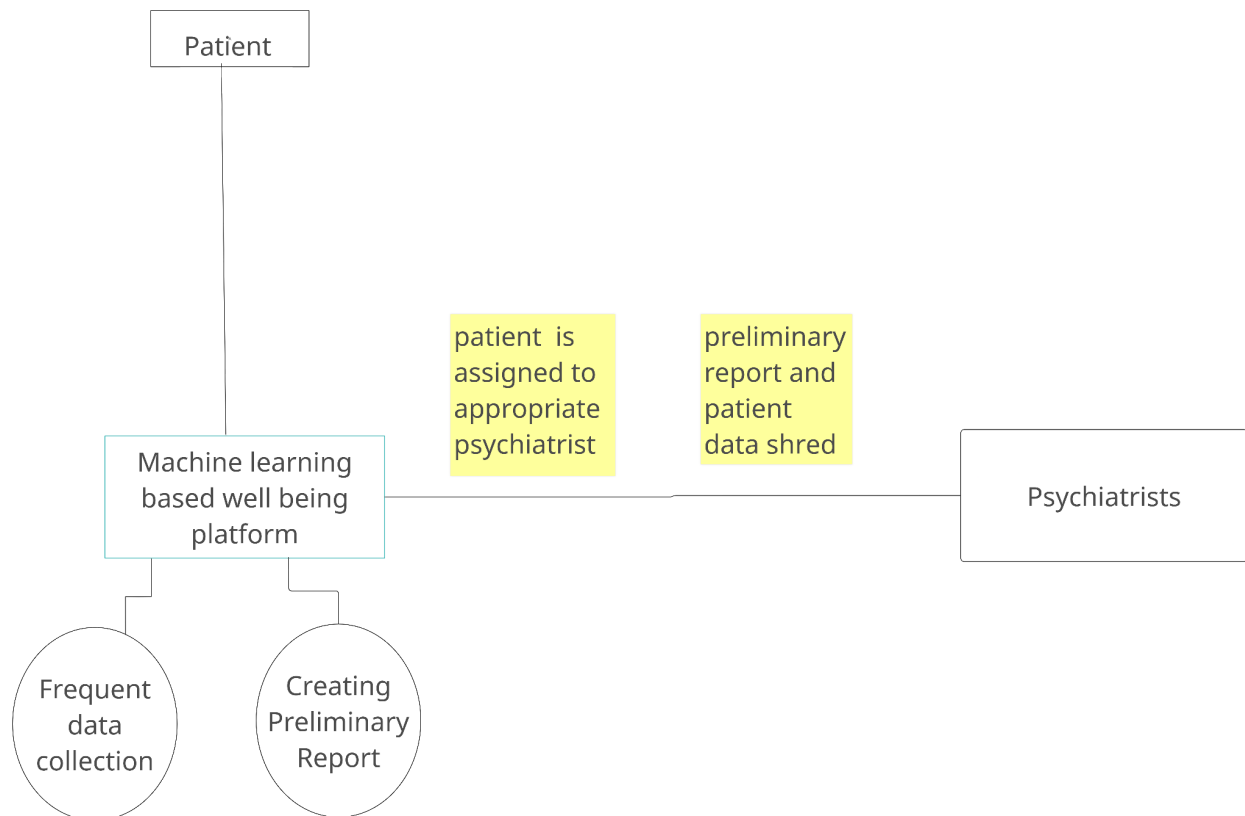
The concept can be developed in several steps as described below

1. Building machine learning models for diagnosis and treatment prediction
  - Collecting and preprocessing relevant mental health data
  - Develop disease prediction model
  - Develop treatment prediction model
2. Developing Mobile and Web Application
  - Design the user interfaces based on the UX/UI design
  - Develop the front-end of the web application.
  - Develop the mobile app for iOS and Android platforms.
  - Develop the backend infrastructure and APIs

### 3. Integration and Testing

- Integrate machine learning models into the application.
- Test the functionality, performance, and security of the application.
- Conduct user testing to gather feedback and identify areas for improvement.

## 10.0 Final Product Prototype (abstract) with Schematic Diagram



## **11.0 Product details**

### **11.1 Algorithms**

For disease prediction and preliminary report:-

- Logistic Regression
- Random Forest
- Support Vector Machine (SVM)
- Gradient Boosting (e.g., XGBoost, LightGBM)

For treatment prediction:-

- Collaborative Filtering
- Decision Trees
- K-Means Clustering
- Naive Bayes
- Support Vector Machine (SVM)
- Ensemble Methods

### **11.2 Team required to develop**

- Project manager
- UI/UX designer
- Machine learning engineer
- Mobile and web application developers
- Data Scientists
- Backend developers and Database administrator

### **11.3 What does it cost?**

The costs can vary widely based on factors like team size, location, complexity, and features. However, a comprehensive estimate could range from 80 Lakh rupees to 4 crore rupees or more, considering development, design, machine learning, infrastructure, testing, and ongoing maintenance.

## **12.0 Conclusion**

In conclusion, the integration of Machine Learning algorithms into psychology represents a promising step forward in significantly enhancing patient care and well-being. Through the approach presented in this report, a technology company seeks to empower patients to proactively engage with their mental health and receive support as and when needed.

The use of daily questionnaires to collect behavioral data, this platform establishes a continuous loop that enables early detection of potential mental health concerns. The use of Machine Learning algorithms to analyze this data offers multiple benefits: accurate diagnosis of mental health conditions and generation of preliminary reports. These reports not only provide patients with valuable insights into their mental well-being but also act as a connection between patients and psychiatrists.

Beyond prediction, prediction algorithms can further support psychiatrists to decide which treatment is necessary for the given patient.