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Importance Of AI and Machine Learning Apps for treating depression.

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Abstract - Depression may be a psychological state disorder characterized by persistently depressed mood or loss of interest in activities, causing significant impairment in lifestyle. It is one of the leading causes, and it can be seen irrespective of the age groups, including children to old age person.

In order to treating this depression Artificial intelligence and machine learning are making their entries in the medical section. Companies and their scientists are using Artificial intelligence, Machine learning, Natural language processing (NLP) for developing different applications and systems with considering the depression. But the key factor is we have to check impact of these technologies over society, because human brain is much more complex to understand by just analytics. So in this paper we will review the technologies which are currently used in market by most users for treating depression, and view their impact on the human society and life which will help us to understand their role better.

Keywords: Conversation agents, chatbots, Natural language processing, Artificial intelligence, impact on mental health, depression.

1.INTRODUCTION

Depression is one of the type of illness which cant be seen from outside by just looking at that person. Globally, by WHO - More than 264 million people of all ages suffer from depression, close to 80,000 died due to suicidal thoughts every year, which will be approximately one person every 40 seconds? It is the second leading explanation for death among 15-29 year old globally [1].It also predicted that by 2020, 20% of Indian Population will suffer from mental illness. It also says that by next year it will be second-largest disease burden for entire world.

On one side, we have a very unique case of depression in each individual. No two cases of depression are the same because individuals differ in their background and previous experiences, in their knowledge, in their thought patterns, in their life circumstances, and similar. While two different cases of depression may resemble to some degree, there is a need to approach each patient individually as a unique case. There is some behaviour which may be found similar in some patients.

Some of the questions that arises while understanding the role of AI and ML for treating depression:

1.What type of AI/ML applications are used for treating?
2.For how much period patient has to use these applications?
3.What is doctors concern about these new applications, and how much they are responding to it?
4.Are these Apps/apps are legally verified to be experimental?
5.How has healthcare market responded to these new inventions?

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2. IMPLEMENTATION

2.1 Predictive Tools

Currently there are no officially approved apps for predicting the depression. The scientists who are working in Vender bilt University, created machine learning algorithm (Paywall) that uses medical records of approximately 5000 hospital patients, like their personal information and their medical history, from this information the algorithm will predicts the likelihood of patients suicidal behaviour's. The accuracy of the algorithm is up to 84% for predicting the patients depressive/suicidal thoughts within a span of week [2]. Most of the ML algorithms uses Support vector machine (SVM), Classification algorithms, Clustering methods. The scientists are really hoping to see their algorithm to be used by worldwide.

2.2 Virtual Conversational agents for Treatment

Clinicians and developers come together to create conversation agent for patients which will help them to defeat their anxious thoughts. These conversational agents are particularly based on Cognitive behavioural therapy (CBT). CBT mostly focuses on challenging and changing unhelpful behaviours and improving the patient behaviour. It uses Artificial intelligence and machine learning algorithms as a base tool which helps to train the system on each conversation with user. It uses natural language processing for communicating with the user and extracts the information from chats for further using in algorithm. Conversational agent has many forms – textual, audio/video, virtual human interaction.

2.3.1 Woebot

The first mental health chatbot woebot was created by Dr. Alison Darcey in 2017. It normally uses text as a communication interface. This chatbot gives a step-by-step guidance to the user with the help of CBT apps to help user minimizing his stress levels and create more positive thoughts towards life. Before launching this software into market they take 2 weeks trial on college students with age group of 18-28 years. Result of trial shows most of the students feel decrease in their depressive thoughts [3].

2.3.1 Wysa

It has some additional benefits over woebot. It provides online coaching sessions with psychologist if the user seeks for extra help. The UI provided by wysa is more users friendly. It gives user different choices of self care exercises, from which user has to choose the required exercise for him.

3. Patent Monitoring System

Patient monitoring system involves actual therapists and doctors to look over patient information. It has three components- therapist monitoring system, patient monitoring system and knowledge derived in the form of patterns from previous two systems.

The doctors have all the records of patients including their medical history and daily activity, they passively monitors patients/users mental condition with the help of system. If system found any changes in behavioural pattern it will be seen by doctors so they could easily reach out to help their patient before things gone worse. These systems take behavioural information about patients such as daily or weekly self assessment; ask about internet or normal activity on mobile, travel etc. Generally the factors for collecting behavioral information from patient are not exact one, but usually these systems track following information from users:

Exercise and sleeping patterns

Their current movement and location

Self assessment tests

Data collected from text messages

Mobile activities

Some of the patients monitoring systems which are used in market are:

1. Ginger.io
2. Mind strong
3. Marigold health

These apps provide live conversation with the therapists to seek better treatment in coaching sessions. The moderators do not read each message typed by patient. Natural language processing uses sentiment analysis and finds out the concerning chats of patients with the system and forwards it to the moderators. The mindstrong app keeps tracks of user mobile activity- speed of typing, scrolling, swiping etc. And keep the measurements.

4. FACTORS FOR CONCLUSION

4.1 Application Accessibility

The current situation in India is there are only 3 Psychiatrists over 10,000 people, which is 0.75% [4]. And currently there are 400 million users who own their personal phone. So accessing these apps will help in those lengthy and moreover costly visits to the therapists to metropolitan cities. It will also help to enable over-burdened mental health professionals to reach to their patients easily and provide services.

So these apps are effective for those patients who enable to access traditional mental professionals for variety of reasons. Procedure for accessing the apps is also very easy to understand.

4.2 Privacy and Security of Patient's Information

Mental health information of patient is very sensitive topic. These apps always first ask for users consent before using any personal information regarding them. Still there have been lots of medical scandals happened by misusing the medical data, so they must earn and ensure the trust of patient‟s privacy and do not leak available information. So there are still conflicts about privacy and security issues. And privacy and consent are related to each other, maybe patient has given primary consent over using medical notes or prescription that does not mean he is also agreed to give consent for sharing audio/video forms of data. So the system will always have to ask for users consent.

4.3 Social Impact

In India mental health is still considered as a taboo and people don‟t want to talk about it publically this is still considered as a stigma around society, these apps are not part of any cultural norms and expectations, they are mostly non judgmental, non opinionated and neutral. People in Society are still not fully aware with these new technologies, a little push is needed towards proper awareness among peers. Also India is demographic country

where culture, language differ from one place to another. So, any app which is based on speech patterns, language to diagnose the mental health information from one place may create false result when it is used in another place.

4.4 Impact on Patient and Doctors

Users who have used these apps for their treatment have very positive review for it. The trials which are conducted by these apps show both positive and negative impact on patients. More research is still required in this field for proper treatment of patients. Same app will be downloaded by different patients who are facing mental health issues, so determining the benefit and harm of each app on two different people having different type of issues is difficult. These apps are beneficial for people – who cannot afford actual therapist, people who feel little uncomfortable visiting actual clinics, people in rural areas where reaching the physical therapist is almost impossible.

According to global survey of doctors, 48% doctors felt that AI/ML will have no or minimal impact on psychiatrists over next decade, and 3.8 % think that these technologies will be overtake them in the future by making them obsolete. Also they believe that there is moderate or minimal chance that technology will provide more care than the psychiatrists. They are more concerned about potential risks about these future technologies. One of the review from the doctors was "There is a stigma associated with mental health treatment already and am not sure how talking to an AI would help the treatment process at all" [5].

4.5 Economical Impact

There are many companies, mostly start- ups who are using AI and Ml in their products for helping the patient to overcome depression. The investment cost needed for implementation of these apps is higher Considering India‟s per capital spending is relatively small as compared to developed nations, and mostly patients may not opt to go for advanced analytical apps for their mental conditions. Still these apps have gain more popularity in healthcare market and count of users who are responding to it also very satisfactory. The conversational agents like youper, wysa, woebot have more than 1 million downloads and positive reviews on playstore. Helping the patient should be the first priority for clinicians; the idea behind these applications is to find a therapist for potential patients. But this does not mean that business model should begin prioritizing pushing patients towards therapists instead of actually realizing they need one or and harm of each app on two different people having different type of issues is difficult. These apps are beneficial for people – who cannot afford actual therapist, people who feel little uncomfortable visiting actual clinics, people in rural areas where reaching the physical therapist is almost impossible.

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4.6 Legalization of Apps

Regulation of mobile apps is significantly less than regulation of medical products and treatments. Most of start up companies creates apps in the name of inventions each day, but in the case of mental health apps it is strictly required that those pirated apps which are currently available to users on google platform should be legally verified by medical council. The apps like woebot, ginger.io, youper are at least approved by some clinically safety standards but not all of them. Some applications are created only for pilot studies and trial. The disadvantage of non legalized application is it provides very poor quality information to the user and thus posing risks to patient‟s mental health by providing harmful recommendations. So for official legalization these applications have to prove their stand and improvise their accuracy towards patient‟s health. In UK, NHS (National Health service) has came forward for helping these apps by creating „NHS Digital Apps Library‟ which has NHS Approved labels for them by creating a proof of their safety and usability.

4.7 Technological Impact

AI and ML both are emerging technologies which are used to train the system by collecting more and more dataset to minimize the errors. In this technological world, people encourage new technology but when it comes to using it, they still step back by fear and insecurities. Another challenge is natural language processing for text and speech recognition. At moment, these apps are learning only English, and mostly dependent on preselected short descriptions for users. If the user interacts with slightly

short forms or different language conversation, the system does not understand it. So to make them more useful they have to focus on removing the language barriers by trying to do more development in communicating multiple languages to reach multiple users

5. CONCLUSION

These new technologies are still in their early stages of development, they required thorough research to ensure the proper treatment and safety of patients. Mostly these apps are useful for minimal to mild conditions of depressive thoughts of users to help them curing it, but they are not replacement for actual in person medical therapy. Also In severe conditions patients should not rely on them and seek medical help. It is true that these technologies has more positive effects than negative effects, they help therapists to reach out for his patients through online access and patients also giving positive response towards this new innovation. To get accepted by medical field these technologies have to work hard on treating patients. If they do, there might be a window that medical field will legally use them in psychiatry.

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