

## Women's Mental Health Chatbot Using Seq2seq With Attention

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**Abstract:** Mental healthcare is a privilege paying little heed to gender differences however the numbers show that ladies experience some emotional wellness conditions at a lot higher rates than men. This is mainly seen in the forms of anxiety and depression. Looking for help is a huge introductory stage in improving mental prosperity and getting access to mental healthcare. Diverse online organizations are instantly available for adolescents including self-composed, low force Web-based passionate health sites (eg, ReachOut), public web exhorting organizations (eg, Eheadspace), stores for information and resources concerning mental prosperity (eg, Somazone), and coordinated self-facilitated online treatment (eg, MoodGym). As the amount of psychotherapists isn't adequate, it is significant for agents to have the alternative to keep their mental prosperity in isolation. An autonomous mental clinical benefits course using VR devices has been made, and its pressing factor decline sway has been endorsed in advance. This assessment proposes another type of the course using phones and chatbots to overhaul its solace for use and to keep up customer motivation for consistently and reiterated use. The effects of pressing factor decline and motivation uphold were perceived to feel heard and give them a phase to their issues. It will allow anybody to login and profit by mental prosperity organizations in their district

**Keywords:** Chatbots, Mental Health Care, LSTM, Seq2Seq with Attention Based Learning, Conversational agents, Mobile mental health, Mental health, Depression, Anxiety

### 1. Introduction

These days, mental prosperity issues can come sparingly in preference especially after the lockdown from COVID-19. Going to for counselling or therapy have gotten more sparse than any time in ongoing time. A couple of individuals may experience wretchedness and feel overwhelmed with inconvenience and despondency for no known clarification. Moreover, during this time it is critical to feel heard. People overseeing wretchedness need to describe their records to somebody and they are for the most part reluctant to address their dear buddies and relatives. My humble attempt is to make a site for people to feel heard and give them a solution to their issues. I plan on developing a site that will allow anybody to login and profit by mental health organizations in their locale.

Despite huge interests in enthusiastic prosperity, organizations can't maintain the immense number of youths experiencing mental health issues. Additionally, existing organizations provide basic impediments for young people by and large due to access, openness, and huge costs of these organizations, similarly as the reluctance of young people to search for capable help due to disgrace and embarrassment. Wilson and partners perceived that adolescents have a ground-breaking desire for self-administration, tolerating they should deal with issues for themselves. As to obstacles, internet organizations have a couple of inclinations: no geological cutoff points, organizations are usually free to the customer, and the Internet is by and large strange and private, which is presumably going to diminish the disgrace and embarrassment related with searching for help.

The smart thought of the Internet contemplates the plan of online medicines in various constructions, for instance, games or eLearning locales. Online mental prosperity organizations can offer natural responses for attracting adolescents in a self-composed and puzzling manner, accordingly aiding and supporting overburdened very close organizations. Understanding adolescents' status for care is a fundamental factor in supporting youths in showing up at organizations fitting to their necessities. Electronic advancement can pass on wandered care organizations, giving non-intruding treatments to those with smooth issues, and growing with power as required.

Routinely, assessments concerning prosperity and enthusiastic wellbeing destinations have included evaluation of the idea of the information, the expansion and reach of the site, and purchaser satisfaction. There is moreover broad assessment showing that coordinated online treatment programs sufficiently improve enthusiastic prosperity results and that convenient self-noticing is a significant gadget. Online mental wellbeing destinations have moreover seemed to construct the usage of organizations for adults; regardless, the effect of online information organizations and other regularly used unstructured locales on assistance pursuing in youths has only occasionally examined treatments for those with delicate issues, and growing with power as required. As improving help searching for is important to having the opportunity to mind and improving enthusiastic prosperity, this systematic review explores the feasibility of recurring pattern online mental prosperity organizations in empowering the help searching for measure in youths. The purposes of this overview are to examine past composing that examination whether online mental health organizations support the help searching for measure in young people, unequivocally

focusing in on assistance pursuing practices, the deterrents and facilitators influencing on the web help-pursuing, and the experiences of adolescents who use these organizations.

## 2. Literature Survey

As of late, task freethinking along with the pre training models that incorporate largescale transformer models[1] and, general content corpora has made extraordinary progress in normal language understanding [2], which has radically impacted chatbots. For example, in light of the overall language model GPT2 [3], DialoGPT [4] they extensively deal with data scraped off of reddit. In Radford's paper[5] for instance, has exhibited that transformer models prepared on exceptionally huge datasets can catch long haul conditions in text based information and produce text that is familiar, lexically assorted, and wealthy in its content. These models have found to have the ability to catch patterned information with fine granularity and produce yield with a high-goal that intently copies genuine world text composed by people.

Present day strategies for learning in NLP involves pre-training models being utilized with unaided learning on unlabeled information. This methodology has as of late been utilized to acquire best in class brings about a significant number of the most well-known NLP benchmarks[6][7][8]. To get a human-like opendomain chatbot, [9] scales up the organization boundaries to 2.6B and utilizes more online media discussions in the preparation interaction, prompting huge enhancement for reaction quality. To moderate unwanted poisonous or predisposition qualities of huge corpora, there are other papers that further adjusts the pre-prepared model with human commented on datasets and stresses alluring conversational abilities of engagingness, information, sympathy and character.

Chatbots in the field of mental thriving consideration have been made to help social limits as an availability part of a dive treatment program as opposed to treatment. Furthermore, chatbots to conform to pressure issues have been additionally considered. Through multiple research efforts it was found that Perceptual Control Theory and chatbots made on those principles fared better than its peers[10]. Facebook's "Woebot" messenger was made using CBT and was well received by the crowd. Due to an appraisal examination using "Woebot" for understudies, it was found that the individuals' troublesome indications were by and large decreased[11]. They commented that using "Woebot" was more open than ordinary medicines. In any case, same as the CBT application referred to beforehand. It is basically perceived better than normal modes of therapy as there are lesser hurdles to cross.

With expanded admittance to innovation and the convenience that goes with, interest in psychological well-being chatbots has arrived at a point where some have marked them "the eventual fate of therapy." However, there is no agreement on the efficiency of mental chatbots or their job in the facility. While they do hold potential, little is thought about who really utilizes them and what their remedial impact might be. Assessment endeavors are additionally confounded by the quick speed of advancement in equipment and that such programming may carry on and react contrastingly relying upon district.

In spite of the fact that there is still a lot to be investigated with regards to chatbots in psychological wellness, their latent capacity has just started to surface. Chatbots are being utilized in self destruction prevention and intellectual social therapy, and they are in any event, being custom fitted to specific populaces.

In India, the ordinariness of mental issues is in growing consistently, at the same time the mental clinical benefits specialists inadequacy furthermore in the rising example. Sharp progressions like Artificial Intelligence (AI) expect a critical part in filling this Mental Health transport opening. In this paper let us consider how the chatbot is one such advancement used in mental clinical consideration movement. Unusually, chatbots are from the start used principally to pass on the mental prosperity organizations like psychotherapy, later is used in various undertakings in addition. The studies show that Chatbots are comprehensively used to manage strain, anxiety, stress and besides to give psychoeducation. In any case, it has its own obstacle, for instance, it can't take on a comparable attitude as a human with knowledge and sympathy; and moreover the arrangement of the data is a ton of veritable concern. All the while, these Chatbots will transform into a fundamental piece of our lives in the coming years. Additionally, we need Chatbots that arrange our lifestyle. All together, to benefit by this inventive progress, we should have a regulatory and examination measure set up. The National Mental Health Survey by the National Institute of Mental Health and Neurosciences revealed an in general weighted predominance for any emotional wellness grimness at 13.7%. The general treatment hole for mental problems went from 70% to 92% across different disorders [12]. In any case, the current figures in India are as per the following: therapists – 0.2/100,000, clinicians – 0.03/100,000, mental social laborers – 0.03/100,000, and psychological wellness medical attendants – 0.05/100,000 populace [13].

One innovation that offers a halfway answer for the absence of limit inside the worldwide emotional well-being labor force is versatile applications. They can possibly improve the quality and openness of emotional

wellness [14]. Chatbots can encourage collaborations with the individuals who are hesitant to look for emotional well-being counsel because of belittling [15] and permit more conversational adaptability[16].

Prabakeran et al states Chaos theory is applied to tune the parameters of proposed HCPDS algorithm. It is also proved that the HCPDS based proposed approach can efficiently meet the requirements of security and privacy in VANETs[17]. Prabakeran et al explains their proposed frameworks of Fuzzy with BW–SMO effectively to solve optimizing selection and join queries with low cost, latency, and securing data. The fuzzy can be used to cluster the query solution. To optimize the query selection, we exploited the Black widow optimization algorithm incorporated with the Spider Monkey optimization algorithm[18].

Whereas Prabakeran et al elaborates develop models efficiently and identify physical activity correctly. Extreme Gradient Boosting (XGBoost), Multilayer Perceptron (MLP), Convolutional Neural Network (CNN), Long Short-Term Memory Network (LSTM) methods are contrasted in this paper to distinguish human behaviors on the HEALTH datasets[19]. Prabakeran et al performs In-depth survey to perceiving the effect of kidney dialysis parameters using clustering framework. In the circle of this examination, a few certainties mining manage called grouping is second-turn in lieu of perceiving the impact of kidney dialysis parameters in addition to quiet survival[20].

### 3. Modules

For the undertaking of this research proposal I utilized subjective information gathered by scraping reddit channels, especially: r/depression\_help, r/askatherapist, r/Stress, r/connections, r/talktherapy and so forth where the organization of the content is ideal for the topic of my task. The scraping of the data was done in a manner to protect the succession of the conversations(basically title and remarks were saved as they are in reddit).

The following stage associated with the interaction was to preprocess the information and clean it. In which I especially utilized a tokenizer, extricating titles and reactions and making lists off of them.

Next I utilized grouping to arrangement with consideration design utilizing tensorflow structure to make a generative chatbot. It utilizes an encoder-decoder model which fundamentally utilizes Long Short Term Memory-LSTM for text age dependent on the reddit preparing corpus. It predicts a word given in the customer information and subsequently all of the accompanying words is foreseen using the probability of likelihood of that word to occur. Presently I fabricated and prepared seq2seq model followed by testing the model.

	Model	BLEU score
	<b>PARTNER</b>	<b>0.1391</b>
<b>Baselines</b>	DialoGPT	0.0722
	MIME	0.0808
	Latent Seq	0.0254
	BART	0.0956
<b>Ablations</b>	- no coherence	0.1335
	- no mutual info.	0.1297
	- warm-start only	0.1281

Fig. Other models and their BLEU Scores

Finally assembling everything in a generative chatbot.

#### A. Text Preprocessing

Cleaning of information prior to playing out any sort of displaying is significant. This module is executed to get quality information that can be utilized for acquiring better quality outcomes.

We need to take the "tag" and "patterns" out of the record and store it. We'll additionally make an assortment of extraordinary words in the attempt to make a Bag of Words (BoW) vector.

**B. Stemming**

Stemming is generally endeavoring to find the main driver of a word. It wipes out all the prefixes and postfixes of a word so the model that we're building will get some answers concerning that word rather than getting discovered taking everything together the intricacies of comparative word with different designs.

**C. Vectorization**

This stemmed once-over of words will be changed over into some kind of numerical data with the objective that we can deal with it to the neural association.

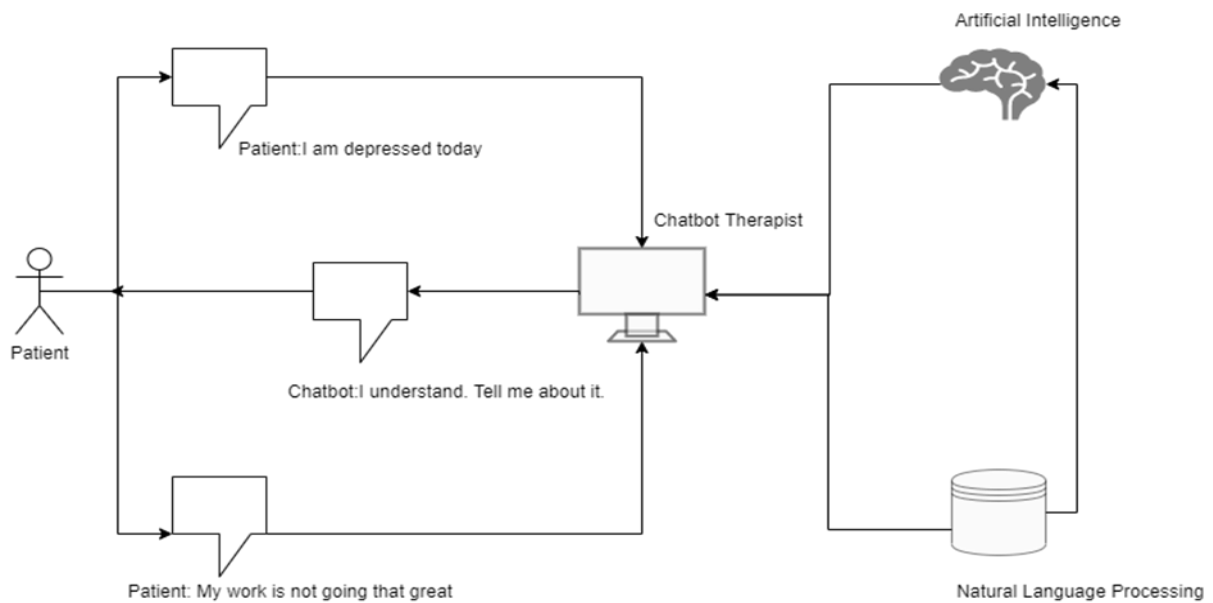
With this procedure notwithstanding, the model can simply grasp the occasion of a word in the sentence. The gathering of the words inside the sentence will be lost.

**D. Building the model**

Two Fully Connected Layers (FC layers) with two of them being concealed layers.

One of those will be giving out the objective probabilities.

Last layer will have a softmax initiation.



**Fig 3.1** The interaction between chatbot and the user

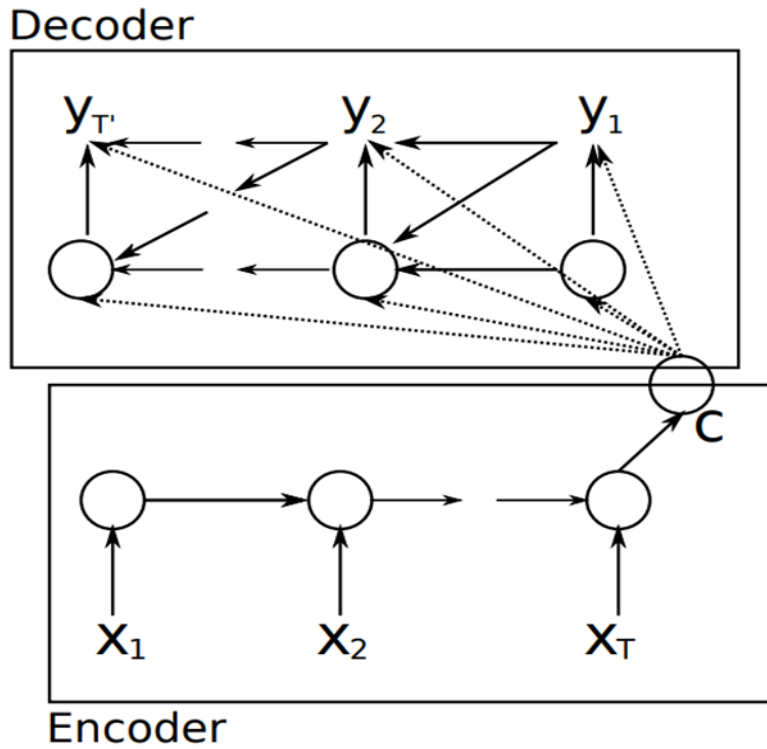


Fig 3.2 Encoder-Decoder model used

The dataset contains sessions as such which help preserve the format of the scraped data:

$$D = \{S_0, S_1, \dots\}$$

These sessions contain the data extracted from the reddit channel.

$$S_k = (u_0^{(k)}, u_1^{(k)}, \dots, u_{T_k}^{(k)})$$

which represents the interpretation space. Here the session we initially characterize the development and they are ordered in terms of successive utterances.

the H-space in the model allows for U and H to allow for many-to-many relationship for the first time as depicted below:

$$P(h|u) = \frac{c(u, h)}{\sum_{h' \in H} c(u, h')} \quad P(u|h) = \frac{c(u, h)}{\sum_{u' \in U} c(u', h)}$$

#### 4. Architecture Diagram

The outline above, sufficiently portrays the design of the model created. Every module has been appeared as an independent part playing out a committed errand. There are absolute of two significant segments:

Encoder: A heap of a few intermittent units (LSTM or GRU cells for better execution) where each acknowledges a solitary component of the info succession, gathers data for that component and engenders it forward.

Decoder A heap of a few intermittent units where each predicts a yield  $y_t$  at an at once. Each intermittent unit acknowledges a concealed state from the past unit and delivers and yield just as its own shrouded state.

To train seq2seq:

Word/Sentence portrayal: this incorporates tokenize the info and yield sentences, network portrayal of sentences, like TF-IDF, sack of-words.

Word Embedding: lower dimensional portrayal of words. With a sizeable corpus, installing layers are strongly suggested.

Feed Encoder: input source tokens/installed cluster into encoder RNN (I utilized LSTM in this post) and get familiar with the concealed states

Associate Encoder and Decoder: pass the shrouded states to decoder RNN as the underlying states

Decoder Teacher Forcing: input the sentence to be meant decoder RNN, and target is the sentences which is single word right-moved. In the construction, the goal of each word in the decoder sentence is to anticipate the following word, with the state of encoded sentence and earlier decoded words. This sort of organization preparing is called instructor compelling.

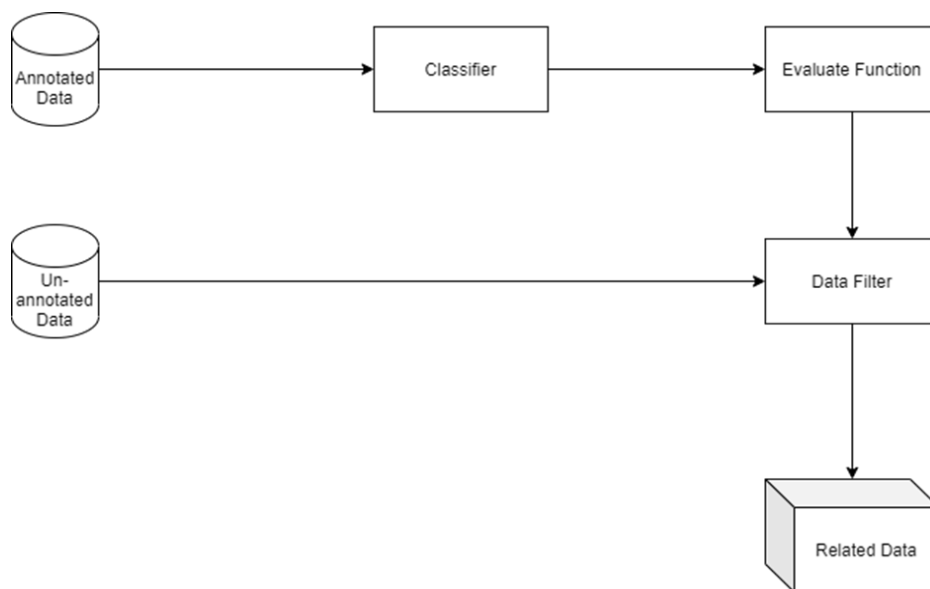
The model uses Keras with TensorFlow backend, in a Jupyter Notebook with Python3. This arrangement makes the model convenient and executable on a wide scope of frameworks. Keras likewise contains all library code we require to build our model, saving the need to search for ideal capacities in various code libraries.

In a Jupyter Notebook with Python3, the model employs Keras with a TensorFlow backend. The model is convenient and executable on a number of systems because of this structure.

On preparing the models, the Adam optimizer with a little learning rate to forestall skirting the ideal arrangement in inclination plummet because of enormous learning rates. To avoid overfitting in the model, check the estimation of acceptance misfortune while planning and use the capacities Early Stopping and Reduce Learning Rate on variables based on the incentive. To avoid knowledge loss in unforeseen capricious circumstances, the model assigned spots were also saved toward the end of each age.

The flowchart for the model is shown in the diagram above: A bunch of mental relevant information m in the arrangement of un-commented on information n is visible using a prepared classifier and a function to evaluate through a bunch of commented on information.

Since the model's assignment is a twofold characterization task, utilize the as of now proposed Bi-LSTM model for arranging the corpora has been utilized. Models objectives appear in formula(number). In particular, we pick double cross entropy.



**5. Results**

The results are as depicted in the images below:

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User	Hi
Bot	Hi! How are you? I just got back from walking my dog. Do you have any pets?
User	I don't feel good
Bot	I'm sorry to hear that. I hope you feel better soon. What's going on?
User	I am very confused in life.
Bot	I'm sorry to hear that. What's going on in your life that is making you feel that way?
User	My career is not going as planned. I feel like I should have taken a different path.
Bot	I'm sorry to hear that. What kind of career are you trying to get into, if you don't mind me asking?
User	I'm sorry to hear that. What kind of career are you trying to get into, if you don't mind me asking?
Bot	I really don't know. I feel like I need to explore more fields.

These chatbots will turn into a basic piece of our lives in the coming years. Chatbots will actually want to break down data, settle on their own choices, and give recommendations. The idea of auto decision of chatbots can terrify numerous individuals. Notwithstanding, we accept this will empower individuals to address their issues/issues successfully and effectively. In addition, we need chatbots that coordinate our way of life. To profit by this innovative progression, we ought to have an administrative and evaluation measure set up.

The proposed conversational framework is completely age based, which can produce new answers relying upon every client question. It likewise expects to consolidate a response framework that can move between an agreeable chatbot and a psychological controlling chatbot to improve the structure's introduction and the customer's experience. We really get a decent outcome through the proposed classifier in division with a by and large restricted dataset of planning.

These advancements have empowered the client to bit by bit deliver and change their negative feelings to good ones. Since the entirety of our models are profound learning based, as more connection with the framework happened, really preparing information can be gathered. Along these lines, the presentation of the framework is probably going to improve after some time.

The outcomes showed that there was little danger of damage with conversational specialist use. The implicit chatbots on most cell phones were unequipped for reacting to psychological wellness issues. As of now, the field comes up short on the vital longitudinal examinations to comprehend the effect of postponed participation with and receptiveness to mental health chatbots, just as their capacity to react fittingly to patients in trouble.

## 6. Discussion

The aftereffects of these examinations show that there is potential for compelling, agreeable psychological wellness care utilizing chatbots. Notwithstanding, the high heterogeneity in both the results and frameworks of these investigations proposes that more exploration is expected to completely fathom the best chatbot methods.

Regardless, we had the choice of recognizing the typical advantages and expected disadvantages of utilizing a chatbot.

### 1. Benefits

Across all investigations, satisfaction with and potential for mental use was accounted for to be high. Psychoeducation and adherence were two of the most important benefits of using chatbots. Despite the fact that these studies examine these variables using various modalities, they show that chatbots have the potential to allow people to provide self-care in both clinical and nonclinical populations, potentially alleviating the labour force inadequacy mentioned recently. Besides, the positive customer fulfillment results show not just that conversational specialists can be utilized for self-adherence and guidance, yet additionally that customers of these systems would profit by and appreciate doing as such. In general, the viability of chatbots with people who have significant burdensome problems suggests that chatbots could be useful in clinical populations. Despite the fact that the concepts behind these tests are diverse, the positive results show that conversational specialists are capable in the field of psychiatry.

### 2. Potential Harms

The discoveries showed that utilizing conversational experts presented little danger of wickedness. One investigation, directed in a controlled lab and hence avoided from our study, taken a gander at how wireless based chatbots react to emergencies related with implosion. Their outcomes found that the reactions were restricted and now and again even unseemly. Most phone chatbots were ill-equipped to react to enthusiastic health issues, like foolish ideation, past giving essential web search or helpline data. In any case, the field is presently ailing in longitudinal examinations to all the more likely comprehend the effect of postponed coordinated effort with and receptiveness to enthusiastic prosperity chatbots, just as their capacity to react properly to patients in trouble.

### 7. Future Scope

Further examination is expected to improve the responses of chatbots and to research their handiness through actual users. The examinations frequently start from creators who principally approach mental issues (like melancholy) from a foundation in data innovation and start to team up with clinical-mental researchers in the wake of building up their chatbots (bottomup). There is an absence of speculative work that surveys what is normal in the clinical-mental setting along these lines (top-down). With the assistance of such tests, appraisals could be made about how and why certain psychological endpoints ought to be met. More highlights can be included in the future to improve the chatbot's convenience. Some of them are mentioned below:

Allowing text to speech technology as an interface for the chatbot

Face recognition to detect the emotions and the variations of the emotions, which will be used to provide much better session

Increase the efficiency of the chatbot by using state of the art chatbot models like PLATO 2

### 8. Conclusion

Albeit the included investigations showed that chatbots might be protected and improve melancholy, misery, stress, and acrophobia, complete ends in regards to the viability and wellbeing of chatbots couldn't be attracted to this audit for a few reasons. In the first place, the seriousness of suffering was not clinically relevant for chatbots and various intercessions. Second, the probability of inclination was solid in most included assessments, and the meta-separated confirmation's temperament moved from medium to low. Third, every perception depended on information from a couple of studies with little example sizes.

Fourth, readings showed contradictory results for some findings (ie, tension and positive and negative effect). Inadequacies in the examination plans detailed in this survey should be avoided by scientists. Suppliers of medical care should consider providing chatbots as an alternative to intercessions that are effectively available.

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