



**DEPARTMENT OF COMPUTER SCIENCE AND  
ENGINEERING**

**CS64: MINI PROJECT WORK**  
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**MINI PROJECT**

**Topic:**  
**HINDI CHATBOT FOR MENTAL HEALTH  
TRACKING**

**Submitted to:**  
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**Signature of the Guide**

# 1. PROJECT ORGANIZATION

## 1.1 SOFTWARE PROCESS MODEL

A software process model is an abstraction of the software development process. The models specify the stages and order of a process.

### 1.1.1 Chosen Process Model: Agile Model

This mechanism divides the product into small builds and these small builds are developed with proper designing, coding, and testing with meetings until one build is completed. After this build, the other requirements are analyzed and the previous process is repeated until the final product is developed. The time for each build is called Sprints.

Agile model is the most suitable development methodology to implement for this project. The flexibility of the Agile model makes it ideal for this project as it is likely new requirements will be identified during the later stages of development and each iterative build makes it easy to implement new requirements throughout the development process.

### 1.1.2 Phases of Agile Model:

1. Requirements gathering
2. Design the requirements
3. Construction/ iteration
4. Testing/ Quality assurance
5. Deployment
6. Feedback



*Fig. 1.1.1 Agile Model Phases.*

## 1.2 ROLES AND RESPONSIBILITIES:

### *1.2.1 Table Roles and Responsibilities*

	Team Member	Role	Responsibility
1.	Abhay	Dataset Collection and Back End Developer	Collection and Preprocessing of the dataset, Back end development of the application.
2.	Ankit Bargotra	Front End and Back End Developer	Front end and Back end development of the application
3.	Bhuvan Raj M S	Dataset Collection and Front End Developer	Collection and Preprocessing of the dataset, Front end development of the application

## **2. LITERATURE SURVEY**

### **2.1 INTRODUCTION:**

As indicated by the World Health Organization (WHO), emotional well-being or mental health is a prosperity state in which an individual can utilize his/her capacities, recuperate himself/herself from the day-by-day schedule pressure, be beneficial, and contribute to the society. Ten to fifteen percent of working age populace experience depression, with discouragement being one of the most common mental issues.

India is very near to mental health epidemic. As per a review directed by the National Institute of Mental Health and Neurosciences expressed a general weighted pervasiveness for any grimness related to psychological wellness at 13.7%. The general treatment hole for mental disorder extended from 70% to 92% across different clutters. Thinking about the lack of mental experts, it will take different creative strategies to connect this huge hole.

Artificial Intelligence gives the incomparable capacity to a computer, to impersonate the human perspective of thinking and behaving. Chatbots are nothing but such sort of computer programs that uses common dialects to interact with the clients. Young adults or college students might hesitate or even the lack of time make it difficult to seek the treatment by a therapist or to fulfil their mental health needs. With the enhancement of Artificial Intelligence (AI), there's a drastic change in many fields which also includes psychiatry. AI has helped in developing many applications in the field of psychiatry that includes prediction of suicide and preventing it, identification of a particular drug which best suits a particular patient and many more.

A chatbot is an application which utilizes AI to initiate a conversation which can be done on different platforms, for example, messaging or voice chat. Few of the chatbots are completely automated while some utilize the human interface. Chatbots have already gained popularity in customer service. They can address the most elementary issues of customer 24X7 every single day, comparatively at a lesser cost when compared to a customer service agent. The chatbots have the ability to provide support, therapy and companionship which helps the therapist by reducing their burden. It appears as an option for individuals who have issue with affordability and accessibility both regarding time and distance.

However, nowadays various online counseling chatbot applications are available but they generally operate in English language which is not easy to use for someone with little or no knowledge of English. So, we here bringing it in Hindi language which is predominantly spoken in India. This Chatbot interacts with user in Hindi Language So, users can openly and comfortably express their feelings and frustrations through text to chatbot. Making it chatbot to identify the user's emotion and recommending the appropriate activity to overcome depression.

## 2.2 RELATED WORKS:

### 2.2.1 Related Works

S. No.	Title	Method Used	Observations
1.	Shivani Shivanand, K S Pavan Kamini, Monika Bai M N, Ranjana Ramesh, and Sumathi H R “Chatbot with Music and Movie Recommendation based on Mood”, <i>JSS Academy of Technical Education, Bangalore, India.</i>	Rule based Chatbot. A rule based chatbot follows a list of predefined rules for answering the queries the user has listed. Rule-based chatbots are mainly used by basic applications that are trained to answer the questions according to the rules.	Rule-based chatbots might be incapable of interpreting complicated conversations, which is its only setback. It is able to only execute the tasks it has been programmed to do unless the developer decides to add in more upgrades.
2.	Falguni Patel, Riya Thakore, Ishita Nandwani, and Santosh Kumar Bharti “Combating Depression in Students using an Intelligent ChatBot: A Cognitive Behavioral Therapy”, <i>Department of CSE, School of Technology Pandit Deendayal Petroleum University Gandhinagar, Gujarat, India- 382007.</i>	The three deep learning algorithms namely Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), Hierarchical Attention Network (HAN) are deployed for training and testing.	Gives classified depression levels accuracy of 75% with CNN and 70% with RNN.
3.	Shivam Sakore, Pratik Jagdale, Mansi Borawake, and Ankita Khandalkar “Music Recommender System Using ChatBot”, <i>Dept. of Computer Engineering PDEA'S College of Engineering Pune, India.</i>	Uses Tone Analyzer by IBM which helps to detect communication tones (emotional, linguistic, and social tones) in written text. Using Support Vector Machine (SVM), a model is created to predict the tone of new texts based on conversations.	Gives an accuracy of above 90%.
4.	Sonali Nagargoje, Vishakha Mamdyal, and Rucha Tapase “Chatbot for Depressed	Deep learning algorithms LSTM (Long short-term	Gives an accuracy of up to 70%. The disadvantage of LSTM model is that it

	People”, <i>Pune Institute of Computer Technology, Pune, India.</i>	memory), RNN is used to identify emotion of user from chat text and reply accordingly.	takes more time than other deep learning algorithm as it works on feedforward and back propagation.
5.	Tulasi Sasidhara, Premjith B, and Soman K P, “Emotion Detection in Hinglish(Hindi+English) Code-Mixed Social Media Text”, <i>Center for Computational Engineering and Networking (CEN), Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Coimbatore.</i>	CNN and CNN headed sequential models like LSTM, Bi-LSTM.	CNN Bi-LSTM achieved 83.21% classification accuracy and CNN LSTM achieved 82.85% classification accuracy.
6.	Gerry Fernando, Z. K. A. Baizal, and Ramanti Dharayani “Music Recommendation Using Conversational Recommender System with Explanation Facility”, <i>School of Computing Telkom University Bandung, Indonesia.</i>	The system makes recommendations using an ontology. The ontology serves as a knowledge base to generate recommendations.	Accuracy up to 90.48%.
7.	Asma Ghandeharioun, Daniel McDuff, Mary Czerwinski, and Kael Rowan “Towards Understanding Emotional Intelligence for Behavior Change Chatbots”, <i>Microsoft Research Redmond, WA, US.</i>	Adopts Russel’s two-dimensional model of emotion as the primary “gold-standard” mood measurement technique.	The limitation of this work lies on the boundary between a data-gathering and a behavior change too.
8.	Varad Bhagwat, Mrunal Nagarkar, Pooja Paramane, Shrikant Jindam “Review of Chatbot System in Hindi Language”, <i>Comp Dept, VIIT College, Pune, India.</i>	Uses language model built in LUIS (Language Understanding) and responses store.	Can answer to only textually typed question which can also be implemented for voice-based question answering system and can also be implemented for other regional language.
9.	Asma Ghandeharioun, Daniel	Classification Models -	Relied on the authors’

	McDuff, Mary Czerwinski, and Kael Rowan “EMMA: An Emotion-Aware Wellbeing Chatbot”, <i>Microsoft Research Redmond, WA, US.</i>	binary classifiers for valence (negative/positive) and arousal (low/high).  Regression Models - Linear Regression, Bayesian Ridge and Support Vector Regression	expertise in psychology and affective computing to assign interventions to their appropriate emotional state. Due to the high missing data rate from multiple potential sources, it was not possible to fully capture context.
10.	Zhaojiang Lin, Peng Xu, Genta Indra Winata, Farhad Bin Siddique, Zihan Liu, Jamin Shin, and Pascale Fung “CAiRE: An Empathetic Neural Chatbot”.	This model is trained with the full Transformer network architecture on 1.7 billion REDDIT conversations.	CAiRE does not have any sense of ethical value due to the lack of training data informing of inappropriate behavior.
11.	Chien-Hao Kao, Chih-Chieh Chen, and Yu-Tza Tsai, “Model of Multi-turn Dialogue in Emotional Chatbot”, <i>National Sun Yat-sen University Kaohsiung, Taiwan.</i>	SeqGAN model with Seq2Seq model	Smoother emotional transition because of higher value for continuous positive and negative emotions.
12.	Dongkeon Lee, Kyo-Joong Oh and Ho-Jin Choi, “The ChatBot Feels You – A Counseling Service Using Emotional Response Generation”, <i>School of Computing, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea.</i>	Deep Learning, Natural Language Processing	Understand user state and observation of continuous user’s emotional changes sensitively and according to that provides mental healthcare
13.	Kyo-Joong Oh, DongKun Lee, ByungSoo Ko, and Ho-Jin Choi “A Chatbot for Psychiatric Counseling in Mental Healthcare Service Based on Emotional Dialogue Analysis and Sentence Generation”, <i>School of</i>	RNN based decoder	Gives effective counseling by continuous observations of users emotional changes.



	<i>Computing, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea.</i>		
<b>14.</b>	Bhuvan Sharma, Harshita Puri, and Deepika Rawat, “Digital Psychiatry – Curbing Depression using Therapy Chatbot and Depression Analysis”, <i>Dept. Of Computer Science HMR Institute of Technology and Management, Hamidpur, Delhi India.</i>	Uses Machine Learning and Text-based cognitive behavioral approach (Natural Language Processing)	Classifies depression level and provides therapy according to level of depression
<b>15.</b>	Eliane M. Boucher, Nicole R. Harake, Haley E. Ward, Sarah Elizabeth Stoeckl, Junielly Vargas, Jared Minkel, Acacia C. Parks, and Ran Zilca, “Artificially intelligent chatbots in digital mental health interventions: a review”.	This AI Chatbot NLP models are trained by Happify Health data Scientists and labeled by a group of Clinicians to ensure interpretation	Limitations includes complexity of human language and not yet proficient in interpreting ellipses, metaphors etc.

### 2.3 CONCLUSION OF SURVEY:

Based on the observations of the survey done on the various research papers, it is seen that the various chatbots with different accuracies and features are available. The chatbots are implemented using different methodologies. Some have certain limitations. Most of the chatbots are available in English language.

### **3. SOFTWARE REQUIREMENTS SPECIFICATIONS**

#### **3.1 PROJECT PURPOSE:**

The purpose of this project is to make a Chatbot which interacts with the user in Hindi language. The Chatbot will keep track of the user's mental health periodically and will recommend activities to the user based on the current mental situation of the user.

#### **3.2 PROJECT SCOPE:**

As digitalization of services has become the prime focus in the 21<sup>st</sup> century, people desire solutions to their problems sitting at home on their mobile phones or computer systems. Chatbots are a step forward in that direction. Moreover, the digital consumers prefer messaging platforms that have a voice and text-based interfaces. Having an application which can interact with them in their native language will be preferred. This project can be extended to include the voice-based interaction in the future.

#### **3.3 OVERALL DESCRIPTION:**

##### **3.3.1 Product Perspective:**

In today's world, deteriorating mental health is a major concern. People don't openly talk about what they are feeling. However, nowadays various online counseling applications are available but they generally operate in English language which is not easy to use for someone with little or no knowledge of English.

The project aims to help the predominantly Hindi speaking users to tackle their mental health issues. By regularly answering the set of questions asked by the chatbot, users can keep track and try to improve their mental health. Deteriorating mental health of a person can lead to crime, a person can hurt others as well as one's own self which will be concerning for the growth of society. Such persons most of the times don't interact with anyone regarding their issues, so this chatbot will be helpful in providing aid to the person.

##### **3.3.2 Product Features:**

The major features for the Chatbot will be the following:

###### **1) Tracking mental health**

The chatbot will track the mental health of the user periodically.

###### **2) Recommending activities**

The chatbot will recommend activities like music, etc. to the user based on the mood of the user.

### **3) Chatting**

The user will chat with the chatbot in Hindi language.

### **4) Natural Language Processing**

The system will ask questions to the user written in standard Hindi.

### **5) Natural Language Responses**

The answer to the question will be written in standard and understandable Hindi.

### **6) Information Extraction**

There will be a database containing all the information needed, populated using information extraction techniques.

### **3.3.3 Operating Environment:**

Operating environment for the Chatbot is as listed below:

This is a web-based system and hence will require the operating environment for a client and server GUI.

The server-side components of the software system must operate within a Windows operating system environment.

The client-side components of the software system must operate within common web-browser environments. This software highly depends on type and version of browser being installed in the system i.e. browser version should be used which have HTML5 support.

## **3.4 EXTERNAL INTERFACE REQUIREMENTS:**

### **3.4.1 User Interface:**

- 1) Graphical User Interface.

### **3.4.2 Hardware Interfaces:**

- 1) 512MB RAM required.

### **3.4.3 Software Interfaces:**

- 1) Operating System-Windows.
- 2) Web browser-Chrome, Firefox.

#### **3.4.4 Communication Interfaces:**

- 1) LAN
- 2) Internet

### **3.5 SYSTEM FEATURES**

#### **3.5.1 Functional Requirements:**

##### **1) Chatting**

Provides user experience of as if chatting with a human being by providing suitable answers for his questions. The user will feel as if he is chatting to some human and not a robot.

INPUT- Here the input would be the user query/question in standard Hindi.

OUTPUT- Output will be the result/answer to the user query that too will be in the standard Hindi.

PROCESSING- Our software accepts the user query in the form of string of characters and then compares that query with the queries that are present in the app database using string matching algorithms and returns the answer.

ERROR HANDLING- If the answer to the user query is not present in the database, then default statement “Sorry unable to process your request” would be returned in Hindi language.

##### **2) Mental Health Tracking**

INPUT- Here the input would be the set of questions asked to the user in standard Hindi.

OUTPUT- Output will be the mental health status of the user and positivity/negativity percent of the responses given by the user to the questions asked to him/her.

PROCESSING- Our software will analyze the answers of the user to the questions asked and will detect the mental health status of the user by running some algorithms for the same.

ERROR HANDLING- If any interruption occurs in the process, then the default statement “Sorry unable to process your request” would be returned in Hindi language.

##### **3) Recommending Activities**

INPUT- Here the input would be the set of questions asked to the user in standard Hindi.

OUTPUT- Output will be the activities recommended to the user based on the mental health status of the user.

PROCESSING- Our software will detect the mental health status of the user by running some algorithms for the same and based on the mood of the user, it will recommend some activities to the user like music, etc.

ERROR HANDLING- If any interruption occurs in the process, then the default statement “Sorry unable to process your request” would be returned in Hindi language.

### **3.5.2 Non-functional Requirements:**

#### **1) Performance**

The average time for the server to respond, over the question testing set, will be less than or equal to 2 seconds.

#### **2) Reliability**

Since our software has ability to learn so it is highly reliable in case of answering questions.

#### **3) Availability**

Our software can work even without internet and is completely independent of any network service. It can be used 24/7 all 365 days.

#### **4) Security**

The connection between the Web API and the programs will use HTTPS, for security reasons.

#### **5) Maintainability**

The system is designed in such a way that the algorithms for the main units will be able to be easily swapped out. In case any module is not functioning properly or causing other modules to crash then they can be removed easily.

#### **6) Portability**

Since our software is mainly based on portable languages such as Python and SQL, therefore it can easily be installed to any system in future.

### **3.5.3 Use case description:**

#### **1)**

Use case: Mood detection.

Primary actor: Software end user.

Goal: Detecting the mood of the user.

Preconditions: Information should be extracted from the database.

Main scenario:

Mood of the user detected by the software.

Alternative scenario:

Software end user: Gets the default statement “Sorry unable to process your request” would be returned in Hindi language implying some error in the processing.

2)

Use case: Recommendations.

Primary actor: Software end user.

Goal: Recommending activities to the user based on the mood.

Preconditions: Information should be extracted from the database.

Main scenario:

Recommends activities like music, etc. to the user based on the mood of the user.

Alternative scenario:

Software end user: Gets the default statement “Sorry unable to process your request” would be returned in Hindi language implying some error in the processing.

3)

Use case: Maintaining mental health record.

Primary actor: Software end user.

Goal: Keeping a history of the results from the previous chatting sessions which helps the user in analyzing whether there is an improvement in the mental state.

Preconditions: Information should be extracted from the database.

Main scenario:

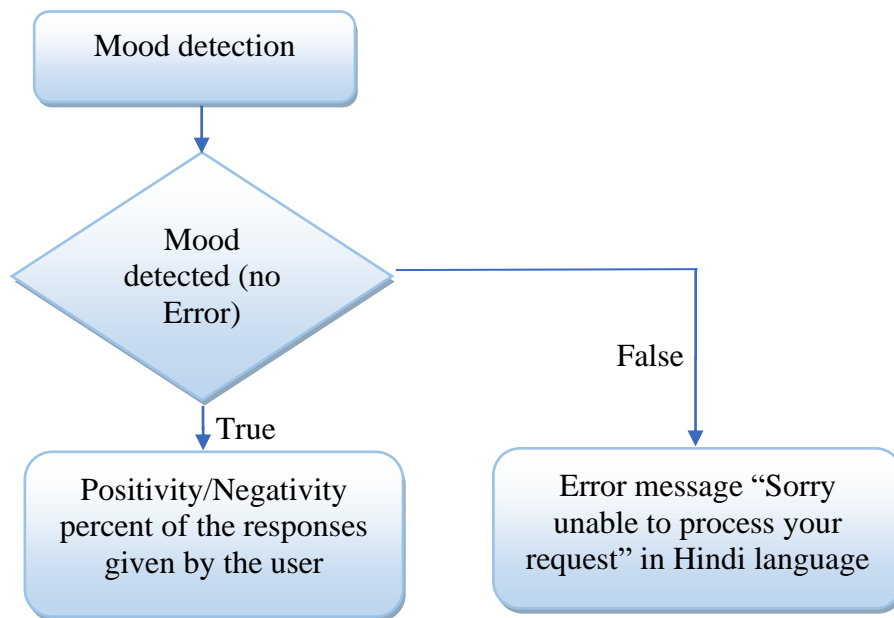
History of the results from the previous chatting sessions.

Alternative scenario:

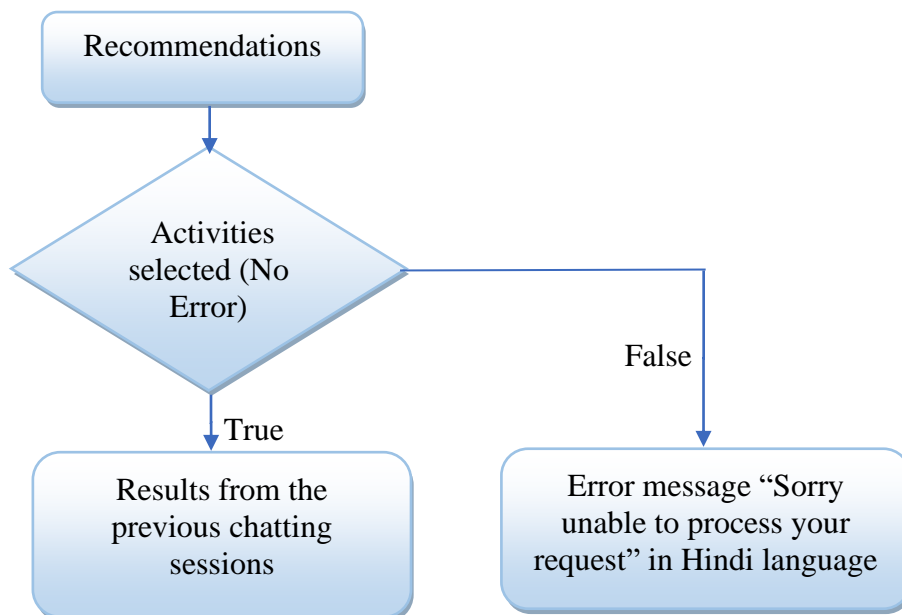
Software end user: Gets the default statement “Sorry unable to process your request” would be returned in Hindi language implying some error in the processing.

### 3.5.4 Use case diagram

1)



2)



3)

