Government College Of Engineering And Research Avasari

Department Of Computer Engineering

Title: Smart Mental Healthcare Assistant Using NLP

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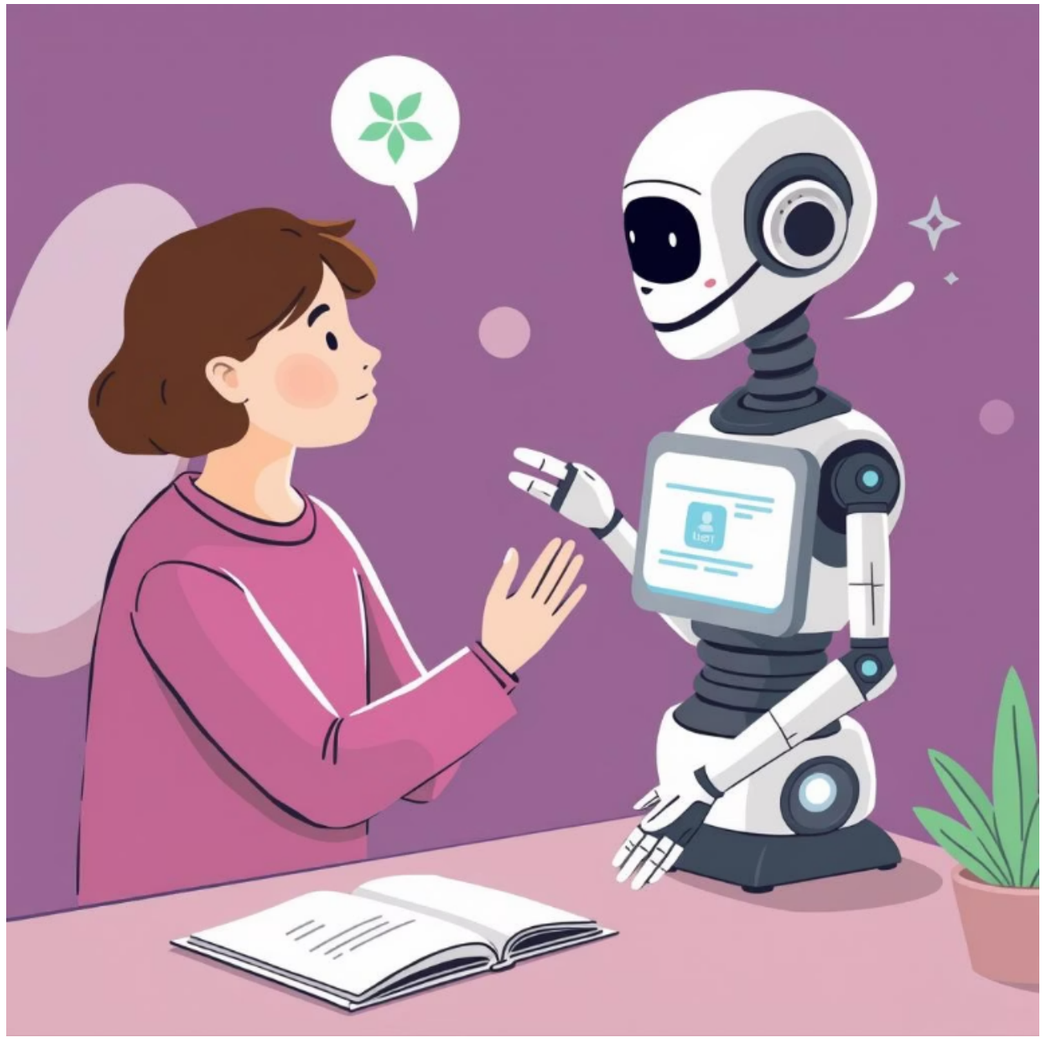
Abstract

- AI-based chatbots are transforming mental healthcare delivery.
- Provides accessible, low-cost, and private therapy through NLP.
- Simulates therapeutic conversations using CBT, mindfulness, and emotional classification.
- Deployed as a Flask web app, storing user data securely for feedback and improvement.
- Addresses limitations in clinical adoption of mental health AI tools.



Introduction

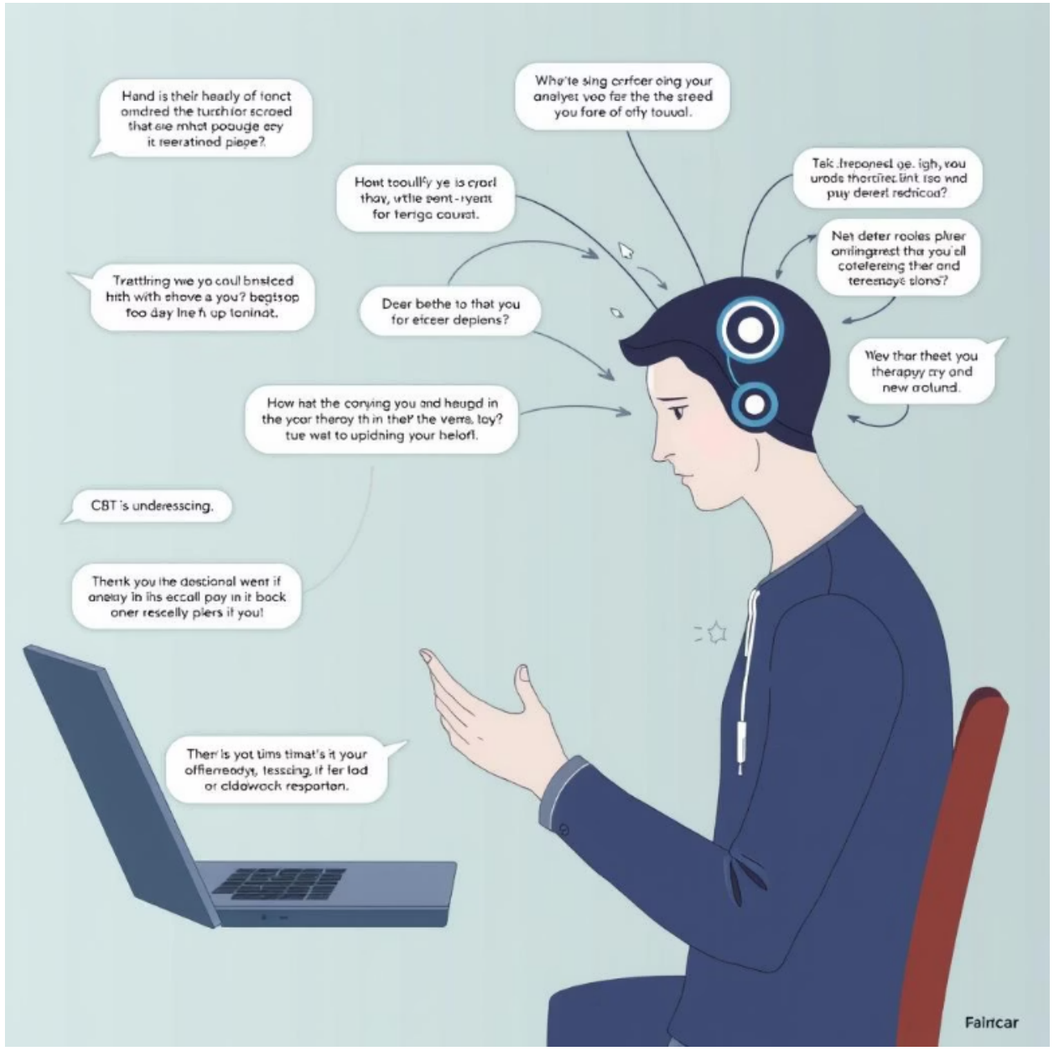
- Mental health disorders (anxiety, depression, stress) are increasing globally.
- India contributes ~15% to global mental illness burden.
- Traditional therapy faces challenges: stigma, cost, and lack of professionals.
- Project offers a virtual assistant to detect emotional distress and provide personalized support.
- Built using NLP, ML, Flask, and secure database architecture.

Problem Statement

Smart Healthcare Mental Health Assistance, using like Natural Language Processing (NLP) to simulate human conversations, have the potential to improve mental health care.

Objectives of the Project

- Develop an NLP-powered mental health assistant.
- Detect stress, anxiety, depression from user conversations.
- Train models using real and simulated datasets.
- Provide therapy-like responses using CBT and mindfulness.
- Deploy as a secure and interactive web application.



- Deploy as a secure and interactive web application.

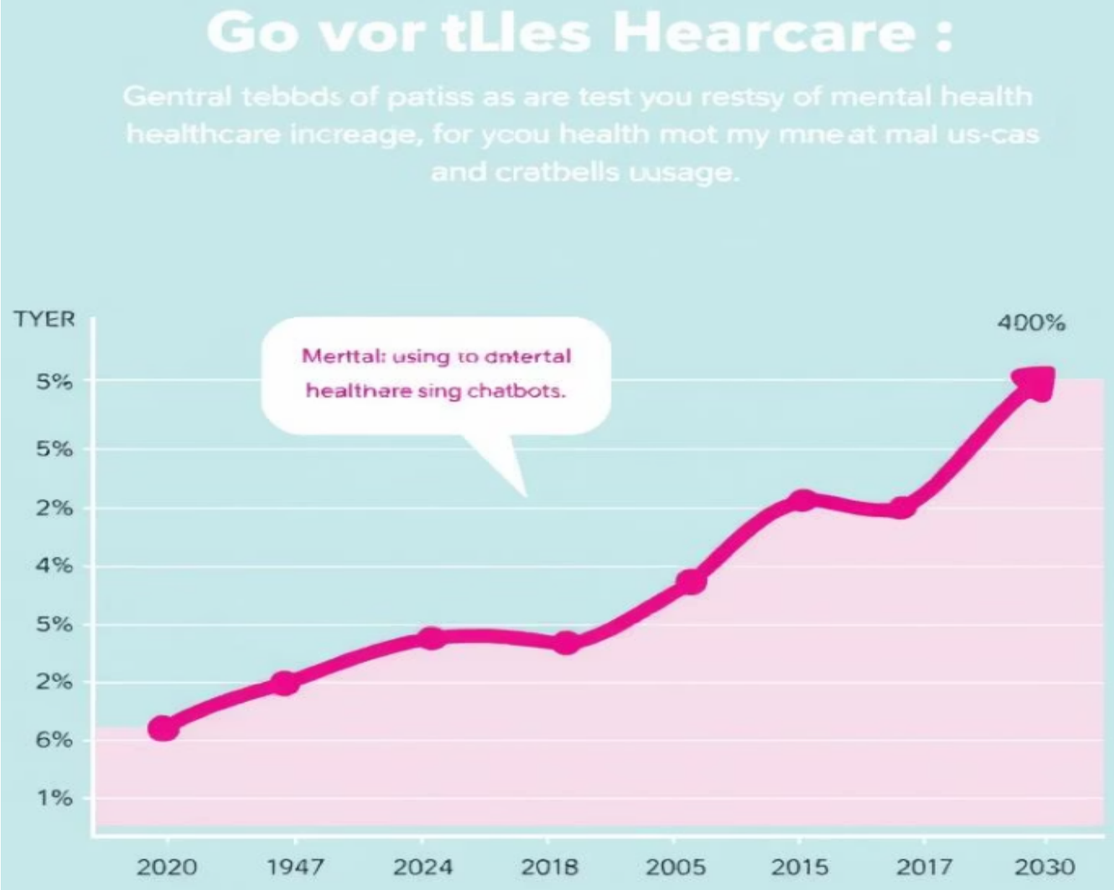
Literature Review: Mental Health Chatbots

1. **Empathy & Expertise Gaps**
   Current chatbots often lack essential empathy and clinical depth.

2. **Adoption Trends (2021 Survey)**
   22% of adults used mental health chatbots.
   47% expressed interest in future use.

3. **COVID-19 Impact**
   60% started using chatbots during the pandemic.
   44% used chatbots exclusively, no human therapist.

4. **Personalised Solutions**
   Focus on individual suggestions over generic advice.
   - Wysa
   - Woebot
   - Replica
   - Tess



Methodology for System Development

Data Collection
Public datasets and user-simulated conversations.

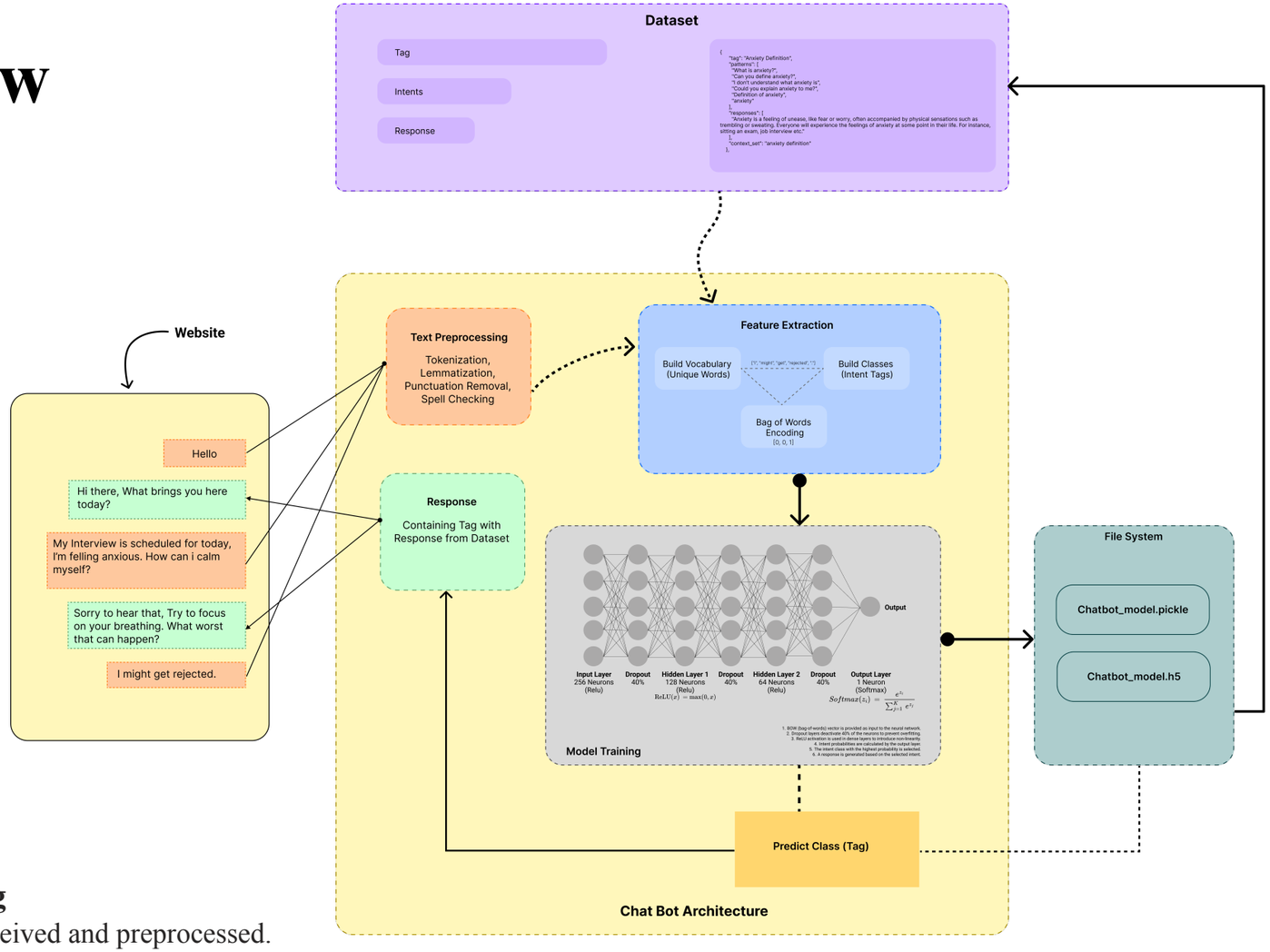
Data Preprocessing
Tokenization, lemmatization, and vectorization techniques.

Model Training
Feed-forward neural network (FNN).

Response Generation
CBT and mindfulness-based conversational logic.

Deployment
Flask-based application with interactive UI and SQLite backend.

Project Workflow



1

Input Processing

User queries are received and preprocessed.

2

Emotion Detection

NLP models classify emotional state.

3

Therapeutic Response

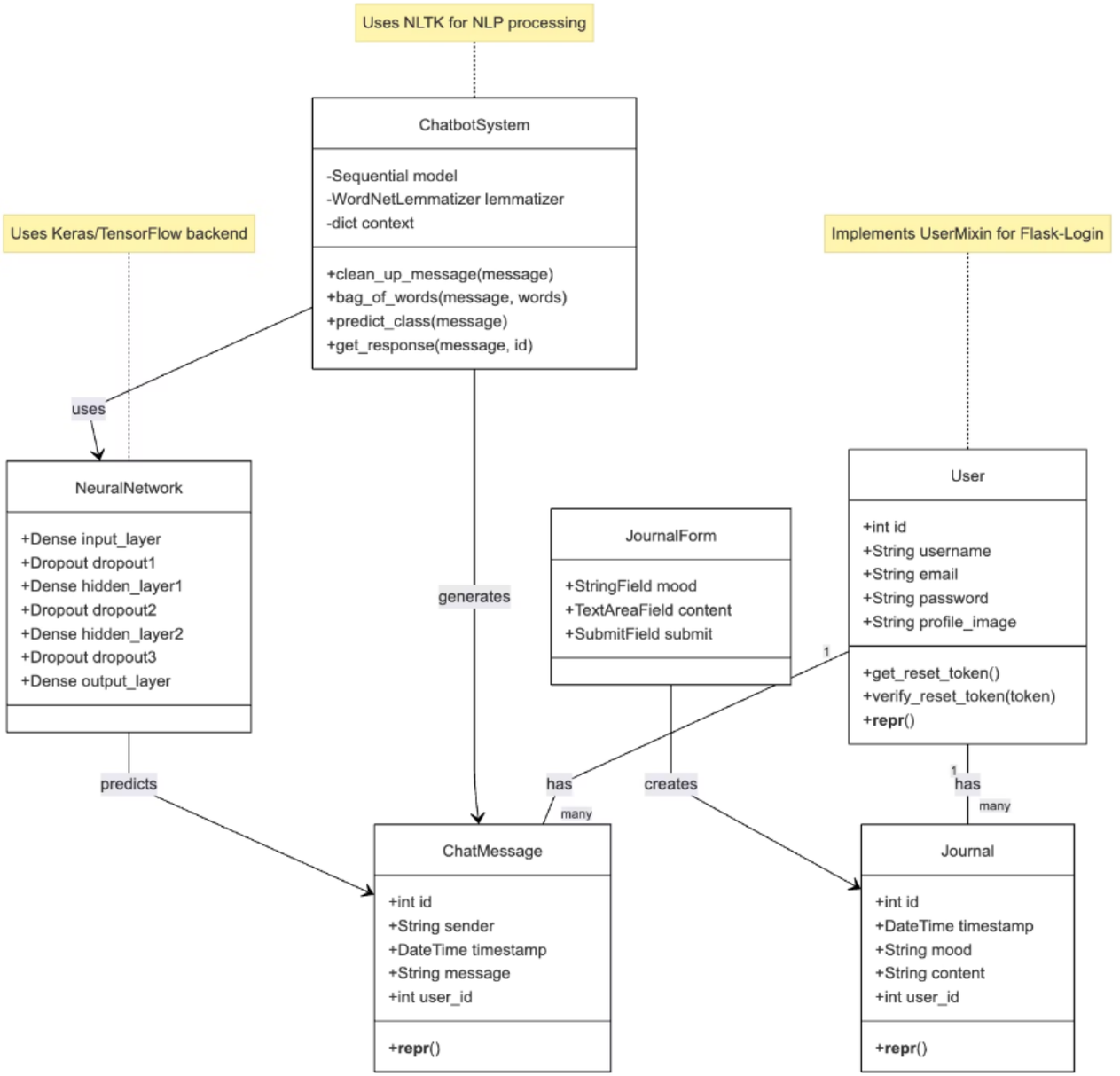
Contextual and empathetic replies generated.

4

User Interaction

Feedback loop for continuous improvement.

UML Diagrams



Gantt Chart

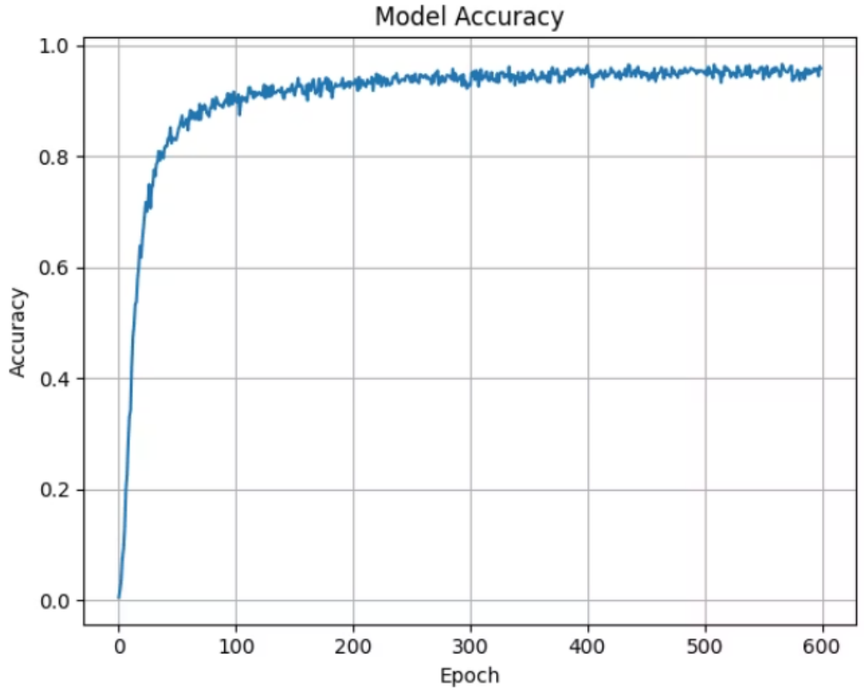
Week Tasks	22/7/24	30/7/24	5/8/24	3/10/24	3/10/24	8/10/24	8/10/24	9/1/25	6/2/25
Problem statement and objectives									
Literature survey									
Requirement and analysis									
Propose methodology									
Modelling and design									
Coding									
Testing									
Deployment									

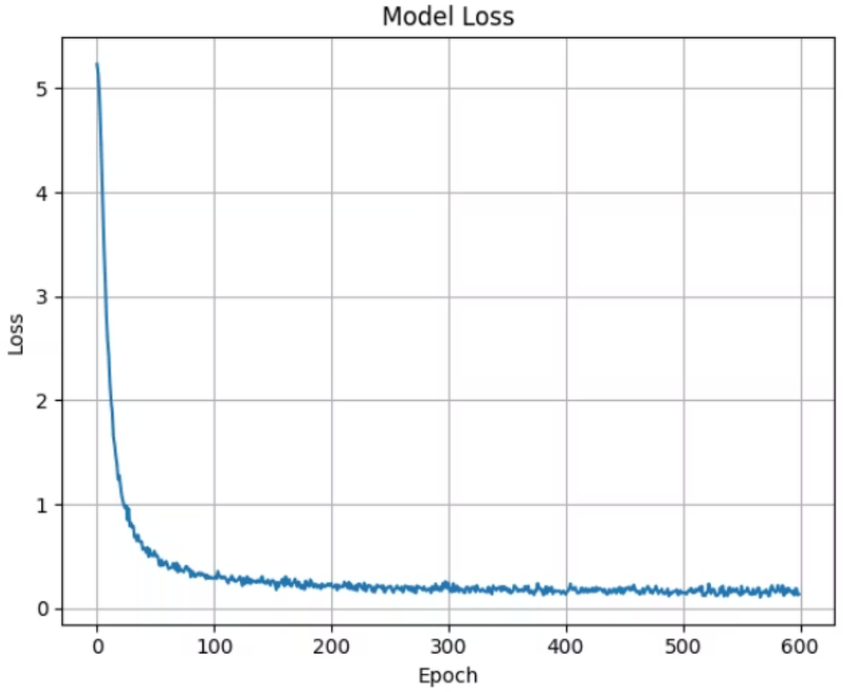
Modules

1. User Authentication (bcrypt hashing)
2. Chat Module
3. Therapeutic Response Generator (CBT and Mindfulness)
4. Journal Module
5. Web Interface (Flask, HTML, CSS, JS)
6. Database Management (SQLite)

Result and Discussion

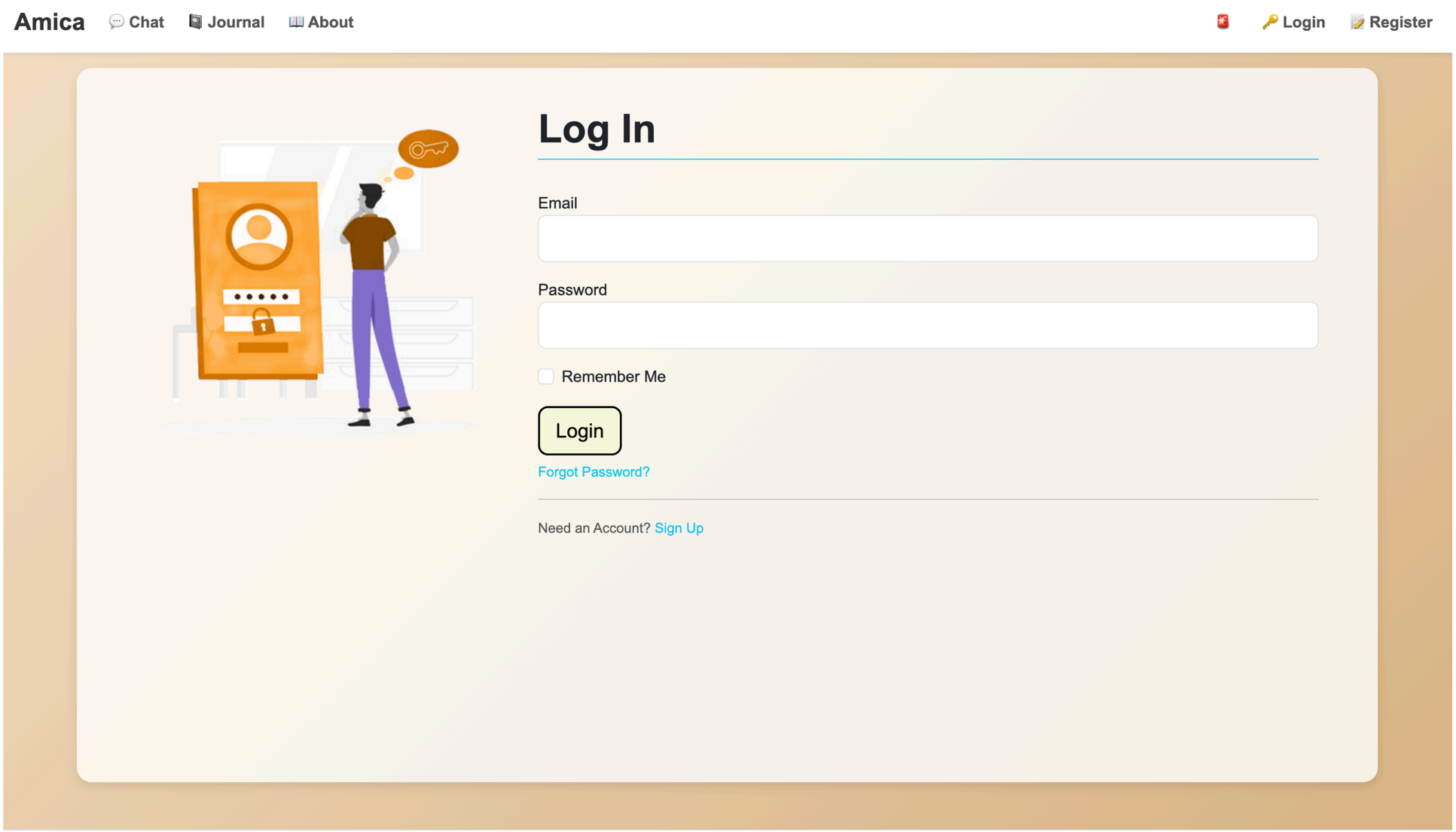
- Tested on 600 epoch with batch size 10.
- Accuracy - 94.38% and Loss - 0.4395 to 0.7839
- Easily scalable for future a models like transformers (BERT/GPT)



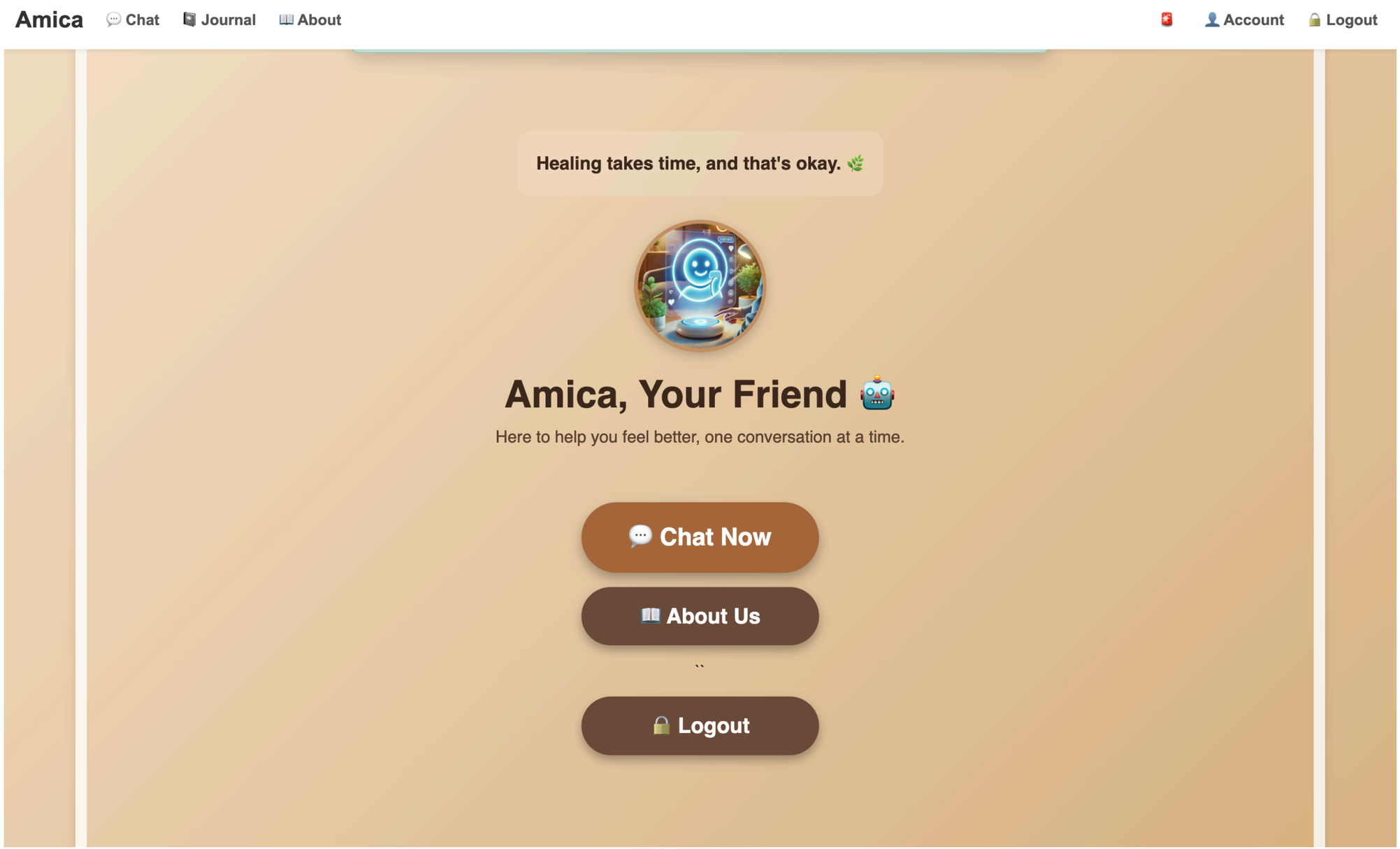


Screenshots of Implementation

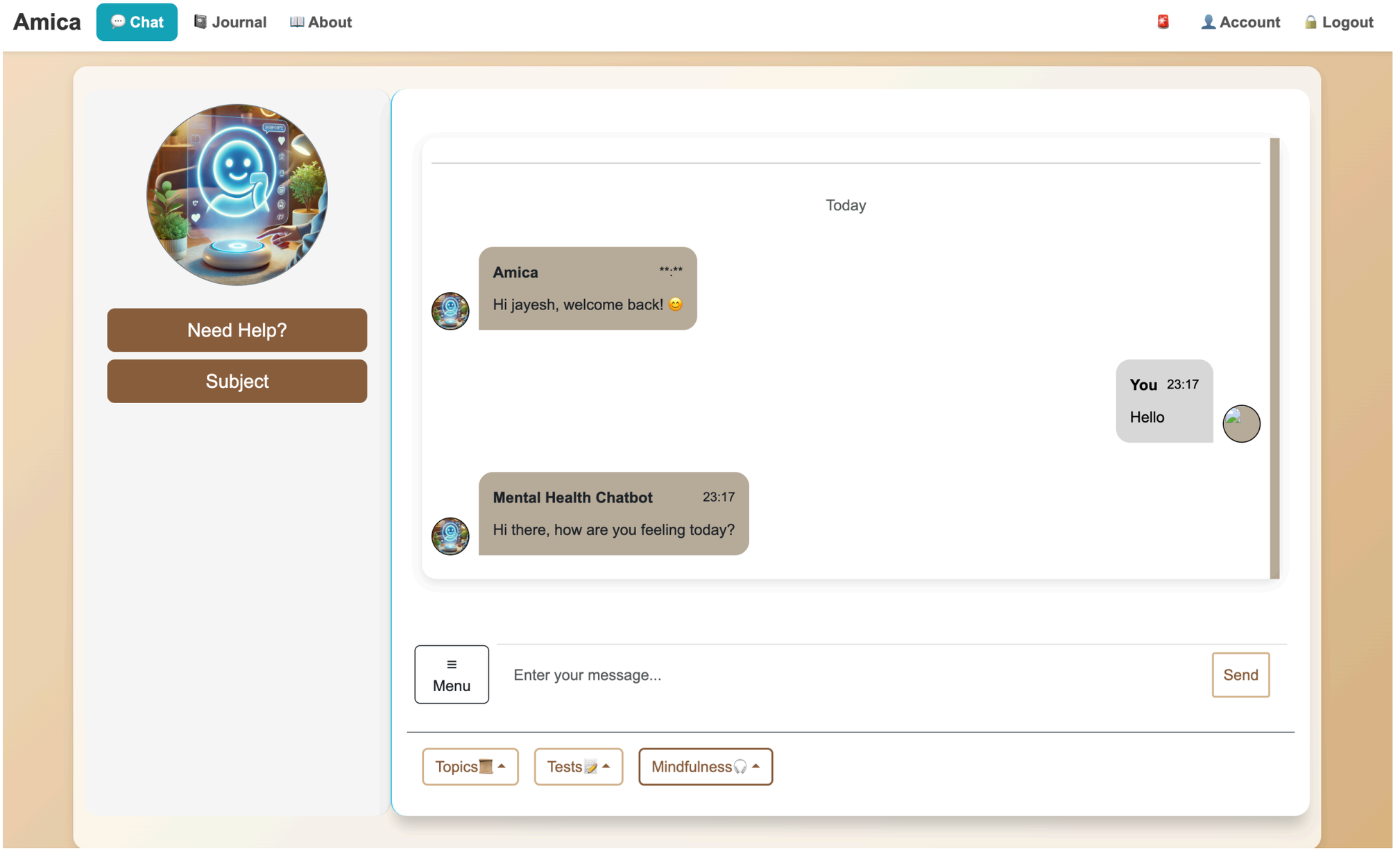
1. Authentication Page



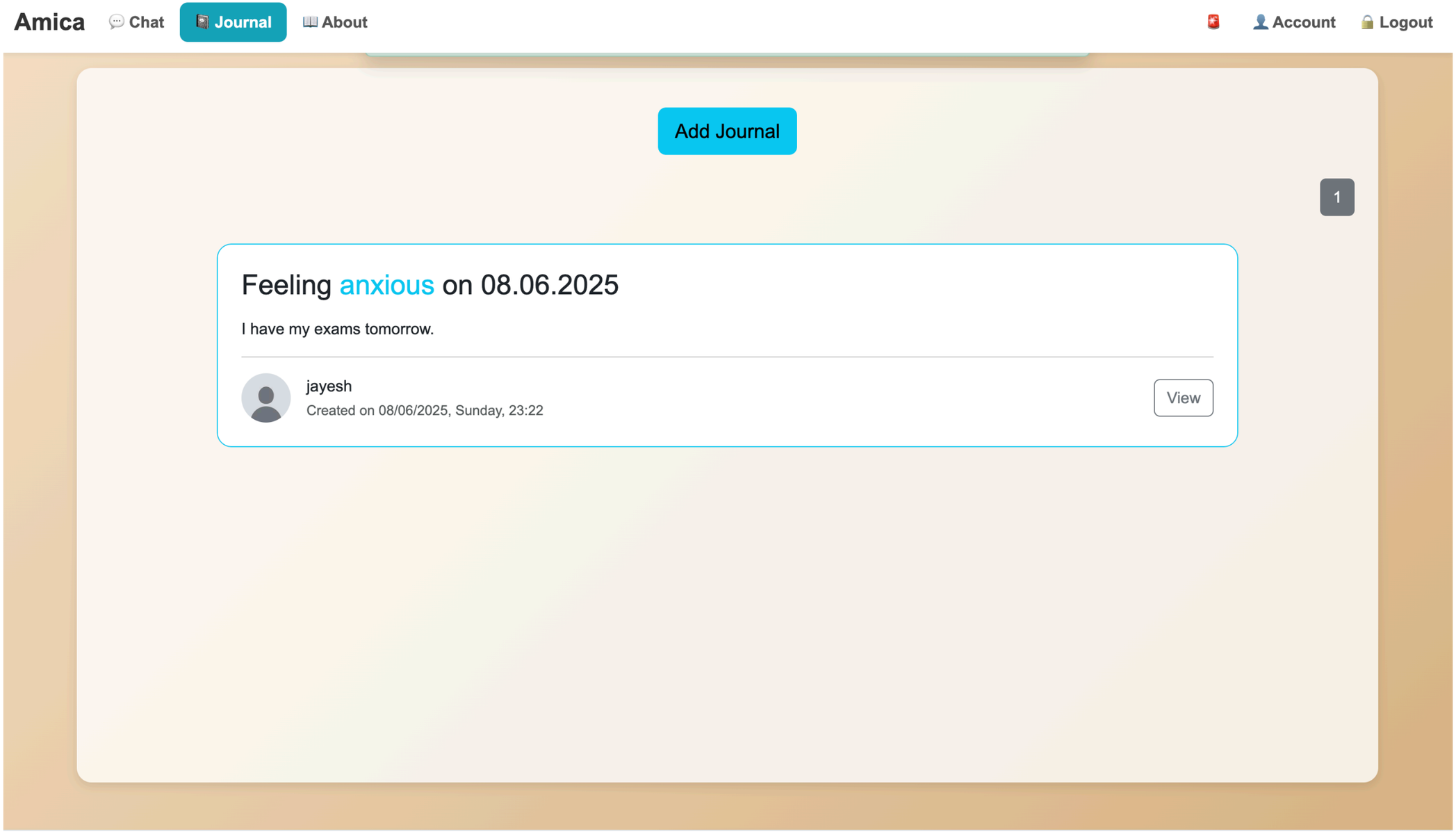
2. Home Page


Amica
Chat
Journal
About
Account
Logout
Healing takes time, and that's okay.
Amica, Your Friend
Here to help you feel better, one conversation at a time.
Chat Now
About Us
Logout

3. Conversations



4. Journal

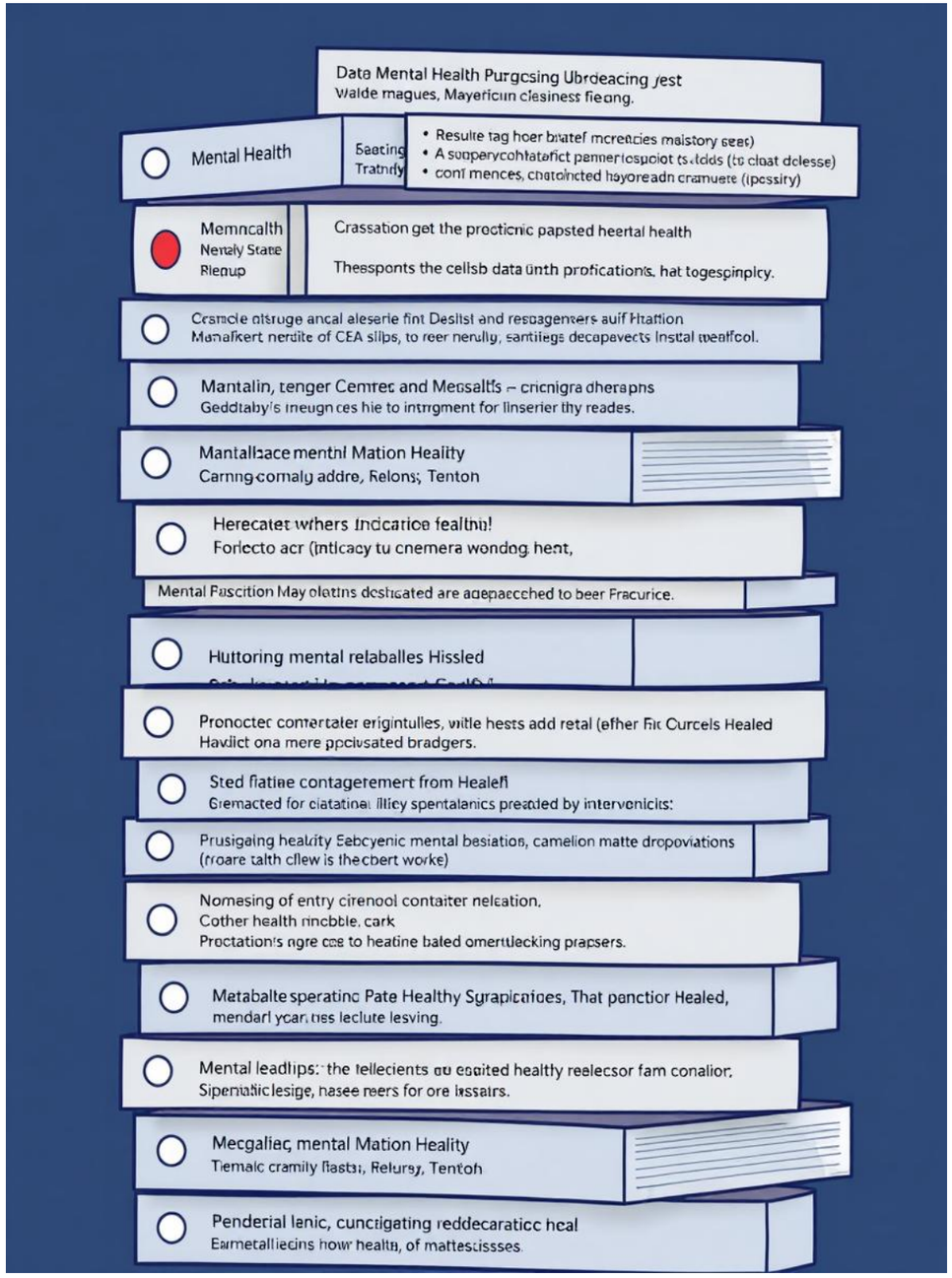


Future Work

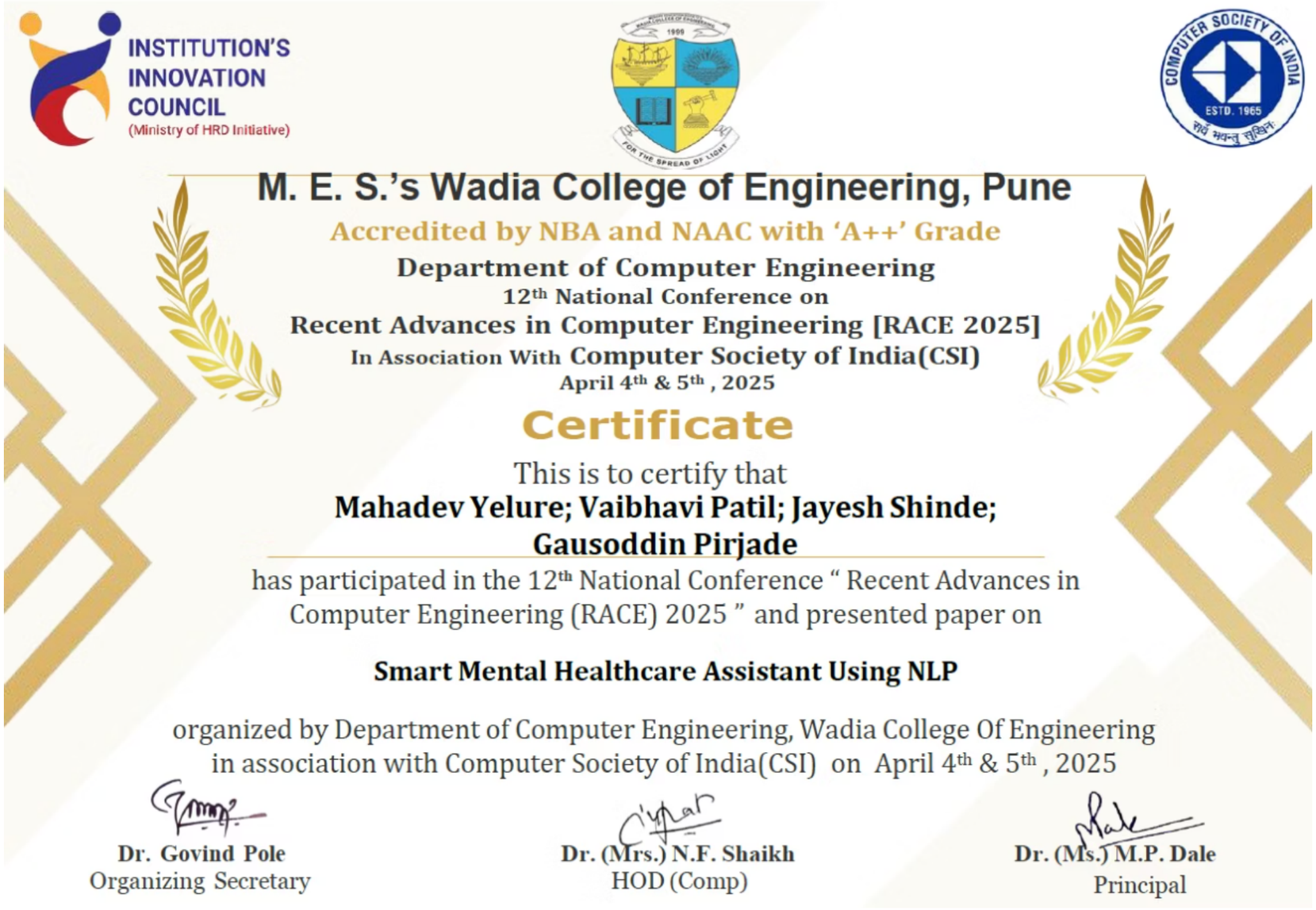
- Focus on other domains in health care such as viral infections, heart diseases, etc.
- Convert into various regional languages
- Provide online therapies / yogas in video format.
- Make doctors available online.

Dataset

- **1,000+** entries in JSON format (intent → patterns + responses).
- Data collected via **Google Forms** and ChatGPT prompts.
- Covers categories: anxiety, academic stress, sleep issues, etc.
- Verified by a **clinical psychologist** for safe and empathetic content.



Paper publication



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(Ministry of HRD Initiative)

M. E. S.'s Wadia College of Engineering, Pune

Accredited by NBA and NAAC with 'A++' Grade

Department of Computer Engineering

12th National Conference on

Recent Advances in Computer Engineering [RACE 2025]

In Association With Computer Society of India(CSI)

April 4th & 5th , 2025

Certificate

This is to certify that

Mahadev Yelure; Vaibhavi Patil; Jayesh Shinde; Gausoddin Pirjade

has participated in the 12th National Conference " Recent Advances in Computer Engineering (RACE) 2025 " and presented paper on

Smart Mental Healthcare Assistant Using NLP

organized by Department of Computer Engineering, Wadia College Of Engineering in association with Computer Society of India(CSI) on April 4th & 5th , 2025

Dr. Govind Pole
Organizing Secretary

Dr. (Mrs.) N.F. Shaikh
HOD (Comp)

Dr. (Ms.) M.P. Dale
Principal

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Conclusion

- Achieved 98–99% accuracy in detecting mental health conditions.
- Real-time emotional support through intelligent interaction.
- Empathetic, private, and accessible solution for users.
- Scalable architecture supports future enhancements.


Thank You