Project Proposal

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1.1 Tentative Project title

Mirror AI: AI Mental Health Companion

1.2 Background and Research Gap

The primary focus of this project is to assess the efficiency of AI mental health assistants powered by Large Language Models trained on mental health datasets.

Mental health is a critical component of overall wellbeing. The demand for mental health support increased significantly due to various socio-economic factors during the past 10 years, which is further exacerbated due to the pandemic.

The recent introduction of AI into mental health have yielded positive results. However, current solutions have failed to fully utilize the enormous progress that have been made in field of generative AI in the recent years.

One of the primary limitations of current AI mental health tools is their inability produce more personalized and empathetic interactions that are characteristic of human therapy. MirrorAI aims to fill this gap.

With the addition of a custom trained LLM that is trained on mental health related datasets, a assistant that provides a more human-like interaction and various other features such as mood tracking and mental health check-ups, this project seeks to address the limitations of currently available solutions.

The research gap that this project aims to address lies in the need for a more personalized, empathetic, and integrated AI-driven mental health solution. While existing tools provide basic support, they often lack the depth and human-like interaction necessary for effective mental health care.

1.3 Research Questions

Research Question 1: How effective is MirrorAI in simulating human like therapeutic interactions compared to text based mental health support tools?

Research Question 2: What are the most suitable open source LLMs for providing mental health support?

Research Question 3: How does fine-tuning LLMs on mental health datasets affect their effectiveness in providing mental health support compared to using prompt engineering alone?

Research Question 4: How effective is the personalized support provided by an LLM compared to existing tools that doesn't use an LLM.

Research Question 5: What are the challenges and limitations to provide real time mental health support using AI generated audio?

1.4 Aim & Objectives

Aim: To create a LLM based AI mental health companion to provide more personalized support to the user.

Objective 1: Study existing AI-driven mental health tools and technologies and Identify strengths, limitations, and gaps in current solutions.

Objective 2: Identify the key tools and technologies required to implement the core features of the project.

Objective 3: Implement chosen technologies to create prototype application and optimize it further to enhance the usability.

Objective 4: Recruit users to test the application over a period and record their feedback.

Objective 5: Create a refined application incorporating feedback from user trials.

1.5 Data Requirement

Datasets that include:

- **Real conversations between a patient and mental health expert**
- **Counseling and Psychotherapy Transcript**
- **Sentiment analysis dataset to train the model to identify the user's emotional status (happy/sad/angry/frustrated etc)**
- **Cognitive distortion patterns**

Following are some datasets that are identified as useful for the project.

https://www.kaggle.com/datasets/elvis23/mental-health-conversational-data

https://www.kaggle.com/datasets/bhavikjikadara/mental-health-dataset

https://www.kaggle.com/datasets/thedevastator/nlp-mental-health-conversations

https://github.com/LCS2-IIITD/MEMO?source=post_page-----dd1a1b9f30b4----------------------------#memo-dataset-access-request

1.6 Project Plan

- **August - September**
- **Objective:** Preparation and Initial Research
    - Finalize project scope and idea.
    - Conduct a literature review on AI in mental health.
    - Draft and submit the project proposal (by September 23rd).
    - **Milestone:** Proposal submission and completion of literature review.
- **October**
- **Objective:** System Design and Prototype Development (Phase 1)
    - Design system architecture and select technologies.
    - Begin implementing core NLP models.
    - Develop a basic prototype of Mirror AI.
    - **Milestone:** Basic prototype completion.
- **November**
- **Objective:** Prototype Development (Phase 2) and Integration
    - Refine AI conversational abilities and integrate mood tracking.
    - Implement guided self-care sessions.

    - Start initial testing of the prototype.
    - **Milestone:** Refined prototype with integrated features.
- **December**
- **Objective:** User Trials and Feedback Collection
    - Conduct user trials and collect feedback.
    - Analyze feedback and identify areas for improvement.
    - **Milestone:** Feedback analysis completed.
- **January - February**
- **Objective:** System Refinement and Final Testing
    - Refine AI features and enhance overall system.
    - Conduct thorough testing and finalize documentation.
    - **Milestone:** Near-final version and documentation completion.
- **March**
- **Objective:** Final Refinements and Submission
    - Make last-minute refinements and prepare for submission.
    - **Milestone:** Submit final project by the end of March.

1.7 Bibliography

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