AI-powered multilingual virtual mental health assistant

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ABSTRACT

Efficient delivery of mental health support requires low latency, high availability, and adaptability to diverse user needs. An AI-powered multilingual virtual mental health assistant leverages Natural Language Processing (NLP), sentiment analysis, and speech recognition to provide real-time psychological support in multiple languages. Traditional chatbot systems often fail to adapt to dynamic emotional states or cultural contexts, leading to reduced effectiveness and user trust. This project proposes a Machine Learning (ML)-based conversational framework that predicts user intent, detects emotional tone, and delivers context-aware responses tailored to individual needs. The system is trained using multilingual mental health dialogue datasets and evaluated against conventional rule-based or single-language assistants in terms of accuracy, user engagement, empathy detection, and latency. The proposed solution aims to enhance accessibility, reduce response delays, and provide scalable, culturally sensitive mental health support across diverse populations.

INTRODUCTION

Providing accessible, empathetic, and real-time mental health support is critical in today's fast-paced and diverse world. Traditional chatbots and single-language systems often fail to address evolving emotional needs, cultural differences, and linguistic diversity, which reduces their effectiveness and reliability. To overcome these limitations, this project introduces an AI-powered multilingual virtual mental health assistant designed to deliver low-latency, personalized psychological support in multiple languages. The system leverages Natural Language Processing (NLP), sentiment analysis, and emotion recognition to predict user intent and adapt responses dynamically based on the user's mental and emotional state. Trained on multilingual conversational and mental health datasets, the assistant ensures context-aware, empathetic, and culturally sensitive interactions.

The proposed framework is evaluated against rule-based and monolingual assistants using key performance metrics such as accuracy, empathy detection, response latency, and user engagement. By harnessing machine learning and multilingual models, the system aims to enhance accessibility, reduce response delays, and provide scalable mental health support for global populations. This solution demonstrates how AI can transform virtual therapy into a more responsive, inclusive, and impactful support system.

PROBLEM STATEMENT

Mental health chatbots often rely on fixed, rule-based responses, which fail to adapt to evolving emotional states and diverse linguistic needs. This leads to reduced trust and engagement. We aim to build an adaptive, AI-powered multilingual assistant that learns from user interactions to deliver empathetic, context-aware, and real-time psychological support.

OBJECTIVES

- **Collect and preprocess** multilingual mental health conversation datasets from diverse sources..
- **Implement baseline caching algorithms** (rule-based, single-language) for comparative analysis.
- **Train machine learning models** (Transformer-based NLP, sentiment analysis, emotion recognition) to understand intent and emotional state
- **Integrate ML predictions** into the cache replacement strategy to improve decision- making.
- **Evaluate system performance** using metrics like accuracy, empathy detection, response latency, and user engagement.