FARAH-Chatbot: Fine-Tuned Arabic Response for Assessment of Mental Well-being in Pediatrics

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1. Introduction

1.1 Background

Mental health disorders, particularly depression, are a growing concern globally, **including in Saudi Arabia**, where a significant portion of the population suffers from depressive symptoms. Despite this, **cultural barriers**, **stigma**, and **limited access to mental health services** often prevent individuals from seeking the help they need.

1.2 Problem Statement

There is a lack of **accessible**, **culturally** relevant mental health tools that cater specifically to Arabic-speaking populations, **especially children**, who may struggle to articulate their emotions in traditional therapy settings. This gap in effective mental health support leaves many individuals undiagnosed and untreated, exacerbating the problem.

1.3 Project Objectives

To develop a chatbot capable of providing culturally relevant mental health support in Arabic.

To detect depression early by analyzing user interactions using the PHQ-9 depression scale.

To engage children in mental health discussions through an avatar feature that allows them to express emotions to beloved characters.

2. Project Description

2.1 Overview

The project involves the development of a mental health chatbot that communicates in Arabic and assesses users' mental health status through interactive conversations. The chatbot integrates the PHQ-9 scale to detect and quantify depression, offering personalized therapy suggestions. Additionally, an avatar feature is designed to help children express their emotions by interacting with familiar and beloved characters, making the experience more engaging and effective.

2.2 Key Features

Text and Voice Communication: Users can engage with the chatbot through text or voice, ensuring accessibility for all ages.

PHQ-9 Integration: The chatbot uses the PHQ-9 questionnaire to detect depression and classify the severity of symptoms.

Avatar Interaction: Tailored for children, this feature allows them to communicate emotions through characters they love, making therapy less intimidating and more relatable.

2.3 Target Audience

General Arabic-speaking Population: Adults seeking mental health support, especially those hesitant to engage in traditional therapy due to cultural stigma.

Children: Young users who may find it challenging to express their feelings in conventional settings but can do so through interactive avatars.

3. Technical Implementation

3.1 Chatbot Architecture

OpenAI Integration: The chatbot leverages OpenAI's advanced language models to understand and generate human-like text responses in Arabic, ensuring accurate and contextually relevant interactions.

Whisper AI for Voice: For voice-based interactions, Whisper AI is employed to convert spoken language into text and vice versa, allowing users to communicate with the chatbot through audio seamlessly.

PHQ-9 Analysis: The chatbot uses responses processed by OpenAI's models and applies the PHQ-9 scale to assess the user’s depression level and provide appropriate feedback and therapeutic suggestions.

ARABERT Training: The ARABERT model has been specifically trained on the PHQ-9 dataset to enhance the accuracy of depression analysis. This model processes user inputs and applies the PHQ-9 scale to assess the severity of depressive symptoms, offering precise and personalized feedback.

3.2 Avatar Feature

Character Customization: Allows users to choose from a variety of beloved characters, making the experience more engaging for children.

Emotion Recognition: The avatar system recognizes and responds to the emotional tone of the user's input, facilitating better emotional expression.

4. Data and Methodology

4.1 Data Collection

PHQ-9 Data: Utilized for depression assessment, this dataset provides a standardized method for evaluating depression severity based on user responses.

User Interaction Data: Collected to improve the chatbot's understanding and response accuracy over time.

4.2 Methodology

Data Processing: User input is processed through NLP algorithms to ensure accurate understanding and appropriate response generation.

Depression Scoring: The PHQ-9 scale is applied to categorize the user’s depression level and provide personalized feedback.

5. Results and Discussion

5.1 Initial Testing

Preliminary testing indicates that the chatbot effectively identifies varying levels of depression based on user interactions. The avatar feature successfully engages children, making it easier for them to express their emotions.

5.2 User Feedback

Users have reported finding the chatbot's interactions comforting and culturally relevant, particularly appreciating the ability to communicate in Arabic. Children

responded positively to the avatar feature, indicating a higher level of emotional engagement.

6. Conclusion

This project demonstrates the potential of an Arabic-language mental health chatbot to bridge the gap in mental health services, especially for populations facing cultural barriers. By offering a user-friendly, accessible, and culturally relevant tool, the chatbot has the potential to revolutionize mental health support in the Arab world. The integration of PHQ-9 for depression detection and the innovative avatar feature for children further enhance its effectiveness.

7. Future Work

Enhanced AI Capabilities: Continue to improve the chatbot's NLP and AI capabilities for more accurate and nuanced responses.

Expanded Features: Explore the addition of other mental health assessments and therapeutic tools.

Wider Deployment: Aim for broader deployment across various platforms, including mobile apps and social media integration, to reach a larger audience.