

Chapter 5

Chatbot: Virtual Counsellor Using Speech Emotion Recognition System

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ABSTRACT

An individual usually stops disclosing deeply to other people because of the fears of bad judgement. They are concerned about being judged, rejected or burdening the listener, thus preventing potential benefits. Some students struggle with embarrassment and shame about topics that need to be discussed to keep to themselves. Technology involvements, such as chatbot, have been designed to help with these problems, such as stress, anxiety, and depression. Thus, this study proposed developing a mobile application with chatbot implementation for students to improve and manage their mental health. Using the Speech Emotion Recognition system, the Virtual Counsellor was developed using Android Studio and Visual Studio Microsoft and implemented a chatbot using Watson Assistant API. The result showed positive feedback from the testing participant. However, some of the features need to be enhanced, including creating mood analysis for the chatbot.

Key Words: psychological, mobile application, mental health, technology

1. INTRODUCTION

In the era of evolving technology, a chatbot is developed to be people's virtual companion when they need someone to talk with. According to Ciechanowski et al.(2019), a chatbot is a computer program that interacts with users using natural language. In contrast, Abd-Alrazaq et al. (2019) stated that a chatbot could interact and communicate with human users using written, visual and spoken languages. The system may encourage interaction for those hesitant to find mental health consultation because of stigmatization (Abd-Alrazaq et al., 2019). The disclosure of intimacy may build up if the partner is a computerized agent because individuals know that the computer cannot judge them.

Moreover, the computerized agent reduces the impression management where people can be just the way they are in contrast to human partners in scenarios in which worries of negative judgement may be influential (Ho et al., 2018). However, chatbot usually works in such a programmatic and predictable way that people only engage with the bot for a while, and after that, they lose interest in it. A chatbot, to be helpful, must be able to recognize people's emotions. An emotional chatbot can be developed whether as text-based, facial expression recognition-based or speech recognition-based. Yet, the chatbot is mainly develop using text-based and visual recognition. A facial expression recognition based chatbot has difficulty being used in a dark place environment. At the same time, text-based is not flexible because users need to stop doing anything else before type commands from a keyboard. Because humans get less and less human interaction, young people tend to have social anxiety that causes them to fear having a face-to-face conversation, especially with someone with whom they are not familiar. As Pierce (2009) stated, people who have suffered from social anxiety may struggle to meet this social need due to their fear of face-to-face interactions.

It is great to have the system to be able to read our emotions through facial expression and text-based. However, reading facial expressions can be difficult and inconvenient in a dark place. According to Smutny and Schreiberova (2020), the biggest difference between text chatbot and voice chatbot is the way of communication. Voice chatbot can be equipped with external devices, such as smart speaker handheld devices and other IoT devices and stimulates adaptable voice communication instead of keyboard typing. This enables voice chatbots to be flexible in different situations as required by the user (Adamopoulou & Moussiades, 2020). Therefore, voice expression recognition should be implemented in emotion recognition chatbots to improve the present emotion recognition chatbots.

2. LITERATURE REVIEW

According to Cameron et al. (2017), AICP can be designed in various ways to communicate and interact with users, including robots, chatbots, VR simulations, voice simulation, and environment sensors. Recently, lifelike virtual humans created to provide care seekers with information, resources, and support about mental health. A virtual intelligent agent system has also been created to help in medication adherence among schizophrenia patients (Phan, 2016). Advancement in sensing and processing enables AI systems to detect, interpret and express emotion by adapting machine learning, natural language processing, physical gestures and computer vision for language analysis and social signals to detect human psychological distress and improve mental health (Cameron et al., 2017). A chatbot is the best AICP to be implemented in the field of mental health. Vaidyam et al. (2019) mentioned that since the birth of ELIZA, a program that can stimulate the behaviour of people with schizophrenia has been "counselled" several times by ELIZA (Vaidyam et al. 2019). These day chatbots are being used in Cognitive-Behavioral Therapy (CBT) as well as in suicide prevention. In particular, a chatbot may well be good at providing treatment for those that are anxious about having to tell a human being their emotions or hardships. Virtual therapy offered by a chatbot is thus designed to improve access to mental health services and make it more effective for anyone afraid to talk to the therapist. In support of the statement, Ly et al. (2017) reported that higher acceptance of the chatbot in the non-clinical population enhanced psychological well-being and perceived stress than ones who did not obtain the treatment. In addition, Bickmore et al. (2010) stated that people with the chronic depressive disorder had a therapeutic relationship between conversational disorders higher than a clinician.

Another benefit of chatbots for mental health applications is that they may support those who otherwise would not seek treatment for fear of stigma or cost. Even though no studies have been found that measured the effect on patient interactions with a chatbot, Lucas et al. (2017) demonstrated that anonymity provided by chatbots helped lead some patients to share more sensitive personal information than they have ever done to a human therapist.

3. METHODOLOGY

In Figure 1, the study will begin with the implementation of a speech-based chatbot. The chatbot that will be integrated into the mobile application is Watson Assistant from IBM. The main dataset for chatbot responses is collected from Kaggle.com, where all the users can find a collection of data sets from share researchers. For the chatbot to be a voice-enabled emotional chatbot, the API Speech to Text and Text to Speech will be embedded in the chatbot, followed by Tone Analyzer. The speech emotion recognition tools that will be used are also from IBM. The tools are implemented to make sure that the user can verbally use the chatbot. After that, the implementation of the Speech Emotion Recognition Chatbot in the application will be completed.

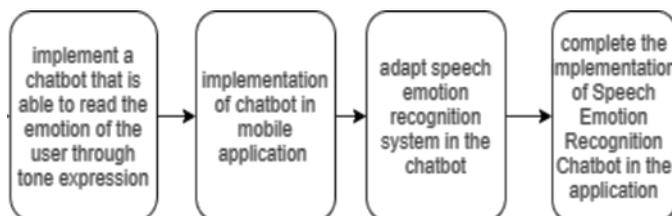


Figure 1: Implement a chatbot in mobile application

The collection of data of the responses for mental health questions is also found in Kaggle.com, a platform to find datasets, a Facebook page “COVIDCare: Sabah Virtual Mental Health and Psychological Support Portal” and World Health Organization official website that contains many trusted information about mental health.

4. RESULTS AND DISCUSSION

There are three main features in the SER system: voice detection, speech to text, and emotion classification using a tone analyzer. When the voice inputs are inserted, the SER system will try to detect the voice. Then the speech from the voice will be extracted and converted into text. After that, the extracted data will undergo classification using a Tone analyzer. Next, the emotion will be recognized according to the classification. This application consists of eight User Interface designs. In this study, User Interface (UI) design serves as a series of visual elements that user will use when interacting with Virtual Counsellor. It is to ensure that the designed interface will make users' interaction with the application smooth and easy to understand. Figures 3 to 6 show the design of the User Interface. When a user enters the system, users will be shown the login interface first to authenticate themselves as the existing user before entering the main page. There are four modules included in the system. The first one is the Chatbot Module, enabling the chatbot to respond to the user accurately and smoothly. The Registration Management Module is to manage the user's information and login details. The Speech Recognition Management Module enables the speech-to-text and text-to-speech between user and chatbot. Next, the List To-do Module helps users to be more organized by listing down all things that need

to be done. Motivation Booster Module consists of activities that help users calm down whenever they feel anxious and panic.



Figure 3:
Login Page

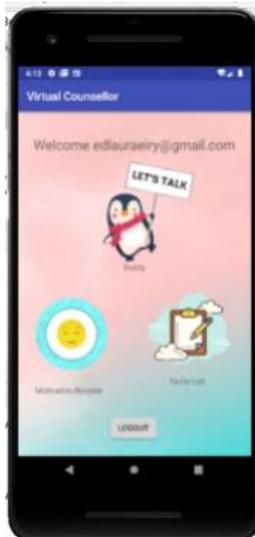


Figure 4:
Main Menu Page

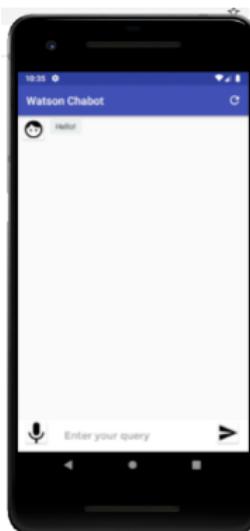


Figure 5:
Virtual Counsellor
Chatbot

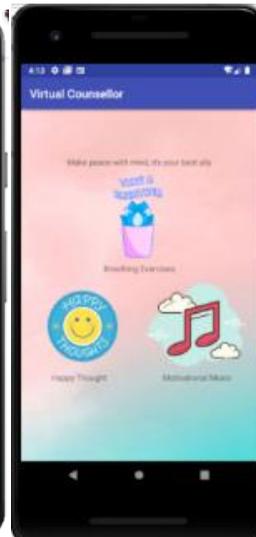


Figure 6:
Motivation Booster
Page

5. CONCLUSION

A Virtual Counsellor mobile application for android is developed and implemented with Speech Emotion Recognition Chatbot throughout the study. The Virtual Counsellor is an application that focuses on helping the student to have a place to feel motivated and comforted. The application also includes the element of mental health awareness to help the student understand their state of mental health and know that it is okay to seek help through the features provided. The app is created as an alternative for students who have difficulties seeking professional help, such as someone in quarantine and isolated. According to the literature review, a speech-based emotion recognition chatbot is still a new thing to society. All the existing chatbot in the Literature review, Woebot, Wysa and TESS, are using text-based. Virtual Counsellor is a flexible mental health assistant. The user can choose either to text or insert a voice note when entering the inquiries to the chatbot. In conclusion, the Virtual Counsellor application receives a positive evaluation for both the pragmatic and hedonic quality of the app. The application can be enhanced by adding language setting and mood analysis to track user daily mood for future work. The number of intents and chatbot training also should be increased to increase the efficiency of the chatbot. In addition, more informative videos should be added to increase mental health awareness among students.

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