PAPER NAME

isi Proceeding ICOMITEE.pdf

WORD COUNT

4754 Words

CHARACTER COUNT

25757 Characters

PAGE COUNT

6 Pages

FILE SIZE

287.1KB

SUBMISSION DATE

Nov 8, 2023 9:53 AM GMT+7

REPORT DATE

Nov 8, 2023 9:54 AM GMT+7

13% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

- 10% Internet database
- 5% Publications database
- Crossref database
- Crossref Posted Content database
- 1% Submitted Works database

Excluded from Similarity Report

- Bibliographic material
- Quoted material
- Cited material
- Small Matches (Less then 8 words)
- Manually excluded sources
- Manually excluded text blocks

LINE-based Virtual Friend Development for Borderline Personality Disorder

Oey, Lysbeth Venella
Information Systems Department
Soegijapranata Catholic University
Semarang, Indonesia
18n10008@student.unika.ac.id

Ridwan Sanjaya
Information Systems Department
Soegijapranata Catholic University
Semarang, Indonesia
ridwan@unika.ac.id

Christin Wibhowo
Psychology Department
Soegijapranata Catholic University
Semarang, Indonesia
christine@unika.ac.id

***Abstract*— During the COVID-19 pandemic situation, the Indonesian government has declared various restrictions on human daily activities to minimize physical contact between people and reduce the transmission of COVID-19. After a very long time, these restrictions may be felt like "eating a simalakama fruit" as not only does it cause a positive result by breaking the chain of virus transmission between humans, but the restriction may also decrease the financial stability and increase people's level of stress. Meanwhile, it is known that Borderline Personality Disorder (BPD) as well as other mental health disorders, may happen to people with high fragility to stress. The original purpose of the development of LINE chatbot discussed in this paper, named "Sovi Lau" which is an acronym that stands for "Sobat Virtual Anti Galau" or "Anti-Stress Virtual Friend" is mainly to make a chatbot that can act as a friend who is always able to talk with and to discuss with. People suffering from BPD can also use it whenever they need. The use of LINE Messenger and Program-O is found to be the simplest way to develop a chatbot that can be used by psychologists to provide a good communication for people suffering from BPD.**

Keywords— anti-stress, borderline personality disorder, chatbot, virtual friend

I. INTRODUCTION

The prolonged COVID-19 pandemic that comes along with various restrictions on human activities and public anxiety about the pandemic situation ultimately resulted in various negative impacts in the health, economic, tourism, socio-cultural, and other sectors. Especially for mentally fragile people, the ongoing COVID-19 pandemic situation may cause stress that ultimately leads to physical health problems as well as mental health issues [1]. This fragile group includes those people with borderline personality disorder whose fragility is caused by an act of overreaction to stress compared to normal people [2]. It is necessary to fully understand that borderline personality disorder as well as any other types of mental disorder can happen to anyone, even to some people who may think they have a tough personality or considered to have always been mentally strong.

Borderline personality disorder (BPD) is a mental disorder characterized by extreme mood swings and followed by impulsive behavior. According to the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), BPD is commonly found in late adolescence and early adulthood. The main factor in BPD is childhood trauma and inappropriate parenting patterns, while the rest is heredity and other factors in adulthood. People with BPD also commonly shows unhappy childhood and difficulties to develop an interpersonal relationship with other people. However, as the number of people with BPD keeps increasing, the lack of research regarding borderline personality disorder in Indonesia sadly makes the number of people with BPD unclearly known [3].

Nevertheless, although the actual number of people with BPD in Indonesia is not yet being known, according to the Rencana Aksi Kegiatan 2020-2024 of Directorate General of P2P and Ministry of Health, the number of people with mental disorders in Indonesia has reached 236 million people and only fewer than 15% of people with mental disorders get mental health services they need because of not only the income problems but also the wrong stigma to mental illness. There is also lack of awareness and public knowledge on the symptoms of mental disorders that causes people with mental disorders to become unaware of their actual mental health situation, so that they are treated late by psychiatrists.

Unfortunately, delay in BPD treatments can be dangerous for the sufferer. The existence of impulses for impulsive and self-destructive behavior in people with BPD may cause them to tend to doing reckless things, such as promiscuity and substance abuse. As many as 50% of people with BPD in the United States are known to consume alcohol and illicit substances. Even worse, about 60-78% people in United States who suffer from BPD also showed suicidal tendencies, while 90% of them showed self-harm behavior [4]. The suicidal tendencies will continue increasing until they reach their highest percentage in the 20s. Meanwhile, the mortality rate of BPD patients reaches its highest percentage in the 30s. These problems certainly require special attention, considering the ages that are most vulnerable in people with BPD are at the age of 20 to 30 years old who are actually still at the age of the productive workforce and are naturally expected to have a good mental health condition to be able to live well.

In general, most people with BPD in Indonesia are known to avoid treatment due to various factors, such as the expensive cost of mental health treatments as well as the public perception that people who suffer any kind of mental disorders bring disgrace and embarrassment on their family [5]. People found to have mental disorders are often being underestimated, considered strange, and deserve to be ostracized from the society, so that people who experience symptoms of mental disorders tend to ignore their condition and choose not to seek any mental health experts or psychologists just so their conditions not being realized by their communities.

Meanwhile, the rapid development of technology and the massive use of gadgets in Indonesia can certainly be used to develop a chatbot that is easily accessible to the public in a broad range to identify symptoms of mental disorders and get the necessary recommendations from the psychiatric experts that can be used by people as an initial treatment for their

978-1-6654-0147-0/21/$31.00 ©2021 IEEE

psychological condition. The chatbot referred in this paper is a LINE chatbot named "Sovi Lau" which is an acronym that stands for "Sobat Virtual Anti Galau" or "Anti-Stress Virtual Friend".

According to Lexico Dictionaries, a chatbot is a computer program designed to have conversations with humans, especially over the internet. Chatbots allow humans to interact with technology using various kinds of voice, text, and touch input, and can be activated 24/7 [6]. Chatbots work by analyzing the user input, considering the appropriate response, and sending it to the user by using various outputs in the form of voice, text, or by completing a task ordered by the user. While from the user's perspective, users generally use the chatbots to increase productivity and other factors, such as entertainment factors, social factors, or just to try new things. Chatbots are also often being used to replace the role of personal assistants by adopting the characteristics of human behavior.

Sovi Lau is a LINE chatbot developed using the LINE Messaging API and can be accessed easily via LINE Messenger application. LINE Messaging API is an application programming interface (API) feature on LINE Messenger that allows two-way communication between the bot server service and LINE Messenger application. It is known to be reliable, easy to use and modify, and has various features that can make chats feel more realistic. LINE Messenger is chosen to run the chatbot because of its flexibility to be used freely on various platforms, such as smartphones and PCs with no additional charges. Besides, LINE Messenger is currently one of the most popular cross-platform social media with 167 million active users worldwide every month [7].

Considering the fact that there is slightly more than one-half of BPD patients that can be fully recovered by having at least one stable and supportive relationship with a friend or partner [8], Sovi Lau's purpose is to be such a friend to the people with BPD so they have someone to talk with and they do not feel being alone. Sovi Lau is being equipped with the knowledge about BPD symptoms and treatments from a psychologist. Hopefully, the user can talk to Sovi Lau like talking to a friend as well as consulting with psychologist. This way, people suffering from BPD—who are commonly known to face struggle while establishing an interpersonal relationship with another—can have a virtual friend without having to directly being in touch with anyone if they do not want to while also getting the proper initial psychotherapy to their BPD symptoms from the psychologist.

II. CONCEPT OVERVIEW

Nowadays, we live in a digitalization era where so many kind of human daily activities can easily be done online. Our works these days are more hard to being separated to the use of an intelligent machine that make our life to be easier, even including our private lives. This digitalization trends can also affect the development of clinical psychology and psychotherapy, for example, chatbots can be used increasingly as the next generation of psychological interventions [9]. Using the same context, chatbots are computer programs that can have conversations with users, which technically based on dialog scripts that should be created by psychologists [10].

In Indonesia, patients with severe mental disorders have reached the number of 0.46% or about 1 million people. Of the total risk population of 1,093,150 people, only about 3.5% or 38,260 served in mental hospitals, general hospitals, or health center communities with sufficient mental health facilities [5]. These numbers are still to small and undeniably shows that many Indonesian people suffering from mental disorders not getting the necessary treatments for their condition. Lately be known, the main reason for this phenomenon is that people with mental disorders in Indonesia are oftenly being negatively stigmatized by their society, even by their families and closest relatives. Not only that their families labelled them as "strange" and "disgraced", but the families of people with mental disorders also face complex financial problems to pay for expensive costs of mental health treatments or hospitals. The minimum knowledge about mental health problems also cause them to be close-minded enough to assume that people with mental disorders can not be cured and deserve to be excluded from a society.

Meanwhile, psychological internet interventions have been evaluated and viewed as an independent medium that does not depend on time and has no place limitations [11]. These can bridge to help to reduce treatment barriers and expand the availability of mental health care [12]. There should be no doubts on using an AI to take care of any mental health disorders, including the BPD, since numerous studies have also shown that this kind of interventions using cognitive-behavior AI have the same effectiveness as traditional face-to-face psychotherapy [13]. By the use of Sovi Lau chatbot, people with BPD are being able to have independent psychotherapy whenever necessary without having to worry about treatment costs, places, time, society stigmas, or any other matters simply just by accessing Sovi Lau through LINE Messenger application.

Sovi Lau is being built by combining the use of LINE Messaging API and Program-O AIML (Artificial Intelligence Markup Language) Interpreter. According to Github, Program-O was initially developed by Elizabeth Perreau and Dave Morton in 2014 using PHP and MySQL to store chatbot informations and AIML files. AIML itself is being defined as a scripting interpreter language that is one of the derivatives of XML (Extensible Markup Language) with more specific functions, one of which is to create a knowledge-based stimulus-response system [14]. While LINE Messaging API works by granting user requests from LINE Messenger and sending those requests in a form of Javascript Object Notation (JSON) to our bot server [15], Program-O that has been installed to the bot server helps to manage, store, add, delete, and edit Sovi Lau's knowledge from the external AIML files using MySQL as the database [16]. These activities are made possible since the Program-O itself has a control panel for the *botmaster* to do such things easily and overtime it can help to develop Sovi Lau to be a more intelligent and interactive chatbot with minimum time and risks.

Chatbots made on LINE, Telegram, and Facebook Messenger chat applications are not really different from the genuine applications in presenting questions and answers interactively in the form of text [17]. Below are some basic steps in the development of Sovi Lau chatbot using LINE Messenger :

A. *Setting Up the Program-O*

Program-O works as an AIML interpreter whose job is to run bots and provide bot responses for user input. The latest version of Program-O can be downloaded through https://github.com/Program-O/Program-O. After being downloaded, Program-O has to be installed on the webserver

that supports PHP and MySQL, then the botmaster has to finish all the configuration.

B. Writing AIML

The AIML program contains a series of categories, patterns, and templates that determine the response of Sovi Lau to user chat input. The AIML files must be uploaded to the Program-O to run and are used as a reference for Sovi Lau's response to requests sent by users through LINE Messaging API.

C. Creating LINE Official Account

In the making process of LINE chatbots, a registered LINE OA is required to log into https://developers.line.biz/. To do so, researchers have to visit https://account.line.biz/login to login with their pre-owned OA or visit https://account.line.biz/signup to create a new LINE OA.

D. Creating a New Channel for LINE Chatbot

Next step, researchers have to go to https://developers.line.biz/en/ and click the "Console" button. Researchers will have to log into their registered LINE OA in the previous step and then click the "Create" button to create a new LINE chatbot channel provider and enter the desired provider name. Right after that, simply researchers have to click "Create a Messaging API Channel" button to create a new LINE chatbot channel for Sovi Lau.

E. Setting Up the LINE Messaging API

One of the most crucial steps of the making of LINE chatbots is entering the webhook URL of researchers' original bot server. This webhook URL serves as the location where requests from LINE Messaging API are sent to chatbots. Basically, through a webhook URL, LINE Messenger intends to connect researchers' bot server to their LINE OA. Technically, after entering the webhook URL, researchers' have to click the "Verify" button and check the "Use Webhook" button after making sure the webhook URL is correct.

F. Writing PHP Program

Researchers can use PHP, Python, Java, or any other programming languages. The researchers must follow the Application Programming Interface (API) of LINE Messenger at https://developers.line.biz/en/docs/messaging-api [18].

III. Strategies

This section will mainly discuss the knowledge base of Sovi Lau chatbot that is written in Artificial Intelligence Markup Language (AIML). The main function of AIML is to make a stimulus-response system based on knowledge [14]. Theoretically, AIML files commonly consist of some important elements, such as:

A. Category

A category usually consists of other AIML elements, such as patterns and templates. Basically, when a category is loaded in AIML memory, the chatbot will respond to a question written in the pattern tag with the answer written in the template tag. Below is an example of simple AIML category.

```
<category>
  <pattern>SAMPAI JUMPA</pattern>
  <template>makasih obrolannya teman! Sampai jumpa lagi :)</template>
</category>
```

Fig. 1. Example of AIML Category

When the user sends a message "*Sampai jumpa*" (transl. "See you soon"), the chatbot will immediately reply with "*makasih obrolannya teman! Sampai jumpa lagi ☺*" (transl. "thankyou for the chats buddy! See you again ☺").

B. Pattern

Pattern contains a series of letters that are expected to match user input. Wildcards (*) can also be applied to the patterns to extend the compatibility of a pattern to the user input. Below is an example of simple AIML pattern.

```
<category>
  <pattern>* NAMAMU</pattern>
  <template>Nama saya Lysbeth</template>
</category>
```

Fig. 2. Example of AIML Pattern

When the user sends a message such as "*Siapa namamu*" (transl. "Who is your name?"), "*Boleh tanya namamu*" (transl. "May I know your name?"), or any other phrases or sentences with similar meanings, the chatbot will immediately reply with "*nama saya Lysbeth*" (transl. "My name is Lysbeth").

C. Template

A template determines the response of the corresponding pattern. Templates may contain pure texts, variables, or passing a pattern to another using the AIML elements called <srai>. If a pattern is equipped with a <srai> element, user questions contained in the same <srai> element will be considered to have the same meaning so that they will get the same response too. The use of a <srai> element can also be supplemented with a <random> element, so that the chatbot can answer questions in the same category with a variety of different answers so as not to be monotonous. Below is an example of simple AIML template.

```
<category>
  <pattern>* HELLO *</pattern>
  <template><srai>HALO</srai></template>
</category>
<category>
  <pattern>HALO</pattern><!-- patokan untuk template SRAI-nya disini -->
  <template>
    <random>
      <li>Halo, nama saya Vanika, Virtual Assistant Unika! Ada yang bisa saya bantu?</li>
      <li>Hai, nama saya Vanika, Virtual Assistant Unika! Apa yang ingin kamu tanyakan?</li>
    </random>
  </template>
</category>
```

Fig. 3. Example of AIML Template

When the user sends a message that contains words like "Hey" or "Hello", the chatbot will assume that the two combinations of words are the same, and then the chatbot will immediately answer both of them with two choices of answers provided, such as "*Halo, nama saya Vanika, Virtual Assistant Unika! Ada yang bisa saya bantu?*" (transl. "Hello, my name is Vanika, Virtual Assistant Unika! Is there anything I can help?") or *"Hai, nama saya Vanika, Virtual Assistant Unika! Apa yang ingin kamu tanyakan?*" (transl. "Hi, my name is Vanika, Virtual Assistant Unika! What would you like to ask?").

D. That

A <that> element in AIML refers to the previous response of the chatbot. By using a <that> element inside a category, the chatbot will respond to the user input with an answer that is still correlated to the previous response of the chatbot. This element is one of the most crucial component of the development of Sovi Lau discussed in this paper because researchers need to educate Sovi Lau users to be clearer with a kind of probably long statements in some categories, but

researchers definitely do not want the users to find these long statements boring or hard to understand.

In the AIML file of Sovi Lau, the <that> element is being used to shorten Sovi Lau's response to user input by dividing these long statements to two parts; the "brief answer" part and the "explanation part", and letting the users to decide if they want a further explanation from Sovi Lau simply by typing one to two provided keywords.

Below is the sample of a category that combines pattern, templates, and <that> element in the AIML file of Sovi Lau.

```
<category>
  <pattern>* SEPI *</pattern>
  <template>
    <srai>TAKUT</srai>
  </template>
</category>
<category>
  <pattern>TAKUT</pattern>
  <template>Wah, Sovi paham banget karena pernah merasakan hal ini. Mau tahu yang Sovi lakukan kalau merasa begitu? (Boleh/Ga)</template>
</category>
<category>
  <pattern>BOLEH</pattern>
  <that>Wah, Sovi paham banget karena pernah merasakan hal ini. Mau tahu yang Sovi lakukan kalau merasa begitu? (Boleh/Ga)</that>
  <template>Beberapa hal yang Sovi lakukan yaitu melihat dan menikmati awan, daun, sungai. Mendengarkan gemerisik daun, burung berkicau, penjual roti, suara kendaraan. Merasakan hangat matahari, daun basah dan merasakan langkahmu saat berjalan. Jangan lupa untuk mencium bau bunga, masakan tetangga atau makananmu. Kamu pernah melakukan itu? (Pernah/Belum)</template>
</category>
<category>
  <pattern>PERNAH</pattern>
  <template>Dengan melakukan seperti yang Sovi ceritakan tadi, kamu makin sadar bahwa ada banyak hal di sekeliling kita yang sering kita abaikan. Padahal semua itu ada untuk kita. Demikian pula saat ini. Kamu tidak sendirian walau mungkin orang yang kamu harapkan tidak bersamamu. Rasakan kehadiran teman-teman lain yang menunggu kamu kunjungi atau kamu sapa. Contohnya seperti apa? Coba ketik "sapa"...</template>
</category>
```

The above AIML program mainly show that when users type a message that contains word "Sepi" (transl. "Lonely"), such as *"Aku sedang kesepian saat ini"* (transl. "I'm currently feeling lonely"), *"Aku merasa sepi"* (transl. "I feel lonely"), *"Aku takut kesepian"* (transl. "I'm afraid to feel lonely") or any other similar messages, Sovi Lau will assume those user inputs as template *"Takut"* (transl. "Afraid") and then it will be responded by saying, *"Wah, Sovi paham banget karena pernah merasakan hal ini. Mau tahu yang Sovi lakukan kalau merasa begitu? (Boleh/Ga)"* (transl. "*Wow, Sovi really understands what you feel because Sovi has ever experienced those feelings too before. Wanna know what Sovi does whenever Sovi feels that way? (Okay/No)").*

After that, if the user replies by *"Boleh"* (transl. "Okay"), Sovi will continue sending her tips to the user by saying, "*Beberapa hal yang Sovi lakukan yaitu melihat dan menikmati awan, daun, sungai. Mendengarkan gemerisik daun, burung berkicau, penjual roti, suara kendaraan. Merasakan hangat matahari, daun basah dan merasakan langkahmu saat berjalan. Jangan lupa untuk mencium bau bunga, masakan tetangga atau makananmu. Kamu pernah melakukan itu? (Pernah/Belum)"* (transl. "Some of the things that Sovi does are viewing and enjoying the view of clouds, leaves, rivers. Listening to the rustling of the leaves, bird chirping, bakers, the sound of vehicles. Feeling the warm sun, wet leaves, and feeling my steps as Sovi walks. Don't forget to smell the flowers, your neighbors' cooking or your meals. Have you ever done them? (Never/Ever)").

Next, if the user replies by *"Pernah"* (transl. "Ever"), Sovi will answer by "*Dengan melakukan seperti yang Sovi ceritakan tadi, kamu makin sadar bahwa ada banyak hal di sekeliling kita yang sering kita abaikan. Padahal semua itu ada untuk kita. Demikian pula saat ini. Kamu tidak sendirian walau mungkin orang yang kamu harapkan tidak bersamamu. Rasakan kehadiran teman-teman lain yang menunggu kamu kunjungi atau kamu sapa. Contohnya seperti apa? Coba ketik "sapa"...*" (transl. "By doing what Sovi has explained before, you will realize that there are so many things around us that we have ignored although they exist for us. The same thing goes right now. You are not alone eventhough some people that you are expecting to be around are not currently being there with you. Feel the existences of your other buddies that may have waited for you to visit or to greet. What can be the example? Try to send me "greeting"..."). And so on.

The same logic goes to if a user rejects Sovi Lau's offers by saying "No" in the provided answer choices at the end of Sovi Lau's message, Sovi Lau will not force to send further explanations to the corresponding user. Not only are these kinds of strategies practically simple, but they are also the easiest and understandable ways to communicate with people, especially to people with BPD simply through text messages.

IV. IMPLEMENTATION

Building a chatbot using Program-O is considered easy since it does not require any advanced programming skill and a programmer does not need to be an expert in Artificial Intelligence to work well with Program-O [18]. Using Program-O, anyone including the psychologists themselves with basic computer literacy can even easily build a chatbot without a programmer.

The main component of building a chatbot using Program-O is the AIML file. To make an interactive chatbot, a botmaster just has to write a communicative compilation of question and answer keywords using the syntax written in section III. As long as the program can direct user's questions to Program-O and the Program-O can direct responses to the

user, the work is done [18]. Below is the text flow that occurs between LINE Messenger and Program-O.

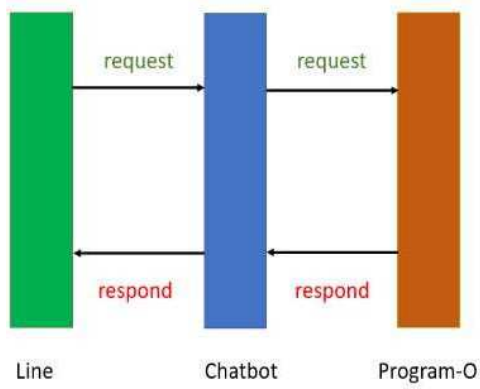
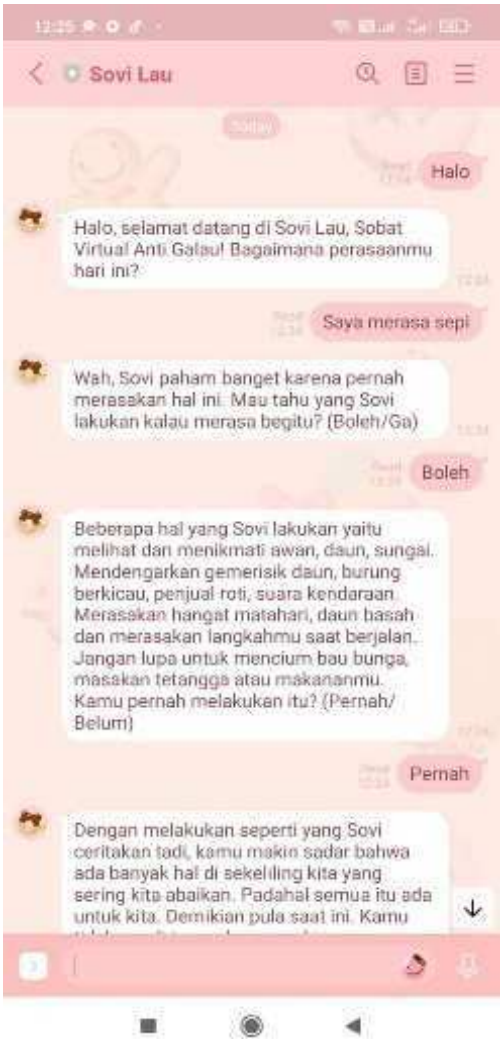


Fig. 4. Text Flow between LINE Messenger and Program-O

Fig. 4 depicts how a request sent by user from LINE Messenger application is being directed to the chatbot that will forward the request to Program-O. Furthermore, Program-O sends a respond to the chatbot that will direct it to LINE Messenger user.

Finally, using the flow displayed in Fig. 4, the Sovi Lau chatbot in screenshots below has been done.



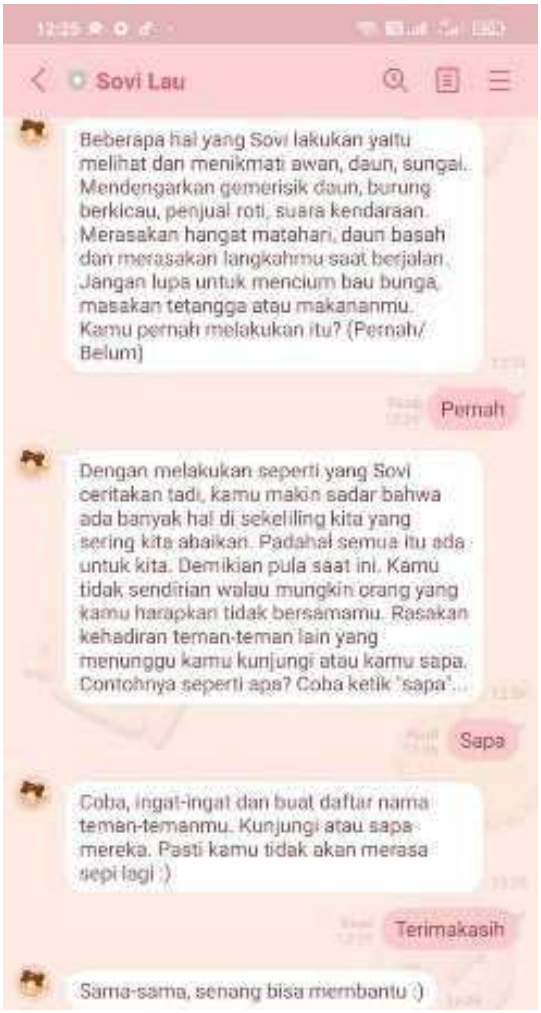


Fig. 5. Conversations with Sovi Lau

All questions and answers provided in the AIML file of Sovi Lau are all being extracted originally from the psychologist. Sovi Lau chatbot is also under the supervision and approval of the psychologist. Therefore, every response sent by Sovi Lau to the user is considered valid, credible, and reliable. All conversations are saved on the database for further research. It is privately secured, and can only be viewed by three responsible parties such as the users, psychologist, and researcher/programmer as the botmaster.

V. CONCLUSION

The purpose of functional development of a LINE chatbot named "Sovi Lau" is to provide a virtual friend for people, especially people with borderline personality disorder who commonly indicate risky symptoms such as feeling lonely, easily overwhelmed, fear of abandonment, unstable relationship, and difficulties to involve in interpersonal relationship, explosive anger, impulsive behaviors, and self-harm. Sovi Lau chatbot is equipped with the knowledge of a psychologist as the BPD expert to make sure that all the conversations between users and Sovi Lau is being handled and supervised by a credible party.

Meanwhile, the use of LINE Messenger and Program-O is considered to be the easiest and simplest way to develop a chatbot that can be used by psychologists to communicate with people suffering from BPD. The psychologists only need to prepare the possible conversations with the users and

provide the necessary responses for the users, especially the people suffering from BPD, stated with friendly statements like a real friend. These keywords will be extracted into AIML to send the response to the user anytime needed.

ACKNOWLEDGMENT

This research was funded by the Indonesian Ministry of Research and Higher Education under the scheme of Higher Education Fundamental Research Excellence Grant on 2021 which is titled as Borderline Personality Disorder Assistance Model using Virtual Assistant Technology.

REFERENCES

[1] D. Banerjee *et al.,* "Impact of the COVID-19 pandemic on psychosocial health and well-being in South-Asian (World Psychiatric Association zone 16) countries: A systematic and advocacy review from the Indian Psychiatric Society," *Indian J. Psychiatry,* vol. 62, no. Suppl 3, pp. S343-S353, September 2020.

[2] K. Wingenfeld, C. Spitzer, N. Rullkötter, and B. Löwe, "Borderline personality disorder: Hypothalamus pituitary adrenal axis and findings from neuroimaging studies," *Psychoneuroendocrinology*, vol. 35, no. 1. Pergamon, pp. 154–170, January 2010.

[3] C. Wibhowo, "Faktor penyebab kepribadian ambang," *PSIKODIMENSIA*, vol. 15, no. 1, pp. 107–122, 2016.

[4] R. S. Biskin, J. Paris, "Diagnosing borderline personality disorder," *CMAJ*, vol. 184, no. 16, pp. 1789-1794, 2012.

[5] N. Lubis, H. Krisnani, M. Fedryansyah, "Pemahaman masyarakat mengenai gangguan jiwa dan keterbelakangan mental" *SHARE Social Work Journal*, vol. 4, no. 2, pp. 137-144, 2014.

[6] E. Tate, "Chatbots: the definitive guide" *Artificial Solutions,* 2020. [Online]. Available: *https://www.readkong.com/page/chatbots-the-definitive-guide-2020-4048256*. [Accessed: 08-May-2021].

[7] Statista Research Department, "LINE – statistics & facts," *Statista,* 2021. [Online]. Available: https://www.statista.com/topics/1999/line/. [Accessed: 11-May-2021].

[8] R. S. Biskin, "The lifetime course of borderline personality disorder," *CanJPsychiatry*, vol. 60, no. 7, pp. 303-308, 2015.

[9] E. Beindeeg, B. Erb, L. Schulze-Thuesing, H. Baumeister, "The next generation: chatbots in clinical psychology and psychotherapy to Foster Mental Health – a scoping review," *Karger Transl. German*, 2019. doi:10.1159/000501812. [*Verhaltenstherapie,* vol. 29, no. 4, pp. 266-280, December 2019].

[10] M. Dowling, D. Rickwood, "Online counseling and therapy for mental health problems: a systematic review of individual synchronous interventions using chat," *J Technol Hum Serv.,* vol. 31, no. 1, pp. 1-21, 2013.

[11] P. Carlbring, G. Andersson, P. Cuijpers, H. Riper, E. Hedman-Lagerlöf, "Internet-based vs. Face-to-face cognitive behavior therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis," *Cogn Behav Ther.,* vol. 47, no. 1, pp. 1-18, January 2018.

[12] H. Baumeister, C. Grässle, D. D. Ebert, L. V. Krämer, "Blended psychotherapy – verzahnte Psychotherapie: Das Beste aus zwei Welten?" *Psychother Dialog,* vol. 19, no. 4, pp. 33-8, 2018.

[13] G. Andersson, N. Topooco, O. Havik, T. Nordgreen, "Guided Internet-supported versus face-to-face cognitive behavior therapy for psychiatric and somatic disorders: a systematic review and meta-analysis," *World Psychiatry,* vol. 16, no. 1, pp. 288-95, October 2014.

[14] W. C. Pamungkas, "Internet relay chatbot dengan menggunakan artificial intelligent markup language (AIML)," *Jurnal Informatika*, vol. 4, no. 1, pp. 54-60, 2008.

[15] Y. I. Chandra, Kosdiana, "Rancang bangun aplikasi chat bot Line menggunakan pendekatan agile process dengan model extreme programming berbasis web (studi kasus di STMIK Jakarta STI&k)," *Seminar Nasional Teknologi Informasi STI&K*, vol. 3, no. 1, pp. 149-160, 2019.

[16] D. Suryani, E. L. Amalia, "Aplikasi chatbot objek wisata Jawa Timur berbasis AIML," *Smartics*, vol. 3, no. 2, pp. 47-54, 2017.

[17] D. Gunadi, R. Sanjaya, and B. Harnadi, "Examining the acceptance of virtual assistant-Vanika for university students," in 2019 3rd International Conference on Informatics and Computational Sciences (ICICoS), 2019, pp. 1–4.

[18] C. Wibhowo and R. Sanjaya, "Virtual assistant to suicide prevention in individuals with borderline personality disorder," in International Conference on Computer and Information Science, 2020.

13% Overall Similarity

Top sources found in the following databases:

- 10% Internet database
- Crossref database
- 1% Submitted Works database
- 5% Publications database
- Crossref Posted Content database

TOP SOURCES

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	stmik-yadika.ac.id Internet	5%
2	Christin Wibhowo, Ridwan Sanjaya. "Virtual Assistant to Suicide Preven... Crossref	2%
3	journal.unika.ac.id Internet	2%
4	karger.com Internet	1%
5	researchgate.net Internet	<1%
6	Dheny Frizki*, Indra Ranggadara, Amalia Fajar Wati. "Artificial Intelligen... Crossref	<1%
7	jurnal.darmajaya.ac.id Internet	<1%
8	arxiv.org Internet	<1%

9 Ryan Randy Suryono, Mardiana Purwaningsih, Arfive Gandhi, Ekawati ... <1%
Crossref

10 I Putu Gede Abdi Sudiatmika, I Made Agus Wirahadi Putra, Komang Ha... <1%
Crossref

11 jmir.org <1%
Internet

Excluded from Similarity Report

- Bibliographic material
- Cited material
- Manually excluded sources
- Quoted material
- Small Matches (Less then 8 words)
- Manually excluded text blocks

EXCLUDED SOURCES

repository.unika.ac.id 85%
Internet

Lysbeth Venella Oey, Ridwan Sanjaya, Christin Wibhowo. "LINE-based Virtual ... 85%
Crossref

EXCLUDED TEXT BLOCKS

Proc. ICOMITEE 2021, October 27th-28th 2021, Banyuwangi, Indonesia
repository.lppm.unila.ac.id

LINE-based Virtual Friend Development forBorderline Personality Disorder
stmik-yadika.ac.id

Information Systems
Devina Gunadi, Ridwan Sanjaya, Bernardinus Harnadi. "Examining the Acceptance of Virtual Assistant - Vani...

ACKNOWLEDGMENTThis research was funded by the Indonesian Ministry ofResea...
journal.unika.ac.id