Sumbawa University Of Technology Infomatrix : Enhancing University Engagement Through An Intelligent Chatbot System

David T. Ndomaina, Shinta Esabella*, I Made Widiarta, Nora Dery Sofya

System Engineering, Informatics, University of Tecnology Sumbawa, Sumbawa, Indonesia

Email: [1]david.ndomaina@uts.ac.id , [2*]shinta.esabella@uts.ac.id , [3]made.widiarta@uts.ac.id, [4]nora.dery.sofya@uts.ac.id

Abstract- *The aim of this research is to design and implement the chatbot system "Universitas Teknologi Sumbawa Infomatrix", which by utilizing the capabilities of Artificial Intelligence (AI) and Natural Language Processing (NLP) produces an interactive and efficient platform for students, facilitating access to comprehensive information about the university and helping makes it easier for students to get the right information to support their academic process on campus. Built web-based chatbot application, developed using the PHP programming language with the Laravel framework, integrated with a MySQL database, and utilizing Dialogflow cloud integration for machine and user conversation chat systems. This research methodology follows Angie Method and in system design, uses a structured design method that combines Context Diagrams, Data Flow Diagram (DFD), and Entity Relationship Diagram (ERD). The system testing uses a beta testing approach. With the presence of this Institutional Chatbot Application, it can make it easier for students to obtain UTS university data and information and become an effort to increase involvement at Sumbawa University of Technology through AI-based interactions.*

Keywords: *System, Chatbot, Institutional, Angie Method, Artificial Intelligence*

1. INTRODUCTION

University environments continually strive to enhance student experiences and accessibility to resources. In this digital age, the integration of chatbot technology stands as a transformative solution. Offering immediate, round-the-clock support, these intelligent systems streamline inquiries, provide instant access to critical information, and foster an interactive platform for students, ultimately augmenting the efficiency and effectiveness of university services. Amidst evolving flow of educational, the incorporation of chatbots emerges as a strategic innovation, catering to the diverse needs of a tech-savvy student body while revolutionizing the educational support paradigm [1]

Sumbawa University of Technology (UTS) is one of the best universities in West Nusa Tenggara Province, Indonesia. The interest in study programs has resulted in a continued increase in students, until 2023, the student population has increased by 4,873 students (UTS New Student Admissions Coordinator, 2023). With the increase in student numbers, UTS faces challenges, one of which is problems related to communication and timely access to important information for students who have various academic-related problems or questions. Observing the results of interviews with informants, the informants were experienced students who had questions and needed information quickly regarding their academics, but had difficulty getting information on time because accessing information had to go through a long organizational structure in stages. By taking the initiative to use Google search for this information, the information was limited and the student could not get answers to his real questions (Wahyudi, 2023). Analysing the problems of students (informants), researchers conducted an in-depth study by conducting interviews with the Head of DSTI UTS, it was stated that there were indeed several problems related to data and information management, including frequent delays in communication between students and student services, such as insufficient existing communication channels (minimal data and information on websites and response times to emails), this creates administrative burdens and academic obstacles. In addition, limitations in Information Provision: Providing access to comprehensive and accurate information about campus structure, room organization, academic guidelines, and department orientation, slows down academic navigation. Another problem is that there are special obstacles for international students, namely cultural gaps, language barriers, and time available for the platform. These are challenges for international students, thus hindering their understanding of university expectations and tasks. So, it is felt that this problem can be solved with sophisticated technology, using a touch of data and information management innovation, especially at UTS, which is very necessary [2]

Reviewing the problems above, the researcher raised the research title "Infomatrix University Of Technology Sumbawa: Increasing University Involvement Through An Intelligent Chatbot System". The Smart Chatbot System was built by utilizing Artificial Intelligence (AI) and Natural Language Processing (NLP) capabilities to produce an interactive and efficient platform for students, facilitating access to comprehensive information about the university and helping make it easier for students to get the right information to support the academic process at UTS . In building a web-based chatbot application using the PHP programming language with the Laravel framework, integrated with the MySQL database, and utilizing Dialogflow cloud integration for the machine and user conversation chat system. This research methodology follows the Angie Method and in system design uses a structured design method that combines Context Diagrams, Data Flow Diagram (DFD), and Entity Relationship Diagram (ERD). System testing uses a beta testing approach.[3]

It is hoped that the results of this research will present an Institutional Chatbot application that can make it easier for students to obtain UTS university data and information in real time as well as an effort to increase engagement at Sumbawa University of Technology through Artificial Intelligence (AI) based interactions.

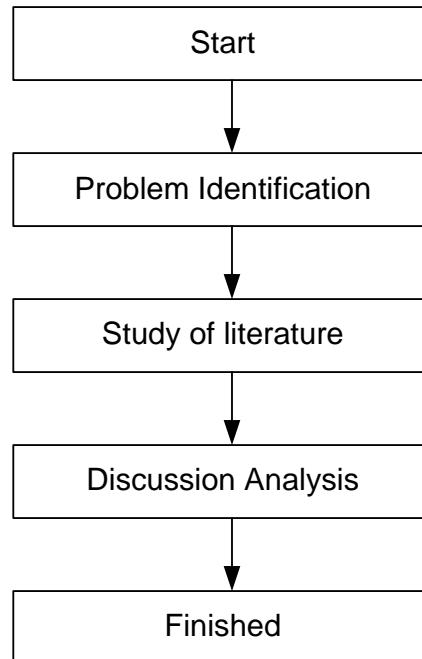# 2. RESEARCH METHODOLOGY

2.1 Data Collection

Figure 1. Research Flow

The research uses the following data collection techniques [4]:

1. Problem identification
   Problem identification is the process of identifying, exploring, and understanding a particular problem or challenge that needs to be solved or resolved. It involves recognizing or understanding dissatisfying, disruptive, or detrimental conditions, situations, or issues, whether in the context of an individual, an organization, or society at large.
2. Literature study
   Literature study is a process of investigation and analysis carried out on literary works that are relevant to a particular topic or subject. It involves collecting, reading, and synthesizing information from various literary sources such as books, journals, articles, and other documents related to the subject under study..
3. Statements Discussed
   Statements Discussed in a text or presentation. This involves an in-depth understanding of the material presented, an assessment of the accuracy, acceptability, and relevance of the information provided, and drawing conclusions about the implications and consequences of the discussion..

3. RESULT AND DISCUSSION

The completion of the Sumbawa university of technology chatbot application marks a significant milestone in augmenting the accessibility and efficiency of information dissemination within campus academic ecosystem. This section outlines the key outcomes and implications of the developed chatbot, emphasizing its functionality, user engagement, and potential impact on the university community [5].

3.1 Use Case Diagram

The following is a picture of a use case diagram of an android-based sumbawa folklore application.
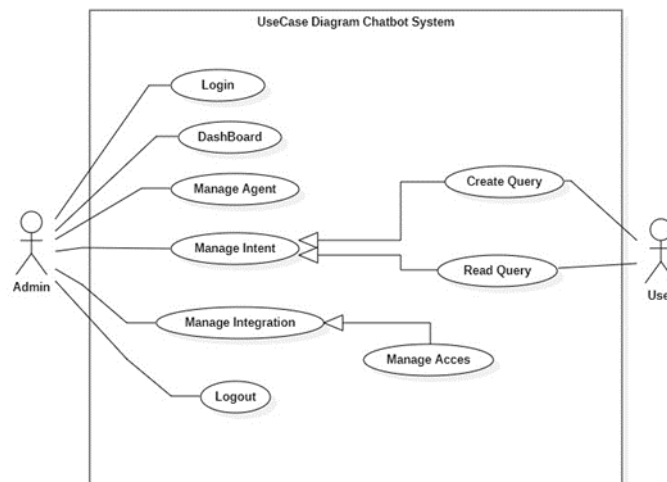
Figure 2. Use Case Diagram

Figure 1 illustrates the system with two roles: an admin managing menus like login, Dashboard, Manage Agent, Intent, Integration, and logout, and users accessing the chatbot on Sumbawa University's webpage for queries and responses.

3.2 Class Diagram
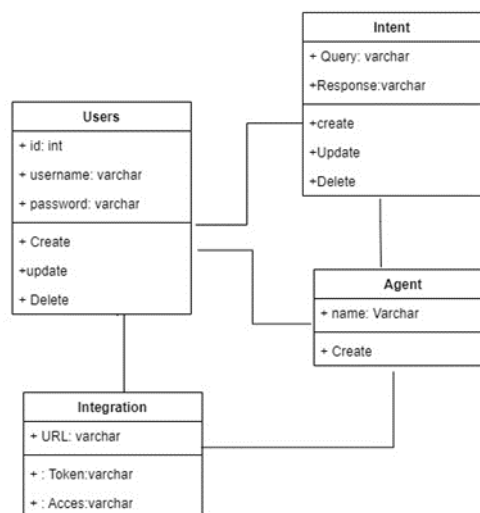
Here's the Class diagram on the chatbot system.

Figure 3. Class Diagram

Figure 2 is a class diagram that explains the database and the correlations that exist in the chatbot system. Class diagram can explain all the flows in the system well

3.3 Result

Based on system design and user interface design what has been done previously, the next stage is to carry out implementation of the design that has been created. The Smart Chatbot System was created using the PHP (Hypertext.) programming language Preprocessor) uses the Laravel framework and the database is MySQL. The following are some of the system implementations that have been implemented created:.

a. The following is a view of the Training Question and from the chatbot system:
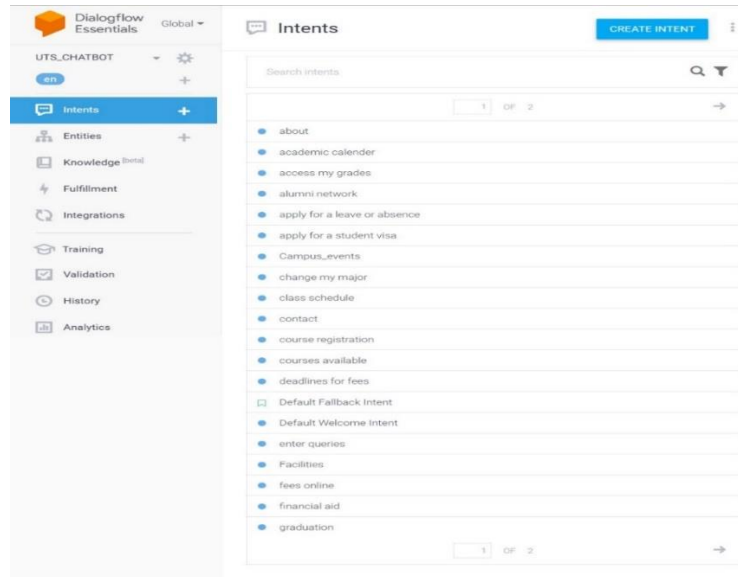
Figure 4. Training Question

Within the "Training Phrases" screenshot, we delve into the art of teaching our chatbot the nuances of human conversation. This interface is where the magic happens. It's where you input an array of phrasing variations for each question, allowing the bot to recognize and respond effectively to the diverse ways users may pose the same query.

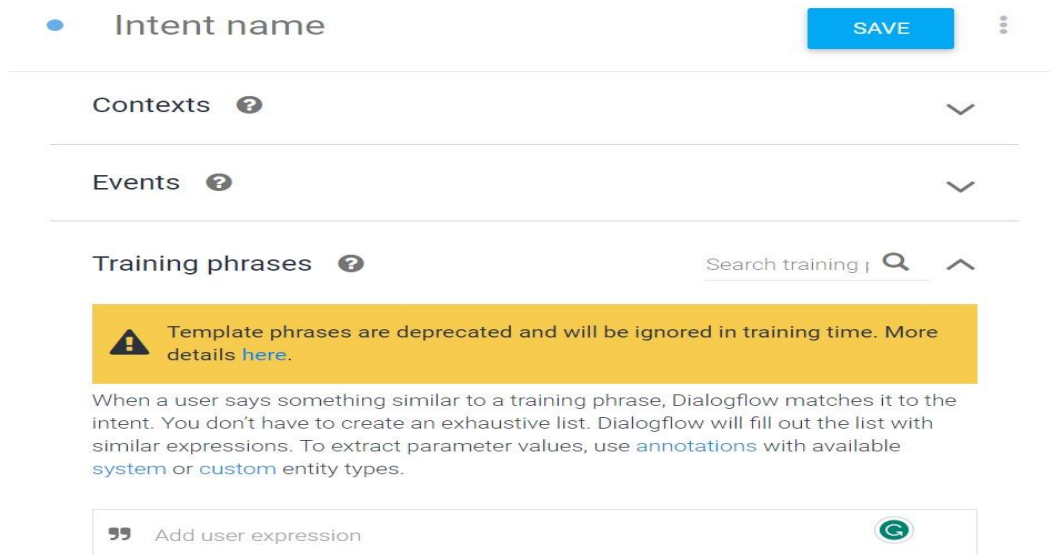b. The following is the display of the u training question from the chatbot system:

Figure 4. Training Question

Figur 4 the "Training Question" screenshot reveals an integral aspect of our Dialogflow chatbot development. This interface is the heart of the chatbot's learning process. It's here that you provide specific queries and questions, helping the bot understand user input better. These training questions are the cornerstone of the bot's natural language comprehension.

c. The following is a display of the response or answer from the chatbot system:

Figure 5. Response or Answer

This is Integration section enables seamless deployment across multiple platforms like websites, messaging apps, and WhatsApp etc. It streamlines connections to deliver consistent AI interactions on diverse user interfaces.

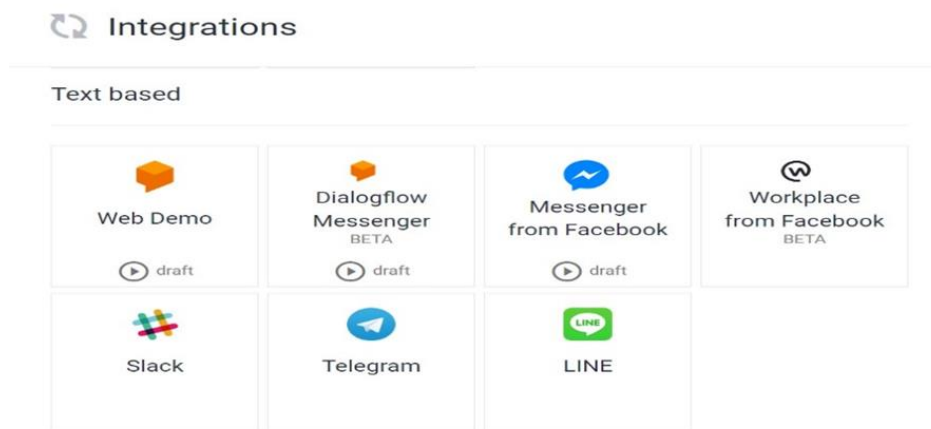d. The following is a view of the Integration Application of the chatbot system :

Figure 6. Integration Application

This is Integration section enables seamless deployment across multiple platforms like websites, messaging apps, and WhatsApp etc. It streamlines connections to deliver consistent AI interactions on diverse user interfaces.

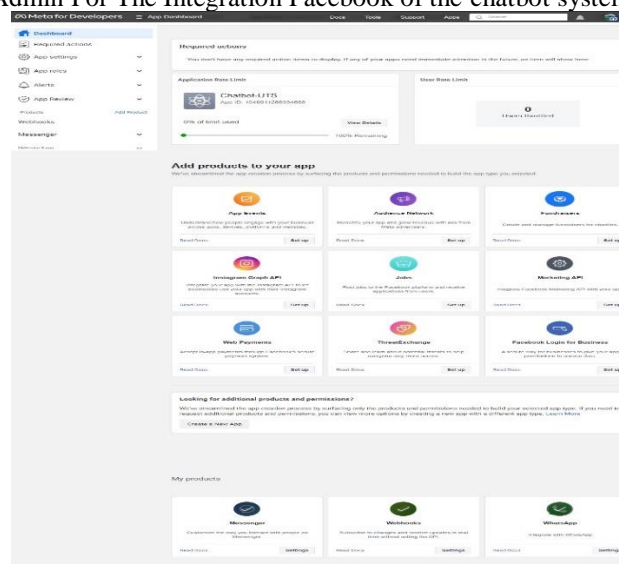e. The following is a view of the Admin For The Integration Facebook of the chatbot system:

Figure 7. Admin For The Integration Facebook

This is a Integration phase with Facebook Messenger facilitates bot deployment within the platform. This

phase configures AI agents to engage users seamlessly, providing personalized experiences and automated assistance directly within Messenger conversations.

f.   The following is a view of the UTS Chatbot Homepage of the chatbot system:

Figure 8. Chatbot Homepage

"Home Screen" is where user interactions with the chatbot begin. The screenshot portrays this initial interface, offering a welcoming, intuitive environment. It's the starting point for users to engage with the chatbot, providing easy navigation and access to various functionalities.

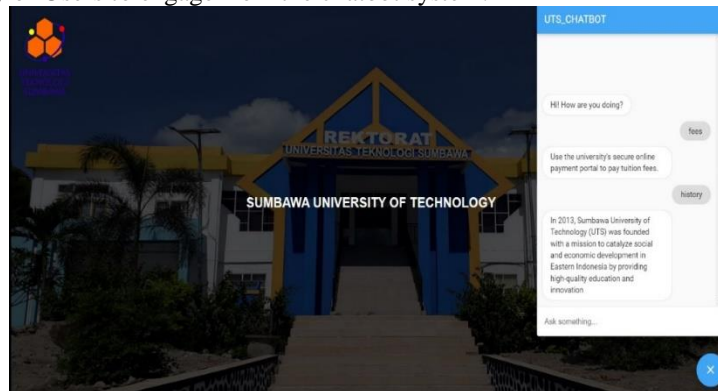g.   The following is the display of Users to engage from the chatbot system:

Figure 9. Users To Engage

In this screenshot, the "Home Screen" reveals its transformative power with an active chat session. Users can witness their ongoing conversation with the chatbot, fostering an engaging and interactive experience. The chat functionality here represents the dynamic nature of communication with the bot.

h.   The following is the appearance of the Chat Pop-up page and facebook integration of the chatbot system:
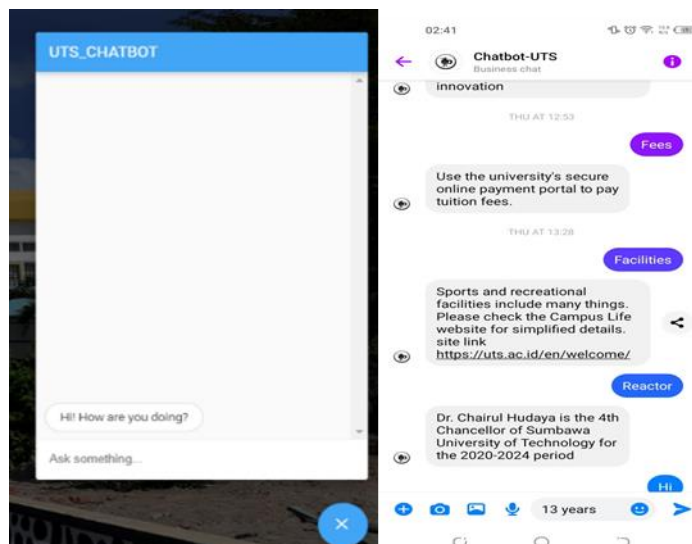

Figure 10. Chat Pop-Up Page

The "Chat Full Screen" view immerses users in their conversation with the chatbot. It takes the chat experience to the next level, providing a spacious interface for seamless interaction. This full-screen mode prioritizes readability, ensuring users are absorbed in the conversation.

CONCLUSION

In the course of this project, the author has made substantial advancements toward fulfilling this project objectives An intelligent chatbot system has been successfully built and developed using the PHP programming language, the Laravel Model framework, and a MySQL database. Where, by using the Agil Software Development Life Cycle in software development it has gone well up to the testing stage using beta testing. The results of implementing an integrated intelligent Chatbot system have been able to provide real-time information, thereby expanding its usefulness and relevance and improving the User (student) experience in obtaining data and information because the intelligent Chatbot system has response elements that include text, images and replies fast, to provide users with a smooth and interactive conversation experience.

REFERENCES

[1] N. A. Ahmad, M. Hafiz, C. Hamid, A. Zainal, and Z. Baharum, "UNISEL Bot : Designing Simple Chatbot System for University FAQs," no. December, 2019, doi: 10.35940/ijitee.B9067.129219.

[2] A. T. Lolinco and T. A. Holme, "Developing a Curated Chatbot as an Exploratory Communication Tool for Chemistry Learning," *J. Chem. Educ.*, 2023, doi: 10.1021/acs.jchemed.3c00520.

[3] R. Junior, "Rebo Junior : Analysis of Dialogue Structure Quality for a Reflection Guidance Chatbot," 2020.

[4] P. Bera, Y. Wautelet, and G. Poels, "On the Use of ChatGPT to Support Agile Software Development," *CEUR Workshop Proc.*, vol. 3414, pp. 1–9, 2023.

[5] F. Ishlakhuddin and A. SN, "Ontology-based Chatbot to Support Monitoring of Server Performance and Security By Rule-base," *IJCCS (Indonesian J. Comput. Cybern. Syst.*, vol. 15, no. 2, p. 131, 2021, doi: 10.22146/ijccs.58588.

[6] N. Sari, R. Riadi, and A. Karim, "Sistem Informasi Pengolahan Data Guru Mengajar Berbasis Web (Studi Kasus : SMA Negeri 1 Kualuh Hilir)," pp. 530–534, 2019.

[7] A. Karim, T. H. Pohan, A. Hasibuan, E. Purba, and S. Trianovie, "Sistem Pakar Diagnosa Kegagalan Koneksi Tcp / Ip Pada Jaringan," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, vol. I, no. I, pp. 138–144, 2017.

[8] A. Karim and E. Purba, "Jurnal Mitra Pengabdian Farmasi Pemanfaatan Digital Marketing Bagi Masyarakat Tanjung Medan," vol. 1, no. 3, pp. 85–88, 2022.

[9] N. Oktari, D. P. Utomo, S. Aripin, and A. Karim, "Penerapan Metode Operational Competitiveness Rating Analysis (OCRA) Dalam Penerimaan Karyawan Perjanjian Kerja Waktu Tertentu (PKWT)," vol. 3, no. 3, pp. 218–226, 2022, doi: 10.47065/josh.v3i3.1471.

[10] A. Karim, "Penerapan Algoritma Entropy dan Aras Menentukan Desa Terbaik Di Pemerintah Kabupaten Labuhanbatu," vol. 3, no. 1, pp. 33–43, 2022.

[11] E. P. K. Trianovie, "Sistem Informasi Pendataan Usaha Micro Kecil dan Menengah Pada Dinas Umkm Labuhan Batu Berbasis web," *J. Infotek*, vol. 4, no. 3, pp. 1–8, 2019.

[12] M. V. Siagian and A. Karim, "OTOMATRIKS : Pengembangan Model Pembangkitan Bilangan Acak Dalam Pembuatan Soal Matriks Secara Otomatis," vol. 4, no. 1, pp. 127–131, 2022, doi: 10.47065/josh.v4i1.2280.

[13] S. T. Karim Abdul, Tatang Hidayat Pohan, Elvitrianim Purba, Awaludin Hasibuan, "Informasi, Sistem Dan Barang Pada Aset Bca Bank Web Berbasis," vol. 3, no. 1, 2018.

[14] S. Dharma Hardi *et al.*, "Implementation of Computer Based Systems for Effective Deci-sions in Acceptance of Vikar," *Int. J. Eng. Technol.*, vol. 7, no. 3, pp. 101–104, 2018, [Online]. Available: www.sciencepubco.com/index.php/IJET.

[15] A. Karim and E. Purba, "Sistem Informasi Pengolahan Data Nilai Siswa Berbasis Web," p. 11160429, 2019.

[16] N. Nurliadi and A. Karim, "Sistem Pendukung Keputusan Penerimaan Analis Di Pusat Penelitian Kelapa Sawit Menggunakan Metode Complex Proportional Assessment (Copras)," *Bul. Ilm. Inform. Teknol.*, vol. 2, no. 1, pp. 32–42, 2023.

[17] M. Mesran, E. Buulolo, G. Ginting, and A. Karim, "Application of The Extended Promethee II (EXPROM II) For International Student Exchange Selection," no. Exprom Ii, 2020, doi: 10.4108/eai.11-12-2019.2290831.

[18] A. Karim, S. Esabella, and U. Hasanah, "Analisa Penerapan Metode Operational Competitiveness Rating Analysis (OCRA) dan Metode Multi Attribute Utility Theory (MAUT) Dalam Pemilihan Calon Karyawan Tetap Menerapkan Pembobotan Rank Order Centroid (ROC)," vol. 5, pp. 1674–1687, 2021, doi:

10.30865/mib.v5i4.3265.

[19] A. Karim, "SISTEM INFORMASI PENGOLAHAN DATA KRIMINAL PADA KEPOLISIAN," *J. Ilm. Infotek*, vol. 2, no. 2, 2017.

[20] M. Mesran, S. D. Nasution, S. Syahputra, A. Karim, and E. Purba, "Implementation of the Extended Promethee II in Upgrade Level of Mechanic," *Int. J. Sci. Res. Sci. Technol.*, vol. 4, no. 2, pp. 125–130, 2018.

[21] S. T. K. A. T. H. P. E. P. Awaludin Hasibuan, "Sistem Pakar Diagnosa Kegagalan Koneksi Tcp / Ip Pada Jaringan," *KOMIK (Konferensi Nas. Teknol. Inf. dan Komputer)*, pp. 138–144, 2017.