IAIC International Conference Series
Vol. 4, No. 1, 2023, pp. 122 ~ 131
E-ISSN: 2774-5899 | P-ISSN: 2774-5880
DOI: https://doi.org/10.34306/conferenceseries.v4i1.641

Forward Chaining Algorithm on Informatics Graduate Job Recommendation System Based on MBTI Test

[1]Jhonatan Laurensius Tjahjadi, [2*]Yulia Wahyuningsih, [3]Padmavati Darma Putri Tanuwijaya, [4]Ryan Putranda Kristianto
[1,2,3.4]Informatics Study Program, Darma Cendika Catholic University, Indonesia
E-mail: [1]nathanjo2001@gmail.com, [2*]yulia@ukdc.ac.id, [3]ryan@ukdc.ac.id
***Corresponding author**

(Received November 8, 2023 Revised November 17, 2023 Accepted November 25, 2023, Available online December 19, 2023)

Abstract

The Myers-Briggs Type Indicator (MBTI) is a method for identifying an individual's personality type based on the psychological theory of Carl Gustav Jung. In the context of computer science students, they often face challenges in planning their academic journey and determining the direction of their career development during their studies, causing confusion when it comes to choosing a career path in the field of computer science in the future. To address these challenges, the researcher has developed a web-based expert system using the PHP programming language. This expert system is designed to make decisions based on a collection of user responses, which are processed using the forward chaining method, ultimately providing the user's personality type along with suitable career choices. The primary objective of the expert system is to assist students in making decisions regarding their studies and future careers. Through this research, the researcher has produced a functioning website capable of efficiently processing user responses and generating decisions regarding personality types and career options. Thus, this study provides a solution to aid computer science students in planning their academic and career paths.

Keywords: *Expert System, Forward Chaining, MBTI, PHP.*

1. Introduction

Currently, 89% of companies in the United States that rank in the top 100 companies use the Myers-Briggs Type Indicator (MBTI) personality test for job recruitment [1]. Every human being is born with a diverse personality, influenced by developmental environmental factors that shape both positive and negative mindsets, critical and non-critical traits, as well as strengths and weaknesses [2][3]. Understanding one's personality type is crucial, as it facilitates daily interactions and extends to the realm of professional work [4].

However, in the academic environment of Darma Cendika Catholic University, students often lack a precise understanding of their personality types and how these can impact their future careers [5]. It is imperative for students to discover their personality types and connect them with their career potential. Darma Cendika Catholic University should provide support to help students gain a better understanding of themselves, guiding their educational studies and preparing them for majors. With improved self-awareness, students can make more informed and suitable decisions about their career choices across various fields of work [6]. In this research, researchers used a forward-chaining-based expert system with a web-based platform. This system was developed to administer a Myers-Briggs Type Indicator (MBTI) test and suggest suitable jobs for students, especially for informatics graduate students, based on their personality test results [7].

Previous research conducted by Wisnu and Yuli on the personality test of SMAN 2 Kebumen, using the forward-chaining method, resulted in a feasibility value of 92.5% as assessed by experts [8]. Indah et al.'s research on android-based applications for testing MBTI prospective students with forward-chaining expert systems successfully ran and displayed personality calculation results on all smartphone devices with Android system version 7 [9]. Erni's previous research on the development of MBTI method personality tests for Gunadarma psychology students concluded that a web-based expert system in personality recognition can assist students in understanding their personality characteristics [10]. In research conducted by Arif et al. on the design of mini psychological tests using Ren'Python with a forward-chaining expert system, they successfully determined personality types [11]. Darmansah et al.'s design of a personality expert system website, which categorized individuals into four personality types—choleric, phlegmatic, sanguine, and melancholic—successfully analyzed input and provided insights into advantages, disadvantages, and suitable jobs [12].

However, previous research did not offer job recommendations in the field of informatics based on the results of personality tests. Therefore, researchers developed a website platform with a forward-chaining expert system, allowing users to take the test anywhere [13]. This research aims to provide innovative solutions with easy access for informatics students who may still not understand future career opportunities. With the application of a forward-chaining-based expert system, it is hoped that it can assist students in planning study and career steps based on an understanding of their own personality [14].

2. Research Method

An expert system is a system that can capture results or information, enabling decision-making used by several experts in a specific field. Researchers utilize the Myers-Briggs Type Indicator (MBTI) method as the approach in the expert system for personality testing [15]. The Myers-Briggs Type Indicator (MBTI) was developed based on the personality theory of Carl Gustav Jung. MBTI provides guidelines on four personality preference scales that are opposites to each other, including extraversion vs. introversion, sensing vs. intuition, thinking vs. feeling, and perceiving vs. judging [16].

Knowledge base is the foundation of knowledge in an expert system that serves as the basis for problem-solving. Researchers use a knowledge base with rule-based reasoning. Rule-based reasoning provides knowledge rules in the form of IF-THEN statements [17]. This knowledge base is used when there is a substantial amount of expert knowledge on a specific problem. The inference engine is the methodology used as the reasoning tool for information in the knowledge base used to make decisions. The inference engine operates with a thinking mechanism similar to that of an expert [18]. Researchers use the Forward Chaining method as the approach in the inference engine [19]. Forward chaining is a method that involves matching facts or tracing facts before testing the truth of a hypothesis and drawing conclusions [20]. Figure 1. Depicts the forward chaining process used by the researcher.

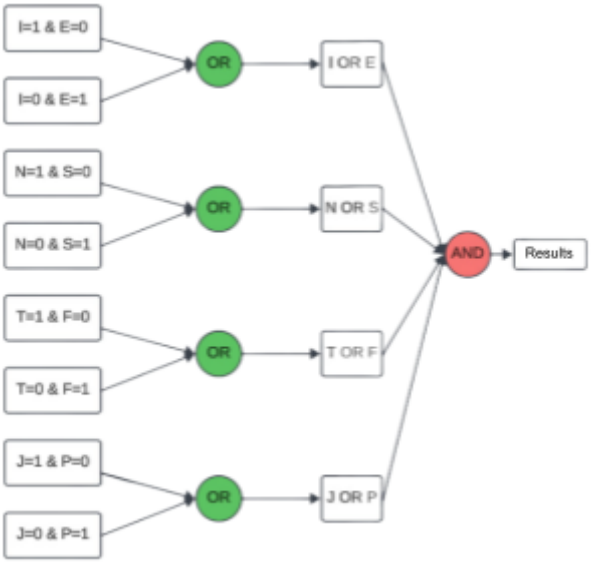

Figure 1. Forward Chaining

3. Results and Analysis

3.1. Expert System Architecture

The Expert System comprises several components, including the interface, data, and the inference engine. In this research, the forward chaining method is employed for decision-making in determining an individual's personality and recommending suitable occupations based on that personality. Figure 2. Illustrates the architecture of the MBTI expert system using the forward chaining method.

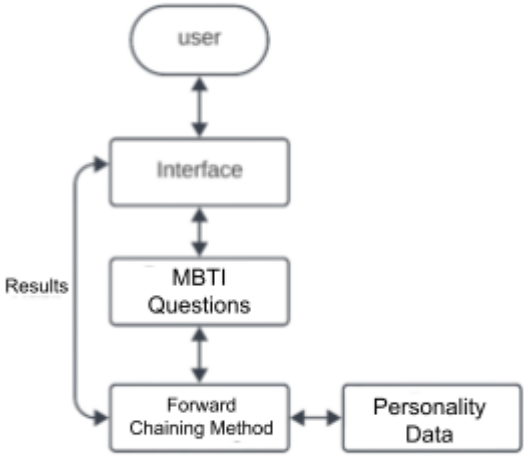

Figure 2. MBTI Expert System Architecture with Forward Chaining Method

3.2. Expert System Knowledge Base

The data required to establish the knowledge base necessary for determining an individual's personality includes various types of information. These data categories are as follows:

1. Personality Traits Data
   Within the MBTI expert system, there are personality traits that contradict each other. Table 1. Displays the four contrasting personality traits.

Table 1. 4 Contrasting Personality Traits

No	Trend
1	Introversion and Extraversion
2	Intuition and Sensing
3	Thinking and Feeling
4	Judging and Perceiving

2. Personality Types Data
   Within the MBTI expert system, personality types are categorized based on the four opposing tendencies. Table 2. Presents various personality types.

Table 2. Various Personality Types

No	Personality Type
1	INTJ
2	INTP
3	INFJ

4	INFP
5	ISTJ
6	ISFJ
7	ISTP
8	ISFP
9	ENTJ
10	ENTP
11	ENFJ
12	ENFP
13	ESTJ
14	ESFJ
15	ESTP
16	ESFP

3. Personality Tendency Question Data
The MBTI expert system involves asking individuals several questions related to their personality tendencies. Table 3. Showcases the questions used in the expert system based on personality tendencies.

Table 3. Questions for Each Personality Tendency

Tendency	Questions
Introversion	1) Do you feel drained of energy after being in a crowded crowd? 2) Do you feel calmer and more comfortable when you are somewhere not crowded? 3) Do you prefer talking to one or two close people rather than many? 4) Do you tend to consider and reflect before speaking? 5) Do you feel more open to talking via text message than in person? 6) Do you enjoy spending time alone at home? 7) Do you feel more comfortable talking to close friends than people you just met?
Extroversion	1) Do you like hanging out with lots of friends at social events? 2) Do you feel more energized when you are in a crowd? 3) Do you often look for activities that involve a lot of social interaction? 4) Do you feel happy when there is a lot of social interaction in a day? 5) Do you like discussing in large groups about interesting topics?

	6) Do you feel more enthusiastic in activities that involve lots of people? 7) Do you feel recharged when interacting with lots of people?
Intuition	1) Do you prefer to think about abstract concepts and big ideas? 2) Do you often imagine about the future and what might happen? 3) Do you enjoy talking about big ideas and creative ideas? 4) Do you feel better when you think about future possibilities and opportunities? 5) Do you like to plan your future carefully? 6) Do you enjoy untested ideas and speculation? 7) Do you enjoy drawing long-term plans?
Sensing	1) Do you tend to focus more on details and concrete facts? 2) Do you like finding information through direct experience and observation? 3) Would you rather face a situation you already know about than an unknown one? 4) Do you focus more on things you can see, hear, or touch? 5) Do you tend to feel more comfortable with concrete information that already exists? 6) Do you tend to rely on existing data and evidence? 7) Do you prefer to take actions based on previous experiences?
Thinking	1) Do you tend to make decisions based on logic and analysis? 2) Do you often try to understand problems from an objective point of view? 3) Do you tend to judge other people's decisions based on common sense? 4) Do you like giving advice based on logic and rationality? 5) Do you often weigh the pros and cons before making a decision? 6) Do you tend to focus on facts and evidence when arguing? 7) Do you prefer to keep your emotions to yourself?
Feeling	1) Do you feel it is important to stick to personal principles and values in decision making? 2) Do you tend to avoid conflict and try to keep the peace? 3) Do you feel better when you can express your emotions openly? 4) Do you often find it difficult to control your emotions in challenging situations? 5) Would you rather make a decision that will benefit many people rather than one person? 6) Do you feel it is important to consider other people's feelings in decision making? 7) Do you often try to find a solution that will make everyone happy?
Judging	1) Do you like to plan your activities carefully? 2) Do you feel better when you have a structured schedule? 3) Do you tend to complete assignments before the deadline?

	4) Do you feel stressed if your plans are disrupted? 5) Do you like making to-do lists and long-term goals? 6) Do you tend to have consistent routines and habits?
Perceiving	1) Do you tend to be flexible and open to change? 2) Do you like going through the day without any special plans? 3) Are you comfortable with uncertainty and change in life? 4) Do you enjoy adapting to sudden changes? 5) Would you prefer to live life without a strict plan? 6) Do you feel better when you can make decisions spontaneously?

4. Determination of Tendency
   Rule 1
   IF I>E THEN I = 1 ELSE E = 1
   Rule 2
   IF N>S THEN I = 1 ELSE S = 1
   Rule 3
   IF T>F THEN T = 1 ELSE F = 1
   Rule
   IF J>P THEN J = 1 ELSE P = 1

5. Determination of Personality Type
   Rule 1
   IF I=1 AND N=1 AND T=1 AND J=1 THEN Personality INTJ
   Rule 2
   IF I=1 AND N=1 AND T=1 AND P=1 THEN Personality INTP
   Rule 3
   IF I=1 AND N=1 AND F=1 AND J=1 THEN Personality INFJ
   Rule 4
   IF I=1 AND N=1 AND F=1 AND P=1 THEN Personality INFP
   Rule 5
   IF I=1 AND S=1 AND T=1 AND J=1 THEN Personality ISTJ
   Rule 6
   IF I=1 AND S=1 AND F=1 AND J=1 THEN Personality ISFJ
   Rule 7
   IF E=1 AND S=1 AND F=1 AND P=1 THEN Personality ISFP
   Rule 8
   IF E=1 AND S=1 AND T=1 AND P=1 THEN Personality ISTP
   Rule 9
   IF E=1 AND N=1 AND T=1 AND J=1 THEN Personality ENTJ
   Rule 10
   IF E=1 AND N=1 AND T=1 AND P=1 THEN Personality ENTP
   Rule 11
   IF E=1 AND N=1 AND F=1 AND J=1 THEN Personality ENFJ
   Rule 12
   IF E=1 AND N=1 AND F=1 AND P=1 THEN Personality ENFP
   Rule 13
   IF E=1 AND S=1 AND T=1 AND J=1 THEN Personality ESTJ
   Rule 14
   IF E=1 AND S=1 AND F=1 AND J=1 THEN Personality ESFJ
   Rule 15
   IF E=1 AND S=1 AND F=1 AND P=1 THEN Personality ESFP
   Rule 16
   IF E=1 AND S=1 AND T=1 AND P=1 THEN Personality ESTP

3.3. System Design

After designing the MBTI Expert System's knowledge base using the forward chaining method in the inference engine.

1. Flowchart
   The flowchart in Figure 3. displays and describes how the MBTI expert system operates using the forward chaining method.

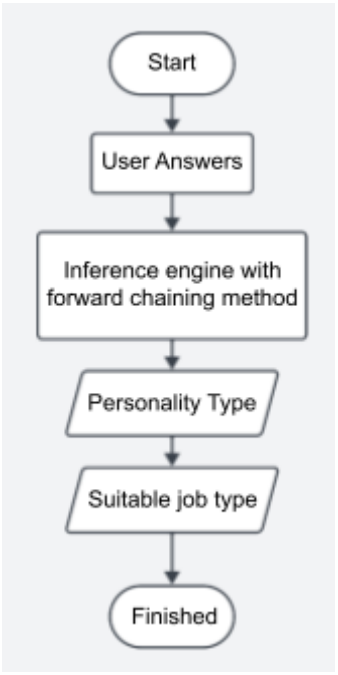

Figure 3. MBTI Expert System Flowchart

2. Use Case Diagram
   Figure 4. Describes the system's process flow in the MBTI expert system.

Figure 4. MBTI Expert System Use Case Diagram

3.4. System Implementation

1. Main Page Display

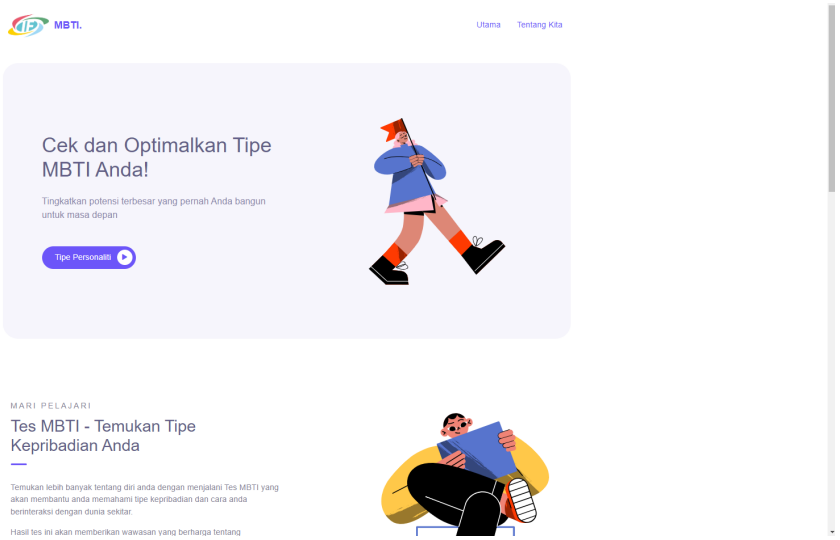

Figure 5. MBTI Website Main Page

The main page provides explanations for various personality types, allowing users or students to understand the details of each personality.

2. Question Page Display

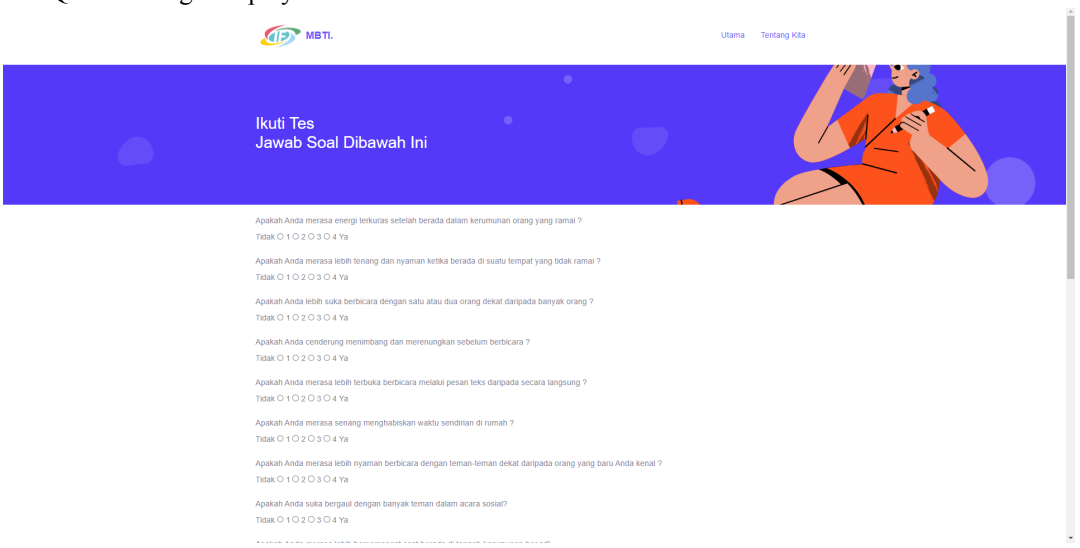

Figure 6. MBTI Website Test Page

The question page is used to display the test questions that users or students will answer. The user's responses are stored and processed using the inference engine to determine the user's personality type.

3. Result Page Display

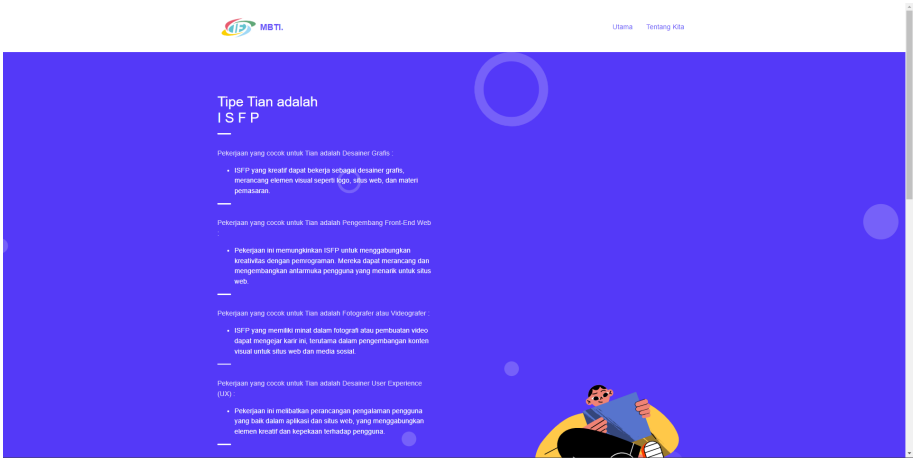

Figure 7. MBTI Website Result Page

The result page provides comprehensive information about the user's personality based on the previously conducted MBTI test. If the personality type is "ISFP," the user will see job recommendations suitable for that personality type. Job descriptions are also displayed to enhance the user's understanding of those recommended occupations. The application of the forward chaining method in the expert system ensures that the decision outcomes align with the user's input.

4. Conclusion

From the results and discussions conducted, it can be concluded that the implementation of the Myers-Briggs Type Indicator (MBTI) test through a website platform using the forward chaining algorithm approach successfully responds to user inputs and generates accurate decisions on personality types and relevant job recommendations in the field of informatics.

Thus, this research has positive implications, especially in assisting informatics students in understanding their personality types and providing guidance for decision-making in further studies and careers. In the future, it is hoped that this MBTI test website will become a useful tool in providing career guidance and has the potential to be applied more broadly within the entire university program or for individuals across various segments of society.

References

[1] Joseph A. Sugihdharma1 , Fitra A. Bachtiar2. Myers-Briggs Type Indicator Personality Model Classification in English Text using Convolutional Neural Network Method . Jurnal Ilmu Komputer dan Informasi (Journal of Computer Science and Information). 15/2 (2022), 93-103. DOI: http://dx.doi.org/10.21609/jiki.v15i2.1052.

[2] A. Eiji and S. Mehta, “Simulation-Based 5G Femtocell Network System Performance Analysis,” *Int. J. Cyber IT Serv. Manag.*, vol. 3, no. 1, pp. 74–78, 2023.

[3] U. Rahardja, Q. Aini, P. A. Sunarya, D. Manongga, and D. Julianingsih, “The Use of TensorFlow in Analyzing Air Quality Artificial Intelligence Predictions PM2. 5,” *Aptisi Trans. Technopreneursh.*, vol. 4, no. 3, pp. 313–324, 2022.

[4] Oktian Dwi Pradana Putra 1); Khairil2); Ilayati Bet. Jurnal Komputer Indonesia, Vol. 1 No. 2 Juli-Desember 2022page: 73–80| 73Application of the Myers-Birggs Type Indicator Method in the Member Personality Test Application (Case Study: Bengkulu Regional Police Mobile Brigade Corps). Jurnal Komputer Indonesia. Vol. 1 No. 2 Juli-Desember 2022page: 73–80. http://jurnalunived.com/index.php/JKI/article/view/21

[5] T. Raharjo, “A Model of Critical Success Factors for Agile Information Technology Project in Indonesia using Analytic Hierarchy Process (AHP),” *ADI J. Recent Innov.*, vol. 5, no. 1Sp, pp. 68–77, 2023.

[6] P. A. Sunarya, “The Impact of Gamification on IDU (ILearning Instruction) in Expanding Understudy Learning Inspiration,” *Int. Trans. Educ. Technol.*, vol. 1, no. 1, pp. 59–67, 2022.

[7] Wisnu Agung Laksono1), Yuli Astuti. Metode Myer Briggs Type Indicator(Mbti) Untuk Teskepribadian Sebagai Media Pengembangan Diri. (StudiKasus: SMA N 2 Kebumen). JOISM :

Jurnal Of Information System Management. 1, No. 2 (2020). https://jurnal.amikom.ac.id/index.php/joism/article/view/443/205

[8] A. Cahyono and Y. D. Nurcahyanie, "Identification and Evaluation of Logistics Operational Risk Using the Fmea Method at PT. XZY," *Aptisi Trans. Technopreneursh.*, vol. 5, no. 1Sp, pp. 1–10, 2023.

[9] Indah Wahyuni, 2Oktaviani, 3Eka Fitri Rahayu. Sistem Pakar Menggunakan Metode Forward Chaining Dan Metode Myer Briggs Type Indicator (MBTI) Untuk Menentukan Kepribadian Calon Mahasiswa. ICIT Journal. Feb 2023 Vol 9 No 1. https://ejournal.raharja.ac.id/index.php/icit/article/view/2643/1584

[10] T. A. D. Lael and D. A. Pramudito, "Use of Data Mining for The Analysis of Consumer Purchase Patterns with The Fpgrowth Algorithm on Motor Spare Part Sales Transactions Data," *IAIC Trans. Sustain. Digit. Innov.*, vol. 4, no. 2, pp. 128–136, 2023.

[11] Erni Karyati Pengembangan Tes Kepribadian Metode Mbti Untuk Mahasiswa Psikologi Universitas Gunadarma, Technologia"Vol 13, No. 2, April 2022 https://ojs.uniska-bjm.ac.id/index.php/JIT/article/download/6686/3682

[12] M. H. R. Chakim, M. A. D. Yuda, R. Fahrudin, and D. Apriliasari, "Secure and Transparent Elections: Exploring Decentralized Electronic Voting on P2P Blockchain," *ADI J. Recent Innov.*, vol. 5, no. 1Sp, pp. 54–67, 2023.

[13] A. Gunawan and R. K. Hudiono, "Industrial Revolution 4.0's Information Technology's Impact on the Growth of MSMEs in the Manufacturing Industries Sector," *Int. Trans. Educ. Technol.,* vol. 1, no. 2, pp. 157–164, 2023.

[14] Arif Kun Nurwanto Putro1, Wiwin Winarti. Perancangan Mini Test Psikologi Berbasis Komputer Menggunakan Python Dengan Metode MBTI(Myers Briggs Type Indicator).BULLET : Jurnal Multidisiplin IlmuVolume 1, No. 4, Agustus-September 2022(media online) Hal 572-579. https://journal.mediapublikasi.id/index.php/bullet/article/view/820/332

[15] R. Widayanti, M. H. R. Chakim, C. Lukita, U. Rahardja, and N. Lutfiani, "Improving Recommender Systems using Hybrid Techniques of Collaborative Filtering and Content-Based Filtering," *J. Appl. Data Sci.*, vol. 4, no. 3, pp. 289–302, 2023.

[16] N. Putri and L. Meria, "The Effect of Transformational Leadership on Employee Performance Through Job Satisfaction and Organizational Commitment," *IAIC Trans. Sustain. Digit. Innov.*, vol. 4, no. 1, pp. 8–21, 2022.

[17] Darmansah*1, Ilham Chairuddin2, Tomy Nanda Putra.Perancangan Sistem Pakar Jenis Kepribadian Menggunakan Metode Forward Chaining Berbasis Web . Jurnal Teknik Informatika dan Sistem Informasi. Vol. 8, No. 3, September 2021, Hal. 1200-1213 https://jurnal.mdp.ac.id/index.php/jatisi/article/view/1033/377

[18] A. Dudhat and T. Mariyanti, "Indoor Wireless Network Coverage Area Optimization," *Int. J. Cyber IT Serv. Manag.*, vol. 2, no. 1, pp. 55–69, 2022.

[19] O. Candra et al., "Energy simulation and parametric analysis of water cooled thermal photovoltaic systems: energy and exergy analysis of photovoltaic systems," *Sustainability*, vol. 14, no. 22, p. 15074, 2022.

[20] Rancang Model Expert System Pada Diagnosa Penyakit Diabetes Melitus Dengan Metode Forward Chaining,Diah Arifah P 1 , Laila Isyriyah 2, https://jurnal.unmer.ac.id/index.php/jtmi/article/view/5930/pdf_1