EXPERT SYSTEM TO IDENTIFY STUDENTS BEHAVIOR AND PERSONALITY IN SMK NEGERI 2 TANGERANG

Fifit Alfiah[1]; M. Arba Adnandi[2], Allyufi Fazril Rasyidin[3]

Informatics Engineering [1], Masters in Informatics Engineering [2,3]
Universitas Raharja, Tangerang, Indonesia
https://raharja.ac.id/
fifitalfiah@raharja.info[1], arba@raharja.info[2], allyufi@raharja.info[3]

Abstract—*The number of problems in learning activities such as personality and student behavior is not good towards the teacher or there are still many students who are confused about their personality in deciding to continue their college studies with majors in accordance with their education or personality. So the authors aim to create an expert system that can help teachers in counseling and students in determining personality and behavior both for students who are not good or to determine in continuing college studies with one of the knowledge that can help humans in making decisions, namely the expert system. The expert system is one part of artificial intelligence that contains knowledge and experience that is input into the knowledge base. In designing this expert system, the author uses the forward tracking technique method (forward chaining) because in solving the problem is done by collecting data then a conclusion is drawn. The results of this expert system can help psychology teachers or counseling guidance in analyzing student behavior to improve quality human resources by testing diagnoses of student behavior and personality with the application of expert systems to produce solutions that meet their needs with a percentage above 90%.*

Key word: Expert System, Forward Chaining, Identification, Behavior, Personality.

Intisari— Banyaknya permasalah dalam kegiatan pembelajaran seperti kepribadian dan perilaku siswa yang kurang baik terhadap guru maupun masih banyaknya siswa yang bingung dalam kepribadiannya dalam menentukan untuk melanjutkan studi kuliah dengan jurusan sesuai dengan pendidikannya atau kepribadiannya. Maka penulis bertujuan untuk membuat salah satu sistem pakar yang dapat membantu guru bidang konseling dan siswa dalam menentukan kepribadian dan perilaku baik untuk siswa yang kurang baik maupun untuk menentukan dalam melanjutkan studi kuliah dengan salah satu pengetahuan yang dapat membantu manusia dalam menentukan keputusan yaitu sistem pakar. System pakar adalah satu bagian dari kecerdasan buatan yang mengandung pengetahuan dan pengalaman yang di masukan ke dalam basis pengetahuan. Dalam perancangan sistem pakar ini, penulis menggunakan metode teknik inferensi pelacakan ke depan (*forward chaining*) karena dalam pemecahan masalahnya dilakukan dengan mengumpulkan data kemudian ditarik sebuah kesimpulan. Hasil dari sistem pakar ini mampu membantu guru psikologi atau Bimbingan Konseling dalam menganalisis perilaku siswa untuk meningkatkan sumber daya manusia yang berkualitas dengan melakukan pengujian diagnose dari perilaku dan kepribadian siswa dengan aplikasi sistem pakar hingga menghasilkan solusi yang sesuai kebutuhannya dengan persentase diatas 90%.

Kata Kunci: Sistem pakar, forward chaining, identifikasi, perilaku, kepribadian.

INTRODUCTION

The need for a computerized system today covers all fields including the world of education. Because education plays a very important role in creating quality human resources. One of the knowledge that can help humans in making decisions is the expert system (Triyanto & Fadlil, 2014). Expert systems are implemented to support problem-solving activities. These include: decision making, knowledge fusing, designing, planning, forecasting, regulating, controlling, diagnosing, prescribing, explaining, advising and tutoring (Heri Nurdiyanto & Putut Hasto Kuncoro, 2017).

SMK Negeri 2 Kota Tangerang is one of the institutions engaged in the field of education. In Principle SMK Negeri 2 Kota Tangerang always strives to provide the best learning in accordance

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify…*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018

with needs, including giving direction to students in controlling self-behavior and good personality in the school environment (Putra, Puspitasari, & Rahutomo, 2016). State Vocational School 2 Tangerang City which has organized the learning and teaching process in a long period of time, State Vocational School 2 Tangerang City provides a quality direction for students and students namely by the Expert System to Identify Student Behavior and Personality in State Vocational School 2 Tangerang. With the existence of this expert system, students hope to be able to control themselves in good behavior and personality, so that they can stimulate the development of students in the learning process because Personality is very important for everyone to know so that each individual is able to develop their strengths (Indah, Anton, & Radiyah, 2018).

Given the above problems, an expert or expert in identifying the behavior and characteristics of students in the development of learning programs is needed to do, namely to find out the quality and ability of individuals so that it can be used as a guide in learning management strategies (Iswahyudi & Sholeh, 2015). So as to know the character of these students, namely talent, motivation to learn, learning styles, thinking abilities, interests and initial abilities. Therefore the need for an expert system that is expected to help in analyzing student behavior to improve quality human resources and also the quality of student learning at school (Akil, 2017).

MATERIALS AND METHODS

In this section the author will discuss the research methods used by the author in the expert system, including the following:

A. Forward Chaining

In designing this expert system, the author uses forward chaining inference techniques because in solving the problem(Fauzi, 2018) done by collecting data then a conclusion is drawn.

B. Inference Engine

The inference machine has a role as the brain of an expert system that has a mechanism of thinking function and the placement of patterns of reasoning systems used by an expert (Ongko, 2014).

Where these mechanisms serve to guide the reasoning process for a condition. In the inference engine, there is a process to manipulate and direct the rules, models, and facts stored in the knowledge base in order to reach a solution or conclusion will analyze a particular problem and then will seek answers.

C. SWOT Analysis

To clarify the position of educational institutions and the role and function of information technology, the position of educational institutions will be mapped in the form of a SWOT matrix, which will be seen as a combination of the use of strengths to seize opportunities, overcome weaknesses by taking opportunities, use strengths to avoid threats, minimize weaknesses and avoid threats:

Table 1 SWOT Analysis

Internal factors / External Factors	*Strength* 1. Human Resources with information technology 2. There is no agreement on all members involved	*Weakness* 1. Human Resources with information technology 2. There is no agreement on all members involved
Opportunity 1. Available information technology tools (facilities and , infrastructure) 2. An affordable educational networking environment 3. There are educational support institutions 4. Supporting natural resources	SO Strategy The superior human resources, the available funds and the approval of all members is a force that can seize the opportunity to provide facilities and infrastructure, provide existing natural resources. This situation suggests that educational institutions use the power to take advantage of opportunities	WO Strategy Poor human resources and, without the approval of the members, are weaknesses that result in not being able to seize opportunities in the form of facilities and infrastructure, supporting educational institutions and adequate natural resources. The state of educational institutions is advised to take advantage of existing opportunities by minimizing existing weaknesses
Thread 1. Educational environment that is not reached by networking 2. There are no educational support institutions	ST Strategy Superior human resources and, the approval of all members is a force but is threatened by the environment in	WT Strategy Poor human resources and, no approval from members is a weakness that is exacerbated by threats from the environment in the form of

| 3. Non-supporting natural resources | the form of facilities and infrastructure that is not available, related institutions do not support, inadequate natural resources. The state of educational institutions is advised to use their strength to avoid threats | facilities and infrastructure that are not available, do not get support from the relevant environment, natural resources are not available. The state of educational institutions is suggested to be defensive and try to minimize existing weaknesses and avoid threats |

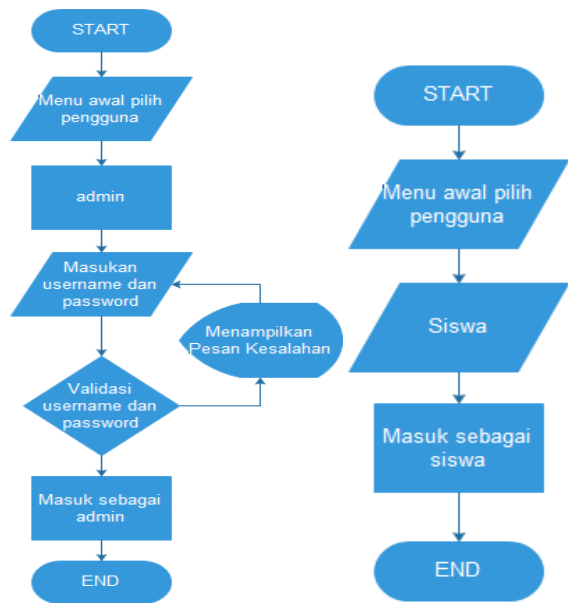Source: (Alfiah et al., 2015)

RESULTS AND DISCUSSION

A.   System Design Flowchart

The Flowchart of the proposed system design, which will describe the system processes that will be proposed are as follows:
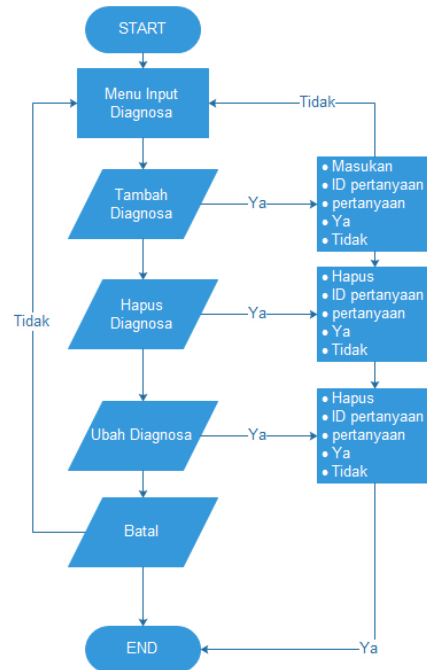
1.   Login Process Flowchart

Flowchart which describes the steps taken by experts in the Login process

Source: (Alfiah et al., 2015)
Figure 1 Admin and Student Flowchart Login

2.   Diagnosis Menu Input Flow Diagram

A flowchart which reviews the steps taken by the expert to carry out the agreed, amendments, release diagnostic data on the application

Source: (Alfiah et al., 2015)
Figure 2 Diagnosis Input Menu Flowchart

3. Input Menu Flowchart Solution

A flowchart which describes the steps taken by experts to make additions, changes, deletions, deletions of data in the application
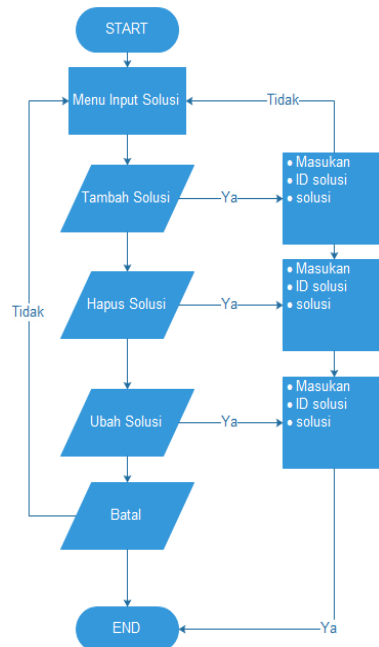
Source: (Alfiah et al., 2015)
Figure 3 Flowchart Input Menu Solution

4. Start Diagnosis Flowchart

A flowchart which describes the steps taken by experts and students to diagnose the application

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018
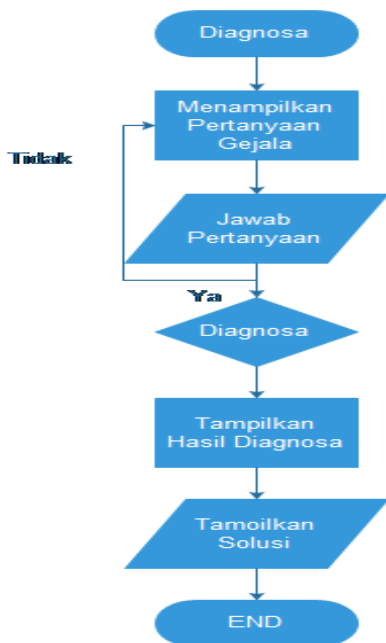
Source: (Alfiah et al., 2015)
Figure 4 Flowchart Start Menu Diagnosis

B. Data Flow Analysis

This expert system data flow analysis which consists of the analysis of decision tables, the formation of rules and Production Rules. In the decision table analysis, there are decision tables, symptom tables, diagnostic tables, and solution tables. Table data was obtained from various sources of information from interviews with experts, and existing journals. So that this becomes the (Knowledge Base) knowledgebase included in making this expert system.

C. Decision Table Analysis

Decision tables are used as a reference in the formation of rules and rules that are used. Following the decision table on the expert system of identifying student personality and behavior

Table 2 Decision Table

Symptom Code	Diagnosis Code					
	D001	D002	D003	D004	D005	D006
G001	*					
G002	*					
G003	*			*		
G004	*	*		*		
G005			*			
G006					*	*
G007		*				
G008				*		
G009					*	
G010		*				
G011	*					

						G012					*

| Code | | | | | | G012 | | | | | |

| G012 | | | | | | | | | * |
| G013 | | | | | | | | | * |

Source: (M. Arba Adnandi, 2015)

Table 3 Diagnostic Table

Diagnosis Table	
Code	Diagnosis
D001	Visual Perception Disorders
D002	Auditory Perception Disorders
D003	Language Learning Disorders
D004	Motor Perceptual Disorders
D005	Hyperactivity
D006	Disorder (distractibility)

Source: (M. Arba Adnandi, 2015)

Table 4 Symptoms Table

Symptoms Table	
Code	The symptoms
G001	Do you see letters or numbers in a different position than what is written?
G002	Do you often lag behind letters when writing? Examples of writing words in the wrong order for example mother is written yam?
G003	Do you find it difficult to distinguish sounds: capture differently what is heard?
G004	Do you have difficulty understanding commands, especially several commands at once?
G005	Are you having trouble understanding and grasping what people are saying to you?
G006	Do you find it difficult to coordinate and say what is being thought?
G007	Do you have problems in coordination and disorientation that result in awkwardness and rigidity in movement?
G008	Are you having trouble using tools like computers etc.?
G009	Are you always unable to stay still, or always moving?
G010	Are you always moving - moving tasks from one task to another without completing it?
G011	Are you unable to distinguish important and unimportant?
G012	Are you disorganized because you don't have sequences in the thought process?
G013	Do you often pay attention that is different from what is being done?

Source: (M. Arba Adnandi, 2015)

Tabel 5. Tabel Solusi

	Solution Table						
Code	The solution	D001	D002	D003	D004	D005	D006

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018

S 0 0 1	As often as possible to practice memorizing the alphabet, read then write back what is after being read, so that it can train memory and train the hands to match when writing.	*
S 0 0 2	Try it as often as possible to communicate with family and friends, and learn to read a lot so that it can help your memory become better.	*
S 0 0 3	Practice communicating with people around you, or if you are embarrassed to learn to speak in front of a mirror to practice communication well	*
S 0 0 4	Try to observe the situation around you and follow what others are doing. Example: dancing, gymnastics and so on who do bodybuilding exercises.	*
S 0 0 5	It is better for you to adjust your movement activities for more benefits if you are a hyperactive person you should need self-control. Use your energy and mind as well as possible and finish first what you do then finish later in the sequence, so you will use energy for something useful.	*
S 0 0 6	In this case, you should make a schedule or plan on a daily basis. So you can determine the sequence that must be done so that it can be completed properly. And by making a plan will determine the goal, whereby making a plan you can determine the steps in the direction of the final goal (goal).	*

Source: (Alfiah et al., 2015)

D. Decision tree analysis

Decision tree analysis is a design used to build an expert system. In the decision tree diagram, the final solution for each search will be found. Decision tree diagrams make it easier to compile a knowledge base and rules for each

diagnostic diagnosis of student personality and behavior.
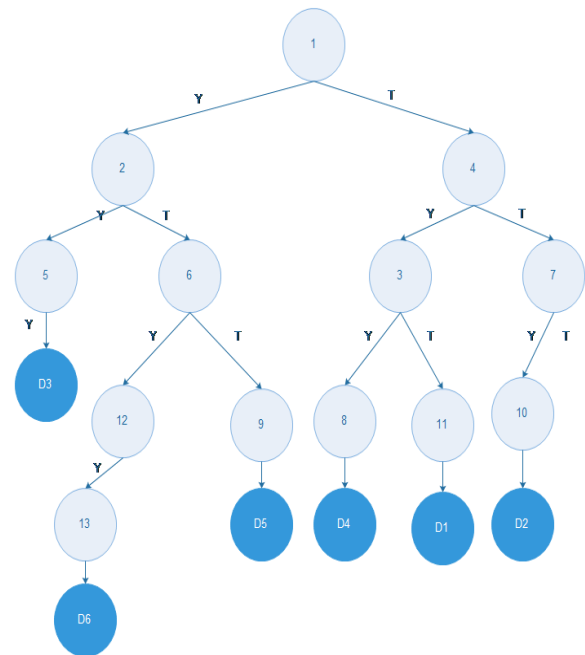
Source: (M. Arba Adnandi, 2015)
Figure 5 Decision Tree

Keterangan:

Source: (Alfiah et al., 2015)

E. Implementation and Testing

Implementation of Expert System application program Identification of personality and behavior of students is done using the Black box Testing method. Black box Testing Method is a testing program that prioritizes testing of the functional needs of a program. The purpose of the Black box Testing method is to find malfunctions in the program.

Testing with the Black box Testing method is done by giving a number of inputs to the program. The input is then processed according to its functional requirements to see whether the application program can produce output that is in accordance with the desired and in accordance with the basic functions of the program. If from the input provided, the process can produce output that is in accordance with its functional needs, then the program created is correct, but if the output produced is not in accordance with its functional needs, there are still errors in the program, and then tracing improvements to correct errors that happened.

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018

1. Black box Testing On the application login page

Table 6 Black box Testing Table On the application's Login page

No	Testing Scenarios	Test Case	Conclusion
1	Fill in your username and password then click "Login"	Figure 6	*Valid*
2	Main Page System	Figure 7	*Valid*
3	Open the Start Diagnosis form	Figure 8	*Valid*
4	Display the diagnostic input form	Figure 9	*Valid*
5	Displays the Solution input form	Figure 10	*Valid*
6	Displays admin input form	Figure 11	*Valid*
7	Respond to the "Yes" Message in the "Logout" Message	Figure 12	*Valid*

Source: (Alfiah et al., 2015)

The following is evidence of the implementation and testing of Black Box from an expert system:

Source: (Alfiah et al., 2015)
Figure 6 Login Menu

Based on Figure 6 above, it proves that if the username and password are blank, a warning will appear to enter the correct username and password.

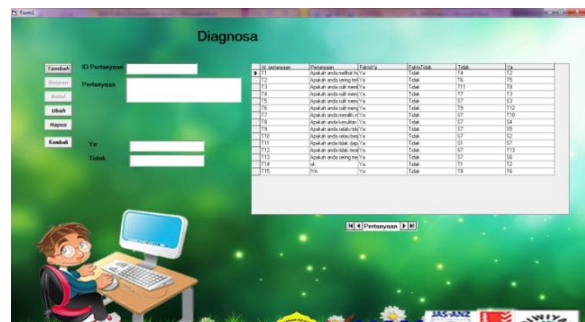Source: (Alfiah et al., 2015)
Figure 7 Main page

Based on Figure 7 above proves valid testing if successful entering the correct username and password on the login form will successfully enter the homepage.

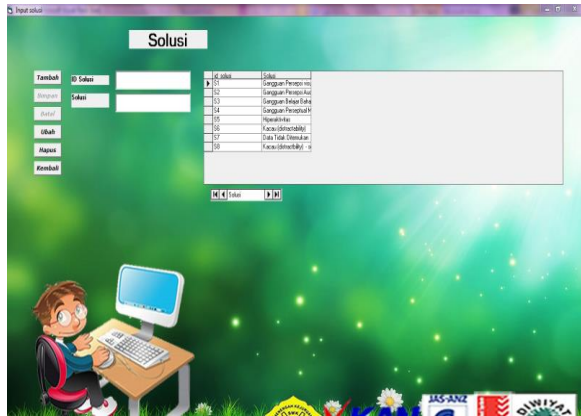Source: (Alfiah et al., 2015)
Figure 8 Opening form for diagnosis

Based on Figure 6 above above to begin the form of successful diagnosis

Source: (Alfiah et al., 2015)
Figure 9 displays the diagnostic input form

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018

Based on Figure 9 above, the system has successfully displayed the form of the results of all diagnostic inputs.

Source: (Alfiah et al., 2015)

Figure 10 Displays the Solution input form

Based on Figure 10 the system tested has successfully displayed an input form for the solution as admin or teacher BK permissions.
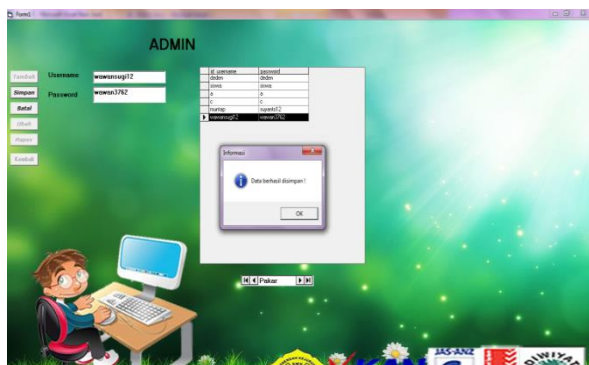
Source: (Alfiah et al., 2015)

Figure 11 displays the admin input form

Based on Figure 11 above the system that was tested has successfully displayed a special input form admin or BK teacher

Source: (Alfiah et al., 2015)

Figure 12 Respond to the "Yes" Message in the "Logout" Message

Based on Figure 12 above, the tested system can log out and display the front page of the system again.

CONCLUSION

The conclusion of the research Expert System to Identify Behavior and Personality of students at SMK Negeri 2 Tangerang in class X majoring in TPHP (Agricultural Product Processing Technology), namely learning and teaching activities at SMKN 2 Tangerang is now getting better with the Expert Identification System and Personality Behavior of students, of course, this is very helpful for students in helping to provide direction and motivation and also helps teachers in dealing with students with problems and makes it easy for students to do counseling without having to fill out class questions.

REFERENCES

Akil, I. (2017). Analisa Efektifitas Metode Forward Chaining Dan. *Jurnal Pilar Nusa Mandiri*, *13*(1), 35–42.

Alfiah, F., Adnandi, M. A., & Rasyidin, A. F. (2015). *Laporan Akhir Penelitian: Sistem Pakar Untuk Mengidentifikasi Perilaku Dan Kepribadian Siswa Pada Smk Negeri 2 Tangerang*. *M. Arba Adnandi*. Tangerang.

Fauzi, M. (2018). Sistem Pakar Mendeteksi Kerusakan Keyboard Menggunakan Metode Forward Chaining, *2*(1), 96–101.

Indah, D. P., Anton, & Radiyah, U. (2018). Sistem pakar deteksi karakteristik dan kepribadian diri menggunakan metode forward chaining. *JIMP - Jurnal Informatika Merdeka Pasuruan*, *3*(1), 34–43.

Iswahyudi, C., & Sholeh, M. (2015). Sistem Pakar Untuk Menentukan Kepribadian Seseorang, (35).

Ongko, E. (2014). Perancangan Sistem Pakar Diagnosa Penyakit Pada Balita. *Jurnal Time*, *II*(1), 1–5. https://doi.org/10.1007/s13398-014-0173-7.2

Putra, D. H., Puspitasari, D., & Rahutomo, F. (2016). Pengembangan Sistem Penentuan Unit Kerja Karyawan Pada PT . Aneka Mode Indonesia Berdasarkan Psikotest Menggunakan Metode

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018

Forward Chaining.

Triyanto, S., & Fadlil, A. (2014). Sistem Pakar Untuk Mendiagnosa Penyakit Kelinci Berbasis Web. *Jurnal Sarjana Teknik Informatika*, *1*(3), 1–13.

P-ISSN: 1978-2136 | E-ISSN: 2527-676X | *Expert System For Identify...*
Techno Nusa Mandiri : Journal of Computing and Information Technology
As an Accredited Ranking Journal 4 base on SK Dirjen Risbang SK Nomor 21/E/KPT/2018