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Application of Expert Systems to Determine I'rob Signs in a Kalimah Using the Forward Chaining Method

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Abstract

The existence of technology that is increasingly developing the teaching and learning process will be more efficient and maximized, by presenting an effective and fun learning method so that students or students will be more enthusiastic in learning. The Nasyrul Ulum Islamic Boarding School is one of the salafy Islamic boarding schools located in Modangan village, Nglegok District. In the Islamic boarding school environment, students are required to be able to read the yellow book or kitap without harokat. To find out the harokat, students must first understand the knowledge of nahwu so that we need a system that can help easily understand the science of nahwu, especially the signs of I'rob. The results to be obtained from this research are in the form of an expert system application to determine the I'rob sign by applying the Forward Chaining method. This application is expected to help and make it easier for students and application users to determine or understand the signs of I'rob in a sentence. From the results of expert validation testing by testing 51 rules and with 10 case examples, 100% valid data was obtained from experts who were familiar with the knowledge of nahwu chapter 'alamatil I'rob by paying attention to the adjustment of certain explanations.
Keywords: applications, expert systems, irob, forward chaining.

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1. INTRODUCTION

Nahwu science is the knowledge that is used to read and interpret the yellow book. A very basic and important discussion chapter in nahwu lies in the I'rob chapter, where I'rob is one of the foundations in learning the science of nahwu. Pondok Pesantren Nasyrul Ulum is one of the Islamic boarding schools in Blitar Regency, East Java Province which requires students to understand the science of nahwu, especially the sign of I'rob. However, some students still have difficulty knowing or understanding the chapter of I'rob, especially when looking for the signs.

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Based on these problems, there is a solution by making an application that can help students find and understand the I'rob sign. This application is made using a web programming language by implementing an expert system and using the forward chaining method for the flow of the system. Based on this description, the writer takes the title "Application of Expert Systems to Determine the Signs of I'rob Using the Forward Chaining Method".

2. RESEARCH METHODS

2.1. Expert System

Expert systems are systems that try to adopt human knowledge to computers, so that computers can solve problems as experts can. With this expert system, even ordinary people can solve quite complex problems which in fact can only be solved with the help of experts (Kusumadewi,2003). [1]

2.2. Forward chaining method

According to Irawan (2005). The forward chaining method is a method of the inference engine to start reasoning or tracking data from existing facts to a conclusion. [2]

According to Wilson in Kusrini (2005) the forward chaining method is a method that uses a set of conditions-action rules. In this method, the interpreter convention matches the facts or statements in the database with the situations stated on the left side of the if rules. [3]

2.3. I’rob

I'rob is a change of the final kharokat in the sentence isim or fi'il which is caused by the amil-amil that is included in the sentence. Isim or fi'il that can change kharokat is finally called Mu'rob, while isim or fi'il that cannot change the sentence is finally called Mabni (Abu Yusuf A J,2018).[4]

2.4. Flowchart

Flowcharts are problem-solving steps that are written in the form of certain symbols that will show the flow of a program logically. Besides being needed as a communication tool, this flow chart is also needed as a documentation tool (Lamhot Sitorus, 2015:14). [5]

2.5. DFD (Data Flow Diagram)

Data flow diagrams (data flow diagrams - DFD) are diagrams that use symbols to present entities, processes, data flows, and data storage associated with a system. Entities in DFD are external objects in the system being modeled (Dewi dan Arnos, 2007:79). [6]

2.6. ERD (Entity Relation Ship)

Entity Relationship Diagram (ERD) is a diagram used to design tables which will be implemented in the database. ERD is formed based on 3 elements, namely entities, attributes and relationships (Feri dan Fajri, 2015:100). [7]’

2.7. System planning

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1. Flowchart.

Figure 1 is a flowchart design of the application made

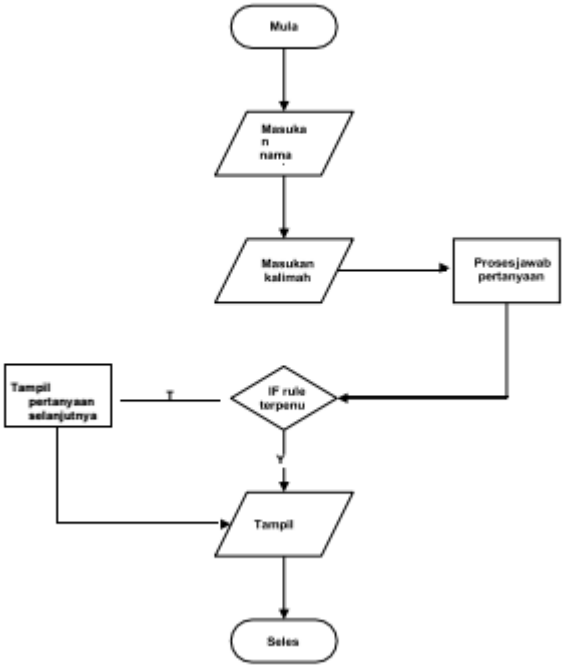

image 1 flowchart

DFD (*Data Flow Diagram*).

Figure 2 below is the DFD design of the application that was made.

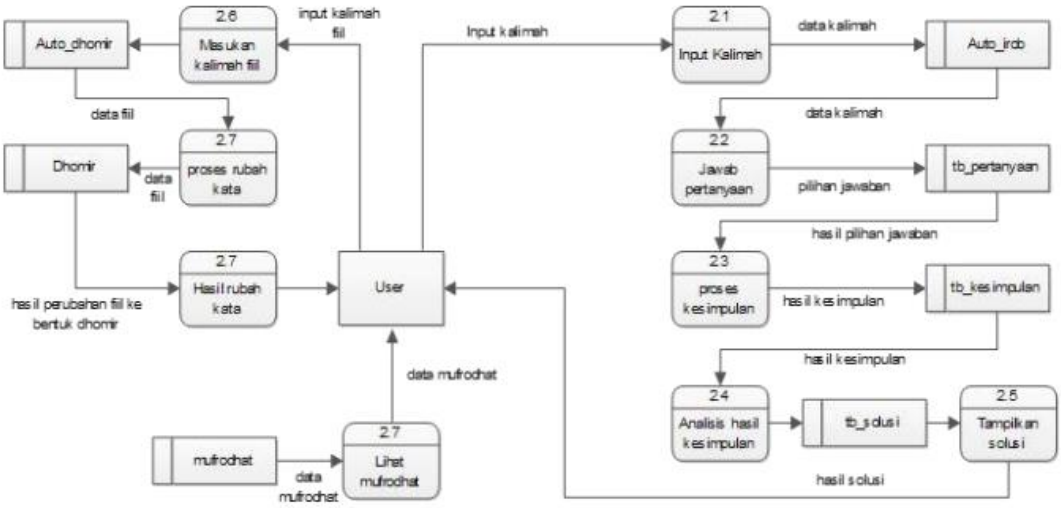

image 2 DFD *(Data Flow Diagram)*.

2. ERD (Entity Relationship Diagram).

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Figure 3 below is an ERD or database design that is used in compiling applications, there are several tables including question tables, conclusion tables, solution tables, autocomplete tables, and dhomir tables.

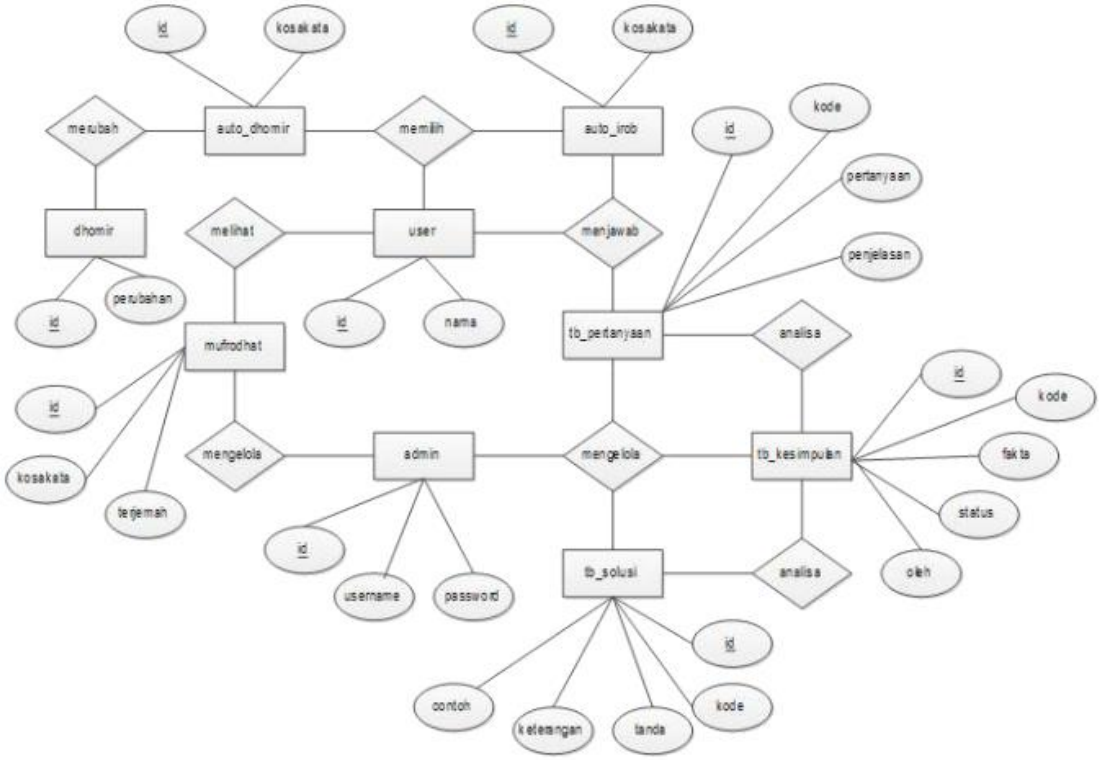

image 3 ERD (Entity Relationship Diagram).

3. RESULTS AND DISCUSSION

3.1. IMPLEMENTATION

a. Dashboard.

Figure 4 is the dashboard page when entering the application. The dashboard contains navigation buttons to start the system, calendar, number of mufrodhat or Arabic vocabulary, and several other features.

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image 4 dashboard.

b. Form input.

Figure 5 is a display of the input form of a sentence or Arabic word to start the expert system to determine the sign of I'rob. The sentence or word that is entered must be a fi'il sentence or verb. The form has provided several choices of sentences or words to make it easier to write them.

image 5 form input

c. Question page.

Figure 6 contains questions that are aimed at analyzing what I'rob signs correspond to the words entered. The question page contains questions, sentences or words that have been input, and an explanation of the questions given, with this explanation, can make it easier for users to understand the meaning of the questions asked.

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Image 6 question page

d. Solution page

Figure 7 contains the results of the analysis of the questions that have been answered along with the results of the I'rob sign, explanations and other examples of sentences that are the same as the results of the analysis that have been obtained, with the information and examples it is hoped that it can provide an understanding of the I'rob sign has been successfully analyzed.

Image 7 solution page

3.2. Expert validation testing.

Expert validation testing aims to obtain valid data from an expert. This test uses a questionnaire that contains the application flow or rules.

Table 1. Validation testing form

No	RULE										Output Sistem	Pakar
1	FL01	F01	R01	R02	R03	R04					A01	Sesuai
2	FL01	F01	R01	R02	R03	R04					A01	Sesuai
3	FL01	F01	R01	R02	R03	R04					A01	Sesuai
4	FL01	F01	R01	R02	R03	R04					A01	Sesuai
5	FL01	F01	R05	R06							A06	Sesuai
6	FL01	F01	R05	R06							A06	Sesuai
7	FL01	F01	R07								A05	Sesuai
8	FL01	F01	R08								A07	Sesuai
9	FL01	F01	R01	R02	R03	R04	R05	R06	R07	R08	Tidak ditemukan	Sesuai
10	FL01	F01	N01	N02	N03						A02	Sesuai
11	FL01	F01	N01	N02	N03						A02	Sesuai
12	FL01	F01	N01	N02	N03						A02	Sesuai
13	FL01	F01	N04								A05	Sesuai

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14	FL01	F01	N05								A03	Sesuai
15	FL01	F01	N06	N07							A08	Sesuai
16	FL01	F01	N06	N07							A08	Sesuai
17	FL01	F01	N08								A010	Sesuai
18	FL01	F01	N01	N02	N03	N04	N05	N06	N07	N08	Tidak ditemukan	Sesuai
19	FL01	F01	JZ01								A04	Sesuai
20	FL01	F01	JZ02	JZ03							A09	Sesuai
21	FL01	F01	JZ02	JZ03							A09	Sesuai
22	FL01	F01	JZ01	JZ02	JZ03						Tidak ditemukan	Sesuai
23	FL01	F04									A02	Sesuai
24	FL01	F04	W01								A01	Sesuai
25	FL01	F05	JZ01								A04	Sesuai
26	FL01	F05	JZ02	JZ03							A09	Sesuai
27	FL01	F05	JZ02	JZ03							A09	Sesuai
28	FL01	F05	JZ01	JZ02	JZ03						Tidak ditemukan	Sesuai
29	FL01	F01	F02	F03	F04	F05					Tidak ditemukan	Sesuai
30	H01	N01	N02	N03							A02	Sesuai
31	H01	N01	N02	N03							A02	Sesuai
32	H01	N01	N02	N03							A02	Sesuai
33	H01	N04									A05	Sesuai
34	H01	N05	N06	N07							A08	Sesuai
	RULE											
35	H01	N05	N06	N07							A08	Sesuai
36	H01	N05	N06	N07							A08	Sesuai
37	H01	N08									A10	Sesuai
38	H01	N01	N02	N03	N04	N05	N06	N07	N08		Tidak ditemukan	Sesuai
39	H02	J01	J02	J03							A03	Sesuai
40	H02	J01	J02	J03							A03	Sesuai
41	H02	J01	J02	J03							A03	Sesuai
42	H02	J04	J05	J06							A08	Sesuai
43	H02	J04	J05	J06							A08	Sesuai
44	H02	J04	J05	J06							A08	Sesuai
45	H02	J07									A02	Sesuai
46	H03	J01	J02	J03	J04	J05	J06	J07			Tidak ditemukan	Sesuai
47	H03	JZ01									A04	Sesuai
48	H03	JZ02	JZ03								A09	Sesuai
49	H03	JZ02	JZ03								A09	Sesuai
50	H03	JZ01	JZ02	JZ03							Tidak ditemukan	Sesuai
51	H01	H02	H03	FL01	F01	F02	F03	F04	F05		Tidak ditemukan	Sesuai

From the results of data validation rules that have been done by experts, 51 results are suitable and 0 results are not suitable out of 51 validated rules. Then the percentage of system suitability can be calculated using the following formula :

$$P = \left(\frac{x}{x_i}\right) \times 100\%$$

information :

P = percentage of system suitability.

x = Total score

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xi = Maximum score.

then the calculation of the percentage of system suitability is as follows:

51

P = (

51

) × 100%

= 100%

Based on the above test, the results of the system suitability percentage are very good with a rule validation percentage of 100%.

4. CONCLUSION

Based on the results of the research that has been done, it can be concluded that are as follows:

1. The system created is an expert system to determine the I'rob sign in a sentence. The application is made using the web programming language and MySQL database.
2. Beta test results using a questionnaire or questionnaire conducted to 10 users with the status of students can be concluded from the calculation of 3 aspects, namely the system design aspect obtained the highest value of 57.61% (Strongly Agree), the system suitability aspect is 59.41. % (Agree) and the aspect of ease of operation is 58.13% (Agree). Meanwhile, from the results of expert validation testing, there are 51 rules in accordance with the conformity percentage of 100%.

5. SUGGESTION

Based on the results of the above conclusions, there are the following suggestions:

1. Applications can be developed again with other development methods and programming languages.
2. The future application can be added to the Nahwu chapter in more detail and comprehensiveness.
3. Applications can be developed again by adding a feature change mark I'rob.

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