ANALYSIS OF THE ELECTRE METHOD IN DECISION SUPPORT SYSTEMS FOR DETERMINING AREAS OF EXPERTISE FOR INFORMATICS MANAGEMENT STUDY PROGRAM STUDENTS

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Abstract

Article Info	Confusion of students in concentrating on the field of science in the Informatics Study Program Univ. Labuhan Batu becomes a problem for students in writing thesis. Informatics Engineering Study Program Univ. Labuhan Batu has a group of expertise that is intended to direct students' thesis titles according to their fields. Elimination Choice and Translating Reality (ELECTRE) is the method used in this study. The ELECTRE method is a method that can produce decisions by comparing alternatives in pairs on the same criteria. The results obtained from this application are to provide a recommendation value in the form of a ranking based on the relationship between the alternatives and the criteria entered. The purpose of this research is to produce recommendations for areas of expertise for students of the Informatics Study Program Univ. Stone Labyrinth. System testing is done in two ways, namely black box testing and accuracy testing. Black box testing is done to test the functionality of the application based on the input entered. While the accuracy test is to see how much accuracy or suitability of the skill group students have with the results of the system recommendations.
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1. Introduction

One of the requirements to complete studies at the Informatics Study Program Univ. Labuhan Batu is completing the final task (thesis). Students are required to determine the title of the final project first, then the title will be grouped into the expertise group provided by the Univ Informatics Study Program. Stone Labyrinth. Based on these problems, a system was created that can determine the area of expertise of students in the Informatics Study Program Univ. Labuhan Batu, this decision support system is expected to provide recommendations on areas of expertise for 5th semester students and students who are writing thesis.

The model used in this decision support system is Multi Attribute Decision Making (MADM) with the Elimination Choice of Translating Reality (ELECTR) method. The ELECTRE method was chosen because this method performs ranking by comparing alternatives in pairs. An alternative is said to dominate another alternative if one or more of its criteria exceed and equal the remaining criteria, in this case the alternative in question is the area of expertise for students based on the criteria provided. With this ranking method, it is hoped that the assessment will be more precise and prove that the ELECTRE method can be one way to determine the field of expertise of students of the Univ Informatics Study Program. Stone Labyrinth.

2. Literature Review

Research on decision support systems that determine students' areas of expertise is not a new thing to do, as for a similar study that was conducted by Yumarlin MZ (2016) entitled "Decision Support System for Concentration and Specialization in Informatics Engineering Study Program, University of Janabadra Yohyakarta" to produce a recommendation in the form of a specialization path. students based

on course grades from semester 1 to semester 4 [1]. Musthofa Galih Pradana (2017) with the research title "Decision Support System for Selection of Informatics Student Concentration, Amikom University Yogyakarta

Using the Website-Based SAW Algorithm using the average value of courses, student interests and high school majors as criteria for recommending concentration to Informatics students, AMIKOM University Yogyakarta [2]. Mulia Rahmayu, and Rosi Kusuma Serli (2018) with a research entitled Decision Support System for Department Selection at SMK Putra Nusantrara Jakarta Using the Analytical Hierarchy Process (AHP) method in which this study produces recommendations for majors using criteria, namely talent, interest, quality of majors, and career opportunities [3]. This study aims to produce recommendations for areas of expertise for students of the Informatics Study Program Univ. Labuhan Batu using Elimination Choice and Translating Reality (ELECTR) method.

2.1 Decision Support System

Decision Support System (DSS) or Decision Support System (DSS) is a specific information system intended to assist management in making decisions related to semi-structured problems [5]. This system has the facility to generate various alternatives that can be used interactively by the user. Little in defining a decision support system (DSS) as a set of model-based procedures for data processing and assessment to help managers make decisions [6]. The uniqueness of DSS is its ability to integrate data with decision models [7]. The objectives of the DSS in the decision-making process are as follows [8]:
1. Help answer semi-structured problems
2. Assist managers in making decisions, not replace them.
3. Increase the effectiveness of a manager's decision making rather than efficiency.
4. Save time because decisions can be made quickly [9].

2.2. Elimination Choice and Translating Reality (ELECTR)

Elimination and Choice Translating Reality (ELECTRE) is a method based on the concept of ranking through pairwise comparisons between alternatives on the appropriate criteria [10]. The ELECTRE method as one of the Multiple Attribute Decision Making (MADM) methods is widely recognized as having good performance for policy analysis involving qualitative and quantitative criteria [11].

The ELECTRE method is very well known, especially in Europe and is widely used in the fields of civil and environmental engineering. The ELECTRE method was developed with the concept of ranking, namely by using pairwise comparisons between alternatives on the appropriate criteria. There are several steps in completing the ELECTRE method are as follows [12].
1. Creating a Normalization Matrix
2. Determining the index of the concordance and discordance matrices, a paired alternative enters the concordance set if,

   Ck C1 And enter the discordance set if,Ck < Cl

Accuracy means that information must reflect the actual situation. Accuracy testing is carried out by two or more different people or sources, if the test produces the same results then the data is considered accurate [16]. Through this method, an analysis will be carried out to provide conclusions from the results of the accuracy test.

3. Results and Discussion
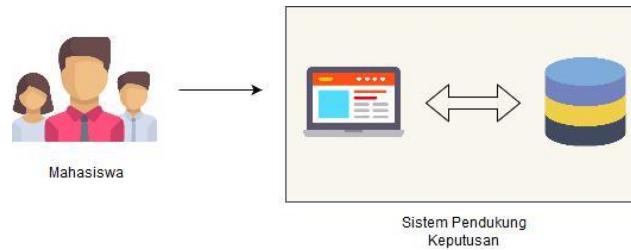The system architecture design is shown in Figure 1 as follows:

Figure 1. System architecture

Based on Figure 1, students access a decision support system that has been integrated with the database. Students start accessing the system by entering their NIM first.

A. System Interface Design

The interface design is designed as an initial description of the system to be built. The system interface design includes several users including students and admins. The system interface structure can be seen in Figure 2 as follows:
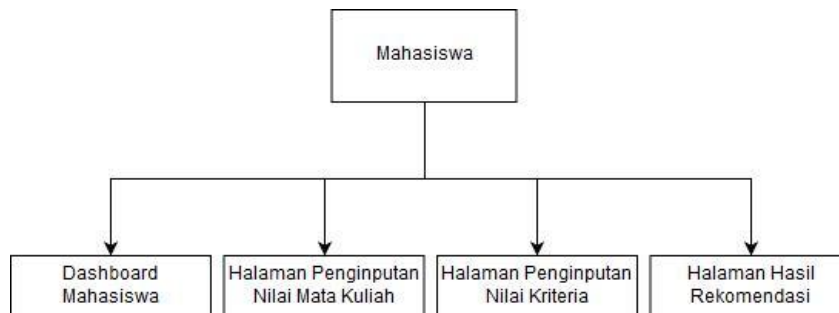

Figure 2. System Interface Design Structure

Based on Figure 2, the interface design is divided into 4 (four) parts, namely the dashboard page, the course value input page, the criteria value input page, and the recommendation results page.

Discussion

1. Design Results

   The design that has been done consists of system architecture design, data flow diagrams, flowchart diagrams, and database design. The design above resulted in the application of the SPK Determining the Field of Expertise for the Informatics Engineering Study Program Univ. Stone Labyrinth. The resulting interface is the initial interface, the criteria value input interface, the course value input interface, and the recommendation result interface.
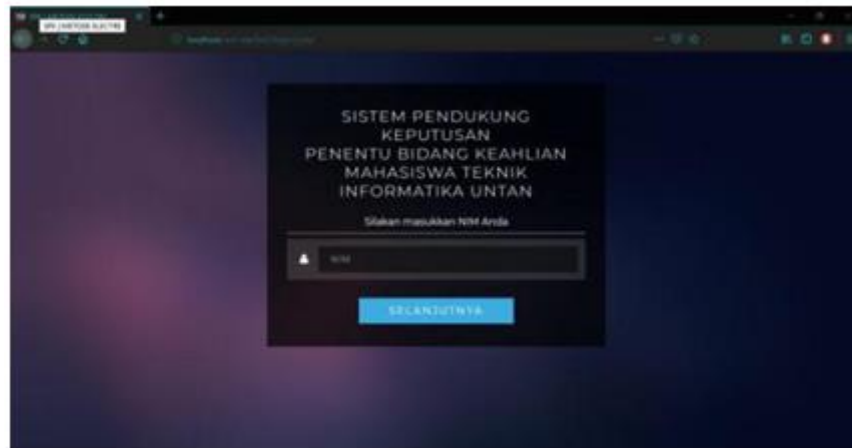
Figure 3. Home page

Based on Figure 3, students must first enter their NIM into the NIM form so that the recommendation results are displayed based on the NIM entered.

Figure 4. The course value input page

2. Test result

   Testing on the SPK Determinants of Expertise in the Informatics Engineering Study Program Univ. Labuhan Batu is carried out in 2 ways, namely black box testing to determine the results of the system output and checking the functionality of the system, and accuracy testing to determine the suitability of the skill group selected by students with the recommendation of the area of expertise from the system.

1. Black Box Test

This test focuses on the functionality of the application. This test needs to be done to see the output of the data input process. The test results entering the NIM are shown in Table 1 as follows,

Table 1. Test Results Entering Nim

Function	Function Example	Execution Results	Information
Enter ID	*Field* empty	Not successful	Order to fill the column that unfilled
	Field NIM filled	Success	

The test results enter the value of the courses shown in Table 2 as follows,

Table 2. Course Input Results

Function	Example Function	Results Execution	Information
Function Input Score Eye Lecture	Empty all columns stuffing	Not successful	*'Choose the filling from this list'*
	Empty one of column	Not successful	*'Choose the filling from this list'*
	No stuffing the empty one	Success	*'Data successful plus'*

3. Accuracy Test

The accuracy test is used to see the suitability between the skill group that has been taken by the student and the expertise group resulting from the system recommendation. The results of the accuracy test are shown in Table 3 as follows.

Table 2. Accuracy Test Results

No.	Group Skills that Already picked up College student	Group Result Skills Recommendation System	Suitability	Score
1	*Computation and Artificial Intelligent*	*Computation and Artificial Intelligent*	Corresponding	1
2	*Computation and Artificial Intelligent*	*Mobile and Software computing, Computation and Artificial Intelligent*	Corresponding	1
3	*Information System and Data Spatial*	*Network and security, Computation and Artificial Intelligent*	It is not in accordance with	0
4	*Information System and Data Spatial*	*Network and Security*	It is not in accordance with	0
5	*Mobile and Software Computing*	*Network and security, Computation and Artificial Intelligent*	It is not in accordance with	0
6	*Computation and Artificial Intelligent*	*Network and Security*	It is not in accordance with	0
7	*Computation and Artificial Intelligent*	Not recommended	It is not in accordance with	0
8	*Computation and Artificial Intelligent*	*Computation and Artificial Intelligent*	Corresponding	1

9	Computation and Artificial Intelligent	Mobile Software computing, Computation and Artificial Intelligent	and	Corresponding	1
10	Network Security	and	Computation Artificial Intelligent, Mobile and Software Computing	and	It is not in accordance with	0

Amount of data	10
Appropriate Amount of Data	4
Percentage (%)	40%

Analysis of the results of testing the application of decision support systems that determine the area of expertise of students in the Informatics Study Program Univ. Labuhan Batu using the ELECTRE method is as follows:

1. The results of testing with the black box method are obtained by experimenting with input to several functions to produce the desired output. From some of these experiments, it was concluded that the application could provide the expected output from the given input, so it can be said that this application was successful through black box testing.
2. The results of the accuracy test on 10 (ten) students gave accuracy results with the suitability of the system recommendation with the expertise group of 40%, of which 4 (four) students in the skill group were selected accordingly and 6 (six) students did not. Based on the results of interviews regarding the factors for selecting the thesis title, there were 7 (seven) students who chose the thesis title based on their interests and 4 (four) students chose the thesis title because of the lecturer's suggestion.

4.   Conclusion

Based on the research conducted, it was obtained Some things that can be observed in the development of uncertainty consultation media in the identification of formalin and borax in meatballs are as follows, including the presence of an expert system with the certainty factor method, so that people can find out the characteristics of formalin meatballs without meeting directly with expert doctors or experts. Likewise for designing expert system applications to identify food hazards in Formalin and Borax can use Visual Studio 2010 Applications

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