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Decision Support System to Determine the Best Student at MAS Islamic Center in Class XI using a Simple Additive Weighting Method

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ABSTRACT

This research aims to develop a Decision Support System (DSS) in determining the best students at MAS ISLAMIC CENTRE by using the Simple Additive Weighting (SAW) method. The SAW method was chosen because of its ability to calculate the number of performance weights on each alternative effectively, allowing comparison of various options based on specified criteria. This research uses a quantitative approach with system development that follows the Waterfall model, starting from the needs analysis stage to implementation and maintenance. The results show that the designed system is able to process student data accurately and display student rankings quickly and efficiently. This provides an advantage for schools in making decisions that are more objective and supported by solid data. The implementation of SAW-based DSS is expected to be a solution that supports transparency and effectiveness in determining the best students in the educational environment.

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1. INTRODUCTION

In the age of fast-paced information, effective decision-making is becoming increasingly crucial [1][2]. Decision support systems are here as an intelligent solution[3][4][5]. A decision support system is a computer-based system designed to assist decision-makers in solving complex problems that often have no standard solution[6]. By utilizing data, models, and sophisticated algorithms, decision support systems are able to present relevant information, analyze various alternatives, and provide measurable recommendations. This allows decision-makers to make more informed, effective, and efficient choices[7][8].

One of the advantages of decision support systems is their flexibility in various fields, including business, health, and education[9][3]. In business, SDM is used to plan marketing strategies, manage supply chains, and predict market trends[6][4]. Meanwhile, in the health sector, DSS can assist doctors in making diagnosis decisions based on symptoms and patient history. This technology makes the decision-making process more objective, transparent, and supported by solid data[7][8][9].

Decision Support System (DSS) using the Simple Additive Weighting (SAW) method is one of the popular methods used to make decisions by grouping and giving weights to relevant criteria[10][11][12]. The Simple Additive Weighting (SAW) method is suitable for determining the best students based on certain criteria, such as report cards, test scores, participation in extracurricular activities, and so on[13][14].

The SAW method allows users to systematically organize assessments by calculating the total score of each available alternative [15][16]. This process involves assigning weights that reflect the importance of each criterion's importance and normalizing the data so that the assessment can be done more fairly. This method allows decision-makers to compare various options and determine the best choice based on the resulting final score[17].

A Decision Support System (DSS) to determine the best student is an application or system that assists in the decision-making process to identify students with the best performance based on various relevant criteria. The purpose of this system is to simplify and assist in the decision-making process, especially in an educational environment.

2. METHOD

Methodology is very important in this life when we want to achieve something that we aspire to. The methodology definition in the Big Indonesian Dictionary is "A regular method used to carry out a job so that something is achieved by what is done, or a systemized way of working to facilitate the implementation of an activity to achieve a specified goal."

This research is quantitative. Quantitative research is a systematic investigation of a phenomenon by collecting data that can be measured using statistical, mathematical, or computational techniques. The research method is a step to get a solution to a problem and helps solve the problem. Researchers use the waterfall model for system development. The Waterfall model is a system development model that provides a sequential or sequential software life-flow approach starting from the stages of requirements, design, implementation, verification, and maintenance.

2.1. System Development Stage

For the development stage, researchers used the waterfall method. The following are the stages that will be carried out, namely:

a. Needs Analysis
   An overview of the plan to be made from the design of the data structure and its modeling is carried out in this stage by utilizing Unifed Modeling Langangue (UML) in the form of activity diagrams, use case diagrams, and ERD, namely so that the application to be made can function according to its needs.
b. Design
   At this stage, the needs are changed from the system concept of the software to be made into a design in the form of the earliest stage.
c. Implementation
   At the implementation stage, it is carried out to solve the problem by changing its needs in the form of a system specification concept of the software to be created into coding, then the application display is completely designed using the available programming language.
d. Testing
   At this stage testing is carried out for the system that has been built, namely the system that has been made whether it can be run in accordance with the design and analysis that has been properly arranged.

2.2. Research Data Presentation Stage

For this stage, it is carried out to process and present the results of research in the form of data that has been carried out using the usability testing method based on the Nielsel Model.

2.3. Research Conclusion Stage

The conclusion stage is the last stage of the research carried out by drawing conclusions from the results of research on the system.

2.4. Testing Stage

In this study, researchers used the usability testing method for system testing techniques that have been developed. According to Jaco Nielson, there are five aspects that are included in usability testing, namely learnability (easy to learn), efficiency (efficient), memorability (easy to remember), errors (errors), and satisfaction (satisfaction). The measurement scale that will be used in the questionnaire is the Likert Scale, which is a scale so that it can measure the opinions, attitudes and perceptions of a person or group of people regarding social phenomena.

2.5. Data Collection Technique

The quality of the research data is strongly influenced by the data collection method. In this study, data was collected through the distribution of questionnaires or questionnaires. For the purpose of this study, a questionnaire or questionnaire is used to collect data using a written form consisting of several questions that are distributed along with the answers needed by the researcher. In this study, the questionnaire or questionnaire will be given to the 11th grade guardian at MAS ISLAMIC CENTRE to determine the quality of the system.

2.6. Data Analysis Technique

The data analysis stage is an important stage in a study because at this stage the results of a study will be formulated. After all the data has been collected, in order to describe the research data, a calculation is carried out using data analysis.

3. RESULTS AND DISCUSSION

3.1. Login Page

This page is the initial page when the website is opened, namely the login page, where users must enter their username and password on the Login page. With a login page, the security and privacy of user data can be well maintained. A user-friendly login page design can also improve user experience.

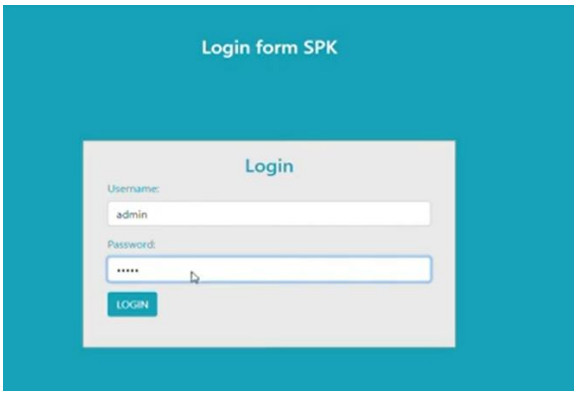

Figure 1. Login page

3.2. Welcome Page

The welcome page is the first page that usually appears when a user accesses a website or application. This page serves as a starting point for users and gives a very important first impression.

Figure 2. Welcome page

3.3. Alternative Data Page

Alternative data pages, in various views, allow users to choose the best way to understand the data. It refers to a page or view in an information system that presents data or information that is different from the main data view. This alternative data is usually presented in a different format or perspective, so that users can see the data from a different point of view. On this page users can enter Name, Daily Grade (C1), Skill Grade (C2), Semester Grade (C3), and Report Card Grade (C4). After the user enters the assessment, then the user can save the data on the alternative data page.

Figure 3. Alternative data page

3.4. Weight Page

This weight page is a display or feature in a system that allows users to give values or weights to various elements or criteria. This weight is used to indicate the level of importance of each element in a calculation or assessment. This weight can be changed at any time.

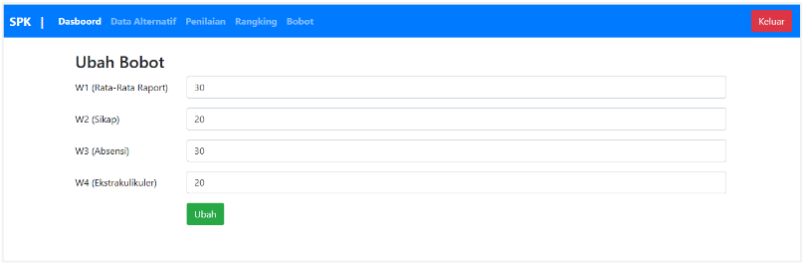

Figure 4. Weight page

3.5. Ranking Page

A ranking page, in a digital context, generally refers to the search results page displayed by the system when a user performs a search. This page contains values that are relevant to the keywords searched by the user.

Figure 5. Ranking page

The design of the best student decision support system at MAS ISLAMIC CENTRE is intended to help the process of selecting the best students between classes. The system is a system that can help the decision-making process for selecting the best students based on parameters, sub-parameters and data that have each alternative. From the analysis of the best student data, it is then processed through modeling using the Simple Additive Weighting (SAW) method.

4. CONCLUSION

Calculations on this system are expected to help in supporting decisions on determining the best students at MAS ISLAMIC CENTRE because it can provide accurate, fast, easy and efficient information. By using the Simple Additive Weigthing (SAW) method by looking for a weighted sum of performance on each of all attributes, making it easier to see the results of this system analysis will be useful for schools as advice in making decisions. This decision support system has been able to display rankings of students as consideration and aids in decision making.

REFERENCES

[1] N. B. Mahiddin, Z. A. Othman, A. A. Bakar and N. A. A. Rahim, "An Interrelated Decision-Making Model for an Intelligent Decision Support System in Healthcare," in IEEE Access, vol. 10, pp. 31660-31676, 2022, doi: 10.1109/ACCESS.2022.3160725.

[2] M. W. L. Moreira, J. J. P. C. Rodrigues, V. Korotaev, J. Al-Muhtadi and N. Kumar, "A Comprehensive Review on Smart Decision Support Systems for Health Care," in IEEE Systems Journal, vol. 13, no. 3, pp. 3536-3545, Sept. 2019, doi: 10.1109/JSYST.2018.2890121.

[3] M. R. Wayahdi and F. Ruziq, "Designing an Used Goods Donation System to Reduce Waste Accumulation Using the WASPAS Method", SinkrOn, vol. 8, no. 4, pp. 2325-2334, Oct. 2024.

[4] M. R. Wayahdi and F. Ruziq, "Optimization of Weighting in the WASPAS Method with Analytic Hierarchy Process (Case Study Selection of New Members at Programmer Association of Battuta)", jmp, vol. 13, no. 1, pp. 1199-1210, Aug. 2024.

[5] Z. Li, Y. Xue, H. Wang and L. Hao, "Decision Support System for Adaptive Restoration Control of Transmission System," in Journal of Modern Power Systems and Clean Energy, vol. 9, no. 4, pp. 870-885, July 2021, doi: 10.35833/MPCE.2021.000030.

[6] F. Khemakhem, H. Ellouzi, H. Ltifi and M. B. Ayed, "Agent-Based Intelligent Decision Support Systems: A Systematic Review," in IEEE Transactions on Cognitive and Developmental Systems, vol. 14, no. 1, pp. 20-34, March 2022, doi: 10.1109/TCDS.2020.3030571.

[7] M. R. Wayahdi and F. Ruziq, "Pemodelan Sistem Penerimaan Anggota Baru dengan Unified Modeling Language (UML) (Studi Kasus: Programmer Association of Battuta)", jmp, vol. 12, no. 1, pp. 1514-1521, Aug. 2023.

[8] M. R. Wayahdi and F. Ruziq, "Implementasi Metode WASPAS pada Sistem Penerimaan Anggota Baru", jmp, vol. 13, no. 1, pp. 164-171, Feb. 2024.

[9] D. Wahyuni and M. R. Wayahdi, "Decision Support System Determining the Best Private Universities Using the Analytical Hierarchy Process Method (Case Study: LLDIKTI Wilayah I)", infokum, vol. 10, no. 1, pp. 244-252, Dec. 2021.

[10] F. N. Khasanah, R. Trias Handayanto, H. Herlawati, D. Thamrin, P. Prasojo and E. S. H. Hutahaean, "Decision Support System For Student Scholarship Recipients Using Simple Additive Weighting Method with Sensitivity Analysis," 2020 Fifth International Conference on Informatics and Computing (ICIC), Gorontalo, Indonesia, 2020, pp. 1-6, doi: 10.1109/ICIC50835.2020.9288617.

[11] Pranolo and S. M. Widyastuti, "Simple additive weighting method on intelligent agent for urban forest health monitoring," 2014 International Conference on Computer, Control, Informatics and Its Applications (IC3INA), Bandung, Indonesia, 2014, pp. 132-135, doi: 10.1109/IC3INA.2014.7042614.

[12] D. Y. H. Tanjung and R. Adawiyah, "Optimizing Selection of Decision Support System with Fuzzy Simple Additive Weighting," 2018 6th International Conference on Cyber and IT Service Management (CITSM), Parapat, Indonesia, 2018, pp. 1-4, doi: 10.1109/CITSM.2018.8674360.

[13] D. F. Murad, E. Fernando, A. Will More L. and R. C. Aulia, "Application Engineer Selection using Simple Additive Weighting Method Approach," 2020 International Conference on Information Management and Technology (ICIMTech), Bandung, Indonesia, 2020, pp. 660-663, doi: 10.1109/ICIMTech50083.2020.9210945.

[14] F. Ruziq and M. R. Wayahdi, "Sistem Pendukung Keputusan Seleksi Karyawan Baru dengan Simple Additive Weighting pada PT. Technology Laboratories Indonesia", jmp, vol. 11, no. 2, pp. 153-159, Aug. 2022.

[15] S. H. N. Ginting, M. R. Wayahdi, and D. Syahputra, "IMPLEMENTATION OF SIMPLE ADDITIVE WEIGHTING (SAW) ALGORITHM IN DECISION SUPPORT SYSTEM FOR DETERMINING WORKING AREA FOR COOPERATIVE", infokum, vol. 9, no. 1,Desember, pp. 7-10, Dec. 2020.

[16] F. Ruziq and M. R. Wayahdi, "Implementation of SAW Method in Website-Based Application (Case Study: New Employee Recruitment at PT. Technology Laboratories Indonesia)", jmp, vol. 13, no. 1, pp. 1220-1227, Aug. 2024.

[17] N. Anzani, M. R. Wayahdi, and E. Purwawijaya, "Decision Making System for Educator Recruitment at IP Daarul Arqam Private Junior High School using Simple Additive Weighting Method", JOTECHCOM, vol. 1, no. 3, pp. 17–22, Aug. 2014, Accessed: Nov. 11, 2024.