Identification of Intelligent Participants Using Profile Matching Method (Case Study at Senior High School 1 Sungai Aur)

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Abstract. Determining the right candidate as an envoy to take part in a quiz contest can increase the chances of becoming a champion. To achieve these opportunities the school must be more selective in choosing the students who excel in the subjects to be contested. In the selection of students, intelligent representatives are usually the school only takes students who get the first rank of each class, even though it is not necessarily that the students master the lessons to be contested. Can help Senior High School 1 Sungai Aur in making quick and accurate decisions for the selection of representatives of quiz competition. Data obtained from the Senior High School 1 Sungai Aur in the form of student data with a sample of 20 students who have the potential in their respective subjects. Furthermore, the data will be analyzed using the Profile Matching method. The results of this study, it was decided that only 12 participants from 20 samples were passed. Processing results found that there were 3 participants whose decisions were different from those of the school and 9 participants with the same decision. So that the value of data processing accuracy is 75% and an error value of 25% of the 12 participants determined. It can be concluded that this study can help the school to determine students who have the right to represent their school in a quiz competition.

1. Introduction
Quiz is a form of competition that is held for the purpose of honing students' abilities in a subject. Quiz games in Indonesia have been widely known by all people, but the main objective is the level of school students. This quiz game is a clever game of both general knowledge and knowledge learned in school [1].

This quiz game is usually carried out, starting from the questions asked in turn until finally fighting over questions [1]. There are five requirements for the test, namely the test must be valid, reliable, objective, diagnostic and efficient. Whether or not the question is good or bad can be known after the analysis is carried out on the question in question. In the quiz competition, the participants were students sent by the school. In the selection of school representatives, the Decision Support System...
(DSS) will be used [2]. DSS contains interactive information that can manipulate data with the aim of helping decision makers. Profile Matching (PM) which is a method is expected to be able to solve the problems in this study [3].

The PM method can sort data that is very varied and has many parameters by calculating the difference between the alternative value and the criteria achievement value. Each aspect is given a load weight as needed. Then the values will appear in the final calculation and sorted in order of largest to smallest value [4]. In the selection of student quiz representatives, usually the school only takes students who get the first rank for each class, even though these students do not necessarily master the subjects to be contested. To overcome this, an DSS was applied and the method used was PM. The use of PM is also applied to produce decisions that make the process faster and more accurate in accordance with specified standards [5].

2. Literature Review

2.1. Decision Support System (DSS)

DSS is an information system that has the main objective of helping to find decision results, utilizing data in preparing non-structured and semi-structured problems. DSS is designed for all decision support, where this stage starts from analyzing problems, selecting the right data, choosing decisions in the approach used so that the steps for making it up to the stage of evaluating the selection of alternatives. So decision making must be based on logical considerations so that it can be accepted by all parties who are the target of the decision, for that we need a system that can help produce decisions [6]. According to (Sprague, et al. 1993) in scientific research work conducted by there are 5 main characteristics of the DSS, namely [7]:

1. The system must be computer based.
2. Use the decision as a stage to assist in problem solving.
3. When you encounter a problem that is not yet understood, it is not possible to do it with manual calculations (face non structured problems).
4. Direct interaction.
5. The main components are the data model and analysis.

The DSS application consists of various subsystems, namely [3]:

1. Data Management Subsystem.
   Database Management System (DBMS) is a software that includes one database so that the results obtained are relevant and can be managed by database management.
2. Model Management Subsystem.
   MBMS in ordinary software is also called a model-based management system.
3. Peer User Interface Subsystem.
   Researchers have contributed greatly to asserting the unique nature of the DSS, of the incentive interactions that occur between computers and decision makers.
4. Knowledge Subsystem in Management.
   These subsystems support each other and act directly so that this independent and knowledge component must be operational.
2.2. DSS Components

The three main subsystem parts in determining the technical standards of the DSS, namely database management, model base management and dialog organizer software. For more details, it can be seen in the following figure [8].

3. Methodology

3.1. Research Flow

In a research, the sequence of activities to solve a problem is very important to be applied, so that this goal is successful the author carries out the PM process in figure 3 below:
Figure 3. Profile Matching Process

3.2. Profile Matching Flowchart
The flowchart display used in this system is shown in figure 4 below:

Figure 4. Profile Matching Flowchart
4. Results and Discussion

4.1. Data Analysis

The data analysis process is one of the important stages in this research, because it is at this stage that the identification of the existing problems will be carried out, to determine which students are more entitled to participate in the quiz competition [9]. The data used were 20 student data with achievement and several subject scores from these students. Student data is used as an alternative and the subject is used as the criterion for the assessment to get a decision.

| No | Alternative | Criteria | Mathematics (C1) | Physics (C2) | Chemistry (C3) | Biology (C4) |
|----|-------------|----------|------------------|--------------|----------------|---------------|
| 1  | Alternative 1 |          | 89               | 83           | 80             | 85            |
| 2  | Alternative 2 |          | 81               | 83           | 86             | 87            |
| 3  | Alternative 3 |          | 81               | 83           | 84             | 85            |
| 4  | Alternative 4 |          | 81               | 83           | 80             | 86            |
| 5  | Alternative 5 |          | 84               | 83           | 80             | 83            |
| 6  | Alternative 6 |          | 84               | 83           | 80             | 82            |
| 7  | Alternative 7 |          | 80               | 83           | 81             | 85            |
| 8  | Alternative 8 |          | 80               | 82           | 80             | 82            |
| 9  | Alternative 9 |          | ......            | ......        | ......          | ......         |
| 10 | Alternative 10|         | ......            | ......        | ......          | ......         |
| 20 | Alternative 20|         | 89               | 89           | 82             | 86            |

4.2. Process Analysis

In the process analysis, the weight of each criterion is determined, the weight of each criterion can be seen in table 2 below:

| Range   | Weight |
|---------|--------|
| 91 -100 | 5      |
| 81 – 90 | 4      |
| 71 – 80 | 3      |
| 61 – 70 | 2      |
| 0 - 60  | 1      |

After determining the weight value, then determine the weight value for each criterion from the alternative. Then the alternative weight value is reduced by the weight value of each criterion. Then the weight value of each criterion can be seen in table 3 below:

| No | Alternative | C1 | C2 | C3 | C4 |
|----|-------------|----|----|----|----|
| 1  | Alternative 1| 4  | 4  | 3  | 4  |
| 2  | Alternative 2| 4  | 4  | 4  | 4  |
| 3  | Alternative 3| 4  | 4  | 4  | 4  |
| 4  | Alternative 4| 4  | 4  | 3  | 4  |
| 5  | Alternative 5| 4  | 4  | 3  | 4  |
Furthermore, from the weight reduction value, the GAP value is determined. The determination of the weighted value of GAP has the following provisions in table 4 below [10]:

**Table 4. The Value of the GAP Weight.**

| No | Difference | Weight Value | Information                                      |
|----|------------|--------------|--------------------------------------------------|
| 1  | 0          | 5            | There is no difference, as needed                |
| 2  | 1          | 4,5          | Individual competence is more than 1 level / level|
| 3  | -1         | 4            | Individual competence is less than 1 level / level|
| 4  | 2          | 3,5          | Individual competence is more than 2 levels / levels|
| 5  | -2         | 3            | Individual competence is less than 2 levels / levels|
| 6  | 3          | 2,5          | Individual competence is more than 3 levels / levels|
| 7  | -3         | 2            | Individual competence is less than 3 levels / levels|
| 8  | 4          | 1,5          | Individual competence is more than 4 levels / levels|
| 9  | -4         | 1            | Individual competence is less than 4 levels / levels|
| 10 | 5/-5       | 0            | Individual competence is more or less than 5 levels / levels|

From the GAP weight value, then the GAP value is determined for each alternative weight. The GAP value for each alternative weight can be seen as in table 5 below:

**Table 5. GAP Value of Alternatives.**

| No | Alternative | Criteria |
|----|-------------|----------|
|    |             | C1  C2  C3  C4 |
| 1  | Alternative 1| 4  5  3  4,5 |
| 2  | Alternative 2| 4  5  4  4,5 |
| 3  | Alternative 3| 4  5  4  4,5 |
| 4  | Alternative 4| 4  5  3  4,5 |
| 5  | Alternative 5| 4  5  3  4,5 |
| 6  | Alternative 6| 4  5  3  4,5 |
The next step is to determine the Core Factor and Secondary Factor values. For Core Factor it is determined on mathematical, physical, chemical criteria and for Second Factor it is determined on biological criteria. The Core Factor and Second Factor formulas can be seen as follows:

\[
\text{Core Factor} \quad \text{NCF} = \frac{\sum N C(i, s, p)}{\sum IC}
\]

\[
\text{Second Factor} \quad \text{NSF} = \frac{\sum N S(i, s, p)}{\sum IS}
\]

Based on the formula above, the Core Factor and Second Factor values can be obtained as in table 6 below:

| No | Alternative | Core Factor | Second Factor | Value |
|----|-------------|-------------|---------------|-------|
| C1 | C2 | C3 | C4 | NCF | NSF |
| 7  | Alternative 7 | 3 | 5 | 4 | 4,5 | 4,000 | 4,500 |
| 8  | Alternative 8 | 3 | 5 | 3 | 4,5 | 4,333 | 4,500 |
| 9  | ...... | ...... | ...... | ...... | ...... |
| 10 | ...... | ...... | ...... | ...... | ...... |
| 20 | Alternative 20 | 5 | 4,5 | 5 | 4,5 | 4,333 | 4,500 |

After the Core Factor and Second Factor values are obtained, the next step is to determine the ranking value of each alternative value. The ranking value is obtained using the formula:

\[
N (\text{Criteria}) = (x)\% \text{NCF (Alternative)} + (x)\% \text{NSF (Alternative)}
\]

At the Core Factor value, a load of 70% is taken and a Second Factor of 30%. The ranking value of each alternative can be seen in table 7 below:

| No | Alternative | NCF | NSF | NH | RANK |
|----|-------------|-----|-----|----|------|
| 1  | Alternative 1 | 2,800 | 1,350 | 4,150 | 12   |
| No | Alternative | NCF | NSF | NH | RANK |
4.3. Result
Based on the results of the ranking above, from the 20 alternative data, the alternative that has the highest value is taken to be used as a decision. The highest value is in Alternative 11 with a total value of 4,733. Then Alternative 1 can be made the best decision.

5. Conclusion & Further Work
Based on the research that has been done, a decision has been made to determine which students are eligible to participate in the quiz competition at Senior High School 1 Sungai Aur. The results of the analysis of the profile matching method can help the school in making the right decision. For further research, it is necessary to develop the assessment criteria for decisions so that the results obtained are maximized and by combining other methods can increase the accuracy of the decision value.

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