Jurnal Media Teknik Elektro dan Komputer
Vol. 01, No.01 (January - June, 2024)
E-ISSN: XXXX-XXXX

Priority Decision Making System for Educational Fund Assistance Letters Using Top-Down Parsing Method

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ABSTRACT

This research proposes and applies a decision-making system to determine priorities in the allocation of educational funding assistance letters by utilizing the Top-Down Parsing method. The aim of this research is to increase efficiency in managing the allocation of education funds through the implementation of parsing technology for analysis and processing of letters requesting financial assistance. This system is designed to automatically analyze sentence structures, identify relevant information, and determine funding allocation priorities based on predetermined criteria. Through simulation experiments, this research evaluates the effectiveness and accuracy of the system in prioritizing letters requesting funding for education. The research results show that the application of the Top-Down Parsing method in the decision-making system is able to increase efficiency in the education fund allocation process. Nonetheless, this research highlights the need for regular maintenance and updating to maintain analytical accuracy.

Keywords: Decision-Making System, Priority Mail, Top-Down Parsing

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1. INTRODUCTION

The introduction should briefly explain the research in a broad context and show why it is important. This section should explain the study's purpose and its significance. Cite key publications and review the current state of research. If necessary, include hypotheses that are crucial, important, or even important points of controversy, along with the pros and cons of different opinions and perspectives. Finally, state the purpose of the study and its main findings. Try to make the introduction understandable to readers outside the research field.

Education is one of the important aspects of the development of a country. The development of education can be an indicator of a nation's progress and the main support for achieving sustainable development goals (Siregar, 2019). In supporting the education sector, funding is often required for various purposes, including the provision of facilities, equipment, and scholarships (Amin, 2019).

Meeting the funding needs for education is a complex challenge, especially when there are various letters of request for funding assistance from various parties (Yoseph et al., 2023).

In this context, the decision-making system plays a crucial role in determining the priority of providing financial assistance for education. To ensure optimal allocation of funds and support the overall development of the education sector, we must make appropriate and efficient decisions (Saputra, 2020). In the decision-making process related to the priority of letters of application for financial assistance for education, there are a number of problems that need to be addressed (Humami, 2020). Some of them are designing a decision-making system that is able to handle various complex aspects in the priority of financial assistance for education (Rizki, 2019).

This study aims to develop and implement a decision-making system that can overcome the above problems, especially in the context of prioritizing letters of assistance for education funds (Rahmawati, 2020). We will use the Top Down Parsing method as the main basis for data analysis and management to support effective decision-making (Priyantina, 2019). In general, the top-down parsing method is a parsing technique in a programming language that starts the parsing process from the initial symbol and tries to build a parsing tree from top to bottom by following formal grammar rules (Octaviano et al., 2019). The development of programming language compilers and interpreters frequently uses this method.

Several previous studies, such as the one on the Provision of Assistance for Poor Students at Sukamenak Elementary School, Tasikmalaya, have utilized this method to minimize and obtain more accurate results. Based on the study's findings, it is hoped that this application program will be developed to enhance its efficiency and address existing deficiencies (Fanda & Hardianto, 2021). Another study focused on providing data assistance to small and medium enterprises (SMEs). The study's findings identified A3 as the recipients of financial assistance, with a preference value of 96.67 (Maksur, 2020). Another study, titled "Selection of Recipients of Social Assistance for COVID-19 Affected Community Members," revealed that community members affected by COVID-19 who were deemed very worthy of receiving social assistance funds had a final assessment exceeding 0.66, resulting in a recommendation of "very worthy". There is a study on Determining Priorities for Assistance for Small and Medium Enterprises in Tegal, with the results of the study being 3.44 on a scale of 4, or the results were 86.11% agreeing with the system that had been created (Nasution, 2021).

We expect the study's results to enhance the decision-making system by prioritizing letters of request for educational funding assistance. This system can help related parties, such as educational institutions, governments, and donors, in optimizing the allocation of funds to support sustainable educational development. Therefore, this study will focus solely on implementing the method and examining its influence on the effectiveness of decision-making concerning the priority of educational funding assistance.

2. LITERATURE REVIEW

2.1. Top-Down Parsing

Parsing is a syntactic analysis process that aims to check whether an input string complies with predetermined grammar rules (Pratiwi, 2022). Programmers and compilers use parsing to analyze the source code and form data structures for further processing. Top-down parsing is one of the earliest developed and most widely used parsing methods. In syntactic analysis, top-down parsing uses an approach to parse input strings using the principles of context-free grammar. This method starts the parsing process with a starting symbol and attempts to match the input string to the grammar

production rules in a systematic and structured manner. Top-down parsing works by starting from the starting symbol and trying to develop a parsing tree using the grammar production rules. In this scenario, a prediction table or a recursive process determines the appropriate production based on the current input symbol. The goal is to parse the entire input string until it reaches a terminal symbol that matches the grammar rules. Recursive Descent Parsing is a basic form of top-down parsing. In this method, the parser consists of a series of recursive procedures, each of which corresponds to a non-terminal symbol in the grammar. Each procedure tries to match a part of the input string with a relevant production rule. Here are the general steps involved in recursive descent parsing:

1. Start from Start Symbol: The procedure starts with the start symbol of the grammar.
2. Select Production Rule: For each non-terminal symbol, select the appropriate production rule.
3. Match Terminal Symbol: If you find a terminal symbol, match it with the input string.
4. Call Recursive Procedure: Call the relevant recursive procedure if you find a non-terminal symbol.
5. Backtrack: If the selected production rule does not match, go back and try another production rule (if any).

3. METHODS

This study uses Top-down parsing We chose this method because it can generate study program recommendations that align with students' abilities and interests. The top-down parsing method breaks down problems into smaller parts and then solves them gradually (Ayuh et al., 2019). Previous research by Renatalia showed that the top-down parsing method is more effective in predicting study programs that are in accordance with students' abilities and interests than other methods (Renatalia et al., 2020). This study also shows that top-down parsing can help agencies choose the right education funding assistance letter.

4. RESULTS AND DISCUSSION

4.1. Application of The Top-Down Parsing Method

When designing a decision support system, the top-down parsing method, which determines the priority of letters of assistance for education funds, requires criteria and preference weights to measure the relative performance of alternatives in simple mathematical form. Table 1 displays the list of criteria used in the application of the top-down parsing method.

Table 1. List of Criteria

Criteria Sub	Sub criteria	Weight value
A1	Letter Number	0,5
A2	Date Received	0,3
A3	Content Subject	0,2

Because the values for each alternative are still linguistic, a simple weighting value is given, which can be seen in Table 2.

Table 2. Alternative Value Weights

Criteria	Letter Category	Weight Value
A3	Secret	**5**
	Invitation	**4**
	Archive	**3**
	Introduction	**2**
	Regular	**1**

The collected research results yielded up to 10 letter data descriptions, as shown in Table 3.

Table 3. Alternative Data

No	Alternative	A1	A2	A3
1	Rose	001	15-Dec-2023	Secret
2	Ali	005	16-Dec-2023	Invitation
3	Buyung	003	11-Dec-2023	Invitation
4	Nisa	003	19-Nov-2023	Invitation
5	Amalia	002	1-Dec2023	Archive
6	Bobi	001	15-Dec-2023	Reguler
7	Elvan	004	9-Dec-2023	Invitation
8	Lili	006	15-Sept-2023	Secret
9	Markus	002	1-Dec-2023	Secret
10	Grace	005	13-Dec-2023	Archive

The data processing results indicate that criterion A1 holds the highest importance among all the criteria. The top-down parsing method yields the priority order of letters for prioritization. The most important letter to prioritize first is Rose's alternative data. However, if you look at the alternative data, Bobi has the same level of criteria as Rose; only there is 1 difference, namely in criterion A3, where the weight value of Rose's criteria is greater than Bobi's criteria. Based on this data, it is evident that the priority level of the processed data determines this outcome.

Table 4. Data Processing Results

No	Alternative	Rangking
1	Rose	1
2	Ali	9
3	Buyung	6
4	Nisa	5
5	Amalia	3
6	Bobi	2
7	Elvan	7
8	Lili	10
9	Markus	4
10	Grace	8

4.2. Implementation in Application Form

The created application implements the results obtained through manual calculations. This display demonstrates the security of the application, as only those with a registered username and password can access it. Login is successful if a successful login notification appears, as shown in Figure 1.

Figure 1. Login Page

Figure 2. Successful Login Display

4.3. Home Page

This display serves as the main dashboard display once you have successfully logged in. This display features three menus, each located in the upper left corner. These menus are the file menu, the mail agenda menu, and the incoming mail menu. The file menu contains the logout and exit submenu, the mail agenda menu contains the incoming and outgoing mail submenu, and the report menu contains the incoming and outgoing mail submenu, as shown in Figure 3.

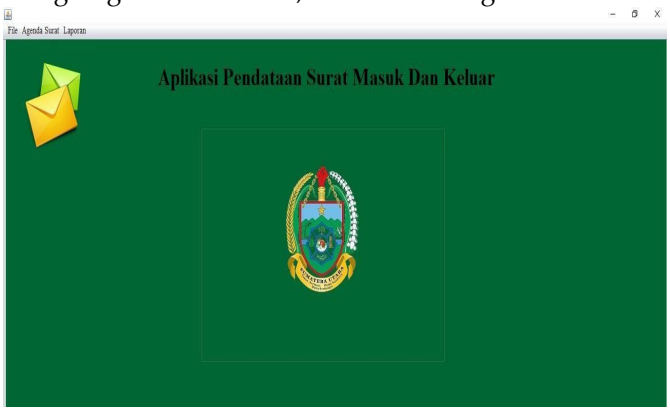

Figure 3. Main Page

4.4. Incoming Mail

This display features a form, along with a table displaying the database's incoming mail data. Simply complete the form below to add incoming mail, and a notification confirming the successful save will appear. You can also delete data by selecting one from the table and clicking the delete button below. Later, a notification will appear asking whether the data will be deleted; if you choose yes, then the data will be deleted; if you choose no, then the data will not be deleted, as shown in Figure 4.

Figure 4. Incoming Mail View

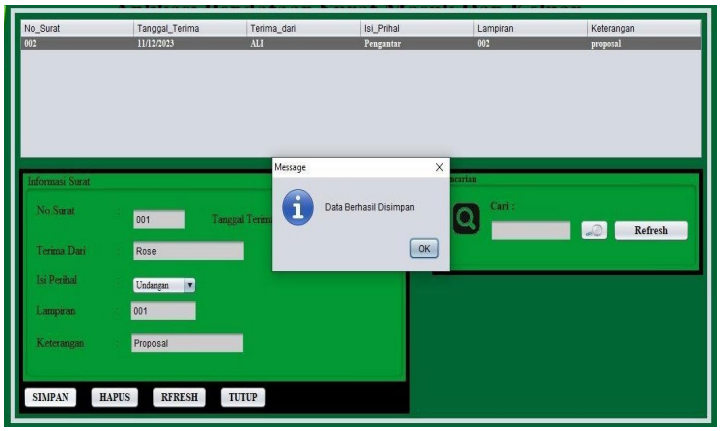

Figure 5. Incoming Mail Successfully Added View

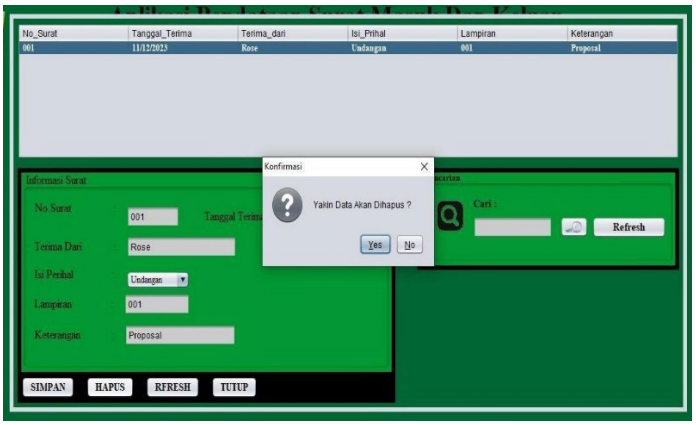

Figure 6. Delete Incoming Mail View

4.5. Outgoing Mail

Similar to the previous display, the outgoing mail display contains form data and also a display of the database in the form of a table of outgoing mail data. This display also features the same functionality as the incoming mail display feature, allowing for the input and deletion of data.

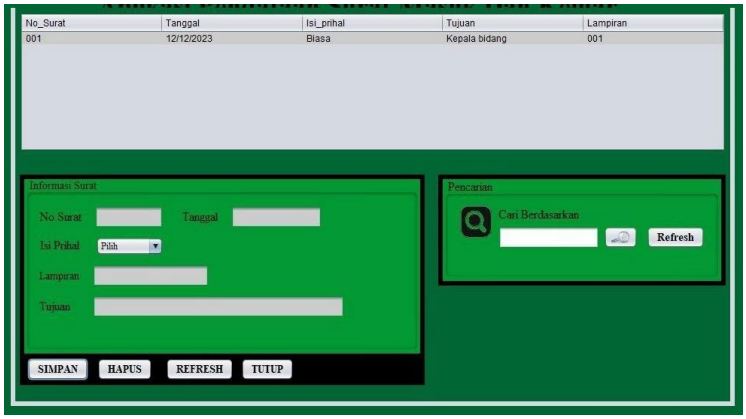

Figure 7. Outgoing Mail View

4.6. Reports

Figures 8 and 9 illustrate this menu, which displays the results of incoming and outgoing mail data ready for printing or saving as soft files or hard copies.

Figure 8. Incoming Mail Report

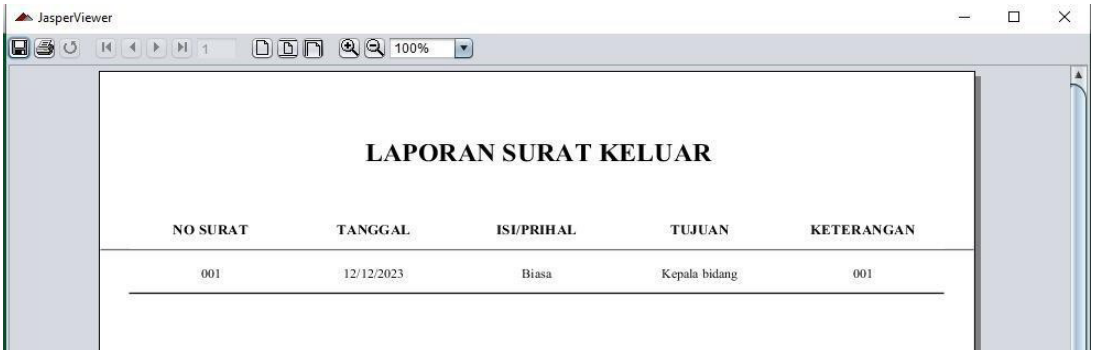

Figure 9. Outgoing Mail Report

5. CONCLUSION

This study explores and develops a decision-making system that uses the Top-Down Parsing method to prioritize letters of assistance for education funds. This method effectively manages and

analyzes information from letters of request for assistance funds in a more systematic and structured manner. In addition, this system is also able to provide priorities more quickly and consistently compared to manual decision-making methods. Overall, the development of a decision-making system for priority letters of assistance for education funds using the Top-Down Parsing method has tremendous potential to increase efficiency and objectivity in the management of education fund allocations. This study contributes to a further understanding of the implementation of parsing technology in the context of priority decision-making and can be a basis for further development in improving the system.

REFERENCES

Amin, M. B. (2019). *Tik & Aplikasi Komputer Manajemen Pendidikan Islam*.

ANGGI ILHAM HADI SIREGAR. (2019). APLIKASI SISTEM PENDUKUNG PENGAMBILAN KEPUTUSAN PENILAIAN KINERJA DOSEN MENGGUNAKAN METODE ANALYTICAL HIERARCHY PROCESS (AHP) BERBASIS WEB. (Studi Kasus: Program Studi Teknik Industri UIN Suska Riau). *Tugas Akhir*, 1–115.

AYUH, FachrurrPUTRIozi, M., & Yusliani, N. (2019). *Identifikasi Kalimat Ambigu Dalam Bahasa Indonesia Menggunakan Top Down Parsing*.

Fanda, R., & Hardianto, R. (2021). Sistem Pendukung Keputusan Untuk Menentukan Penerima Bantuan Khusus Siswa Miskin (Bksm) Menggunakan Metode Saw dan Ahp. *Jurnal Karya Ilmiah Multidisiplin (JURKIM)*, *1*(1), 1–6.

Humami, A. G. (2020). Aplikasi Penentuan Kedudukan Kata Bahasa Arab Menggunakan Metode Rule-Based. *UIN Maulana Malik Ibrahim Yogyakarta*, 57.

Isnapoh Maykel Yoseph, H., Amir, H., & Susanti, E. (2023). *Sistem Pendukung Keputusan Penentuan Beasiswa Menggunakan Metode Simple Additive Weighting (Studi Kasus Di Ist Akprind)*. *11*(02), 30–38.

Maksur, I. Al. (2020). *Perancangan Dan Pembuatan Prototype MyBots Pada Media Sosial Discord Serta Klasifikasi SVM*. 1–74.

Nasution. (2021). Implementasi Mongo Db, Express Js, React Js Dan Node Js (Mern) Pada Pengembangan Aplikasi Formulir, Kuis, Dan Survei Online. *Informatics Engineering*, 1–160.

Octaviano, D., Studi, P., Informatika, T., Sains, F., Teknologi, D. A. N., Islam, U., & Syarif, N. (2019). *Perbandingan Seleksi Fitur Term Frequency*.

Pratiwi, I. (2022). Implementasi Algoritma Left Corner Parsing Dalam Pencarian Surat Pada Arsip Surat Masuk dan Surat Keluar. *Bulletin of Data Science*, *1*(3), 99–102.

Priyantina, R. A. (2019). *Jurnal Cara Analisis Sentimen Untuk Memahami Kebutuhan*.

Rahmawati, D. S. (2020). Implementasi data project dalam proses mining dan perbandingan hasil dengan menggunakan tools prom, disco dan pm4py process mining for phyton. *Repository.Uinjkt.Ac.Id*, *11140910000008*.

Renatalia, Y., Asfi, M., & Fahrudin, R. (2020). *Program Studi Menggunakan Metode*. *10*(2), 148–160.

Rizki, M. M. (2019). Analisis Sentimen Terhadap Produk Otomotif Dari Twitter Menggunakan Kombinasi Algoritma K-Nearest Neighbor dan Pendekatan Lexicon (Studi Kasus: Mobil Toyota). *Repository.Uinjkt.Ac.Id*, 1–127.

Saputra, A. W. (2020). Analisis Permasalahan pada Aplikasi Smartphone KAI Access Berdasarkan End-User Review Menggunakan Metode Text-Mining dan Fishbone Diagram. *Dspace.Uii.Ac.Id*, 1–102.