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Design A Web-Based Manggarai Language Translator Application

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Abstract: Technological developments have led a decline in the usage and knowledge of the Manggaraian language, one among many of Indonesian native languages. This research aims to address the aforemtioned issue by developing a web-based application that functions as a translator, facilitating communication with the Manggaraian people. The application employs the Sequential Search Algorithm for word search with a total vocabulary of 500 words sourced from the Manggarai Indonesian dictionary. The results demonstrate the application's effectiveness in translating words and sentences, allowing users to input text into the designated textbox and viewing the translated output in another textbox. Detailed translation information is also provided for an enhanced comprehension. The research emphasizes the importance of preserving the Manggaraian language, urging the younger of Manggarai generation to actively partake in its preservation to safeguard their native heritage. Furthermore, the implementation of the Sequential Search Algorithm proves to be practical and effective in the context of word search.

Keywords: Manggarai language, translator application, Sequential Search, Web.

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1. Introduction

Language is one of the most important things in the daily life of mankind. Indonesia has at least 720 languages actively spoken according to Central National Statistics Agency in 2010. These languages are cultural assets that should be preserved [1] including the language of Manggarai [2]. Language preservation also plays a significant role in protecting traditional knowledge and understanding. Language often acts as a medium to convey knowledge about the environment, plants, medicine, mythology and local wisdom practices [3]. If this language were to die out, much of the valuable information would be lost forever. Language varieties arise along with the occurrence of changes in society. The change is in the form of language variations that are used according to their needs. Due to the large number of variations, not to reduce the function of language as an efficient means of communication, a mechanism arises for choosing certain variations that are suitable for certain purposes and it is called standard variety [4].

The Land of Manggarai is rich in local knowledge, wisdom and culture including its language. Language is not just a collection of words and deals with communication. Moreover, it symbolizes the identity of a community, reflects the nation, characterizes culture and it signifies the life of a society itself. Therefore, native language must be glorified, utilizeed, maintained and appreciated.

Manggaraian language is used by majority of the population in three districts. According to Verheijen (1960: IX; 1970: I), this language is included in the Bima-Sumba language group. Similar to the Mon Khmer language, it retains many of the original sounds of the Austronesian language group [5].

Since the role of language in communication is very crucial and a problem occurs while establishing communication between the Manggaraian community and the general public, therefore this web-based Manggaraian language translator application system is built using the Sequential Search vocabulary search. By utilizing this application, individuals can learn vocabulary, grammar and expressions in the Manggarai language. This supports the efforts of language preservation and education for the Manggarai community, both within the school context and independently.

Developing a web-based application system for translating the Manggarai language can support the promotion of tourism and culture [6]. Tourists visiting the region can utilize this application to interact with local residents, comprehend tourist information and better appreciate the local culture. This act can enhance the tourists' experience and broaden their knowledge about the cultural richness of Manggarai.

2. Method

System Development

This research system uses Software Development Life Cycle model. SDLC is the process of creating and modifying, modelling and methodologies used to develop a system [7]. The SDLC model used in this study is the Waterfall model. The Waterfall Model or Classic Life Cicle is the most widely used model in Software Engineering (SE). The stages in the Waterfall method consist of several sequential phases that need to be followed. The applied phases and their sequence in this research can be observed in Figure 1

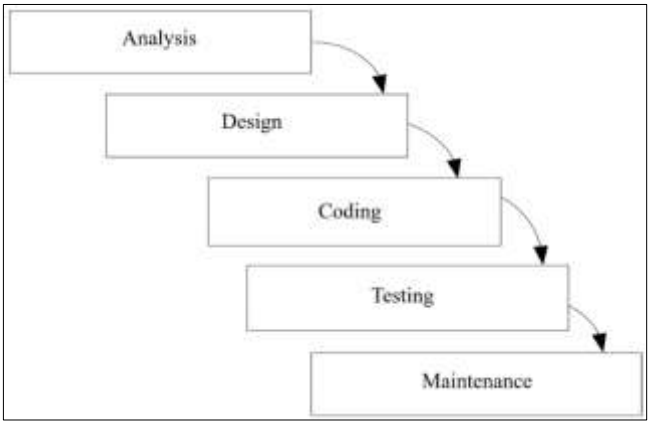

Figure 1. Waterfall Method (Susafa'ati, 2019)

Here are the Waterfall stages for the development of a web-based Manggarai language translation application:

1. Analysis: Identifying functional and non-functional requirements, such as necessary features, the platform to be used, and other limitations.
2. Design: This phase involves designing the application's architecture and layout including database structure, user interface, translation algorithms and other components.
3. Coding: During this stage, the designers develop application code based on the established design. This phase involves creating application modules, coding, and implementing planned functionalities.
4. Testing: After the implementation process, the application needs to undergo a series of tests to ensure optimal functionality. Testing involves examining each module individually, as well as integration testing to check interactions between interfaces and other components. The entire application is thoroughly tested to ensure optimal performance of the web-based Manggarai language translator.
5. Maintenance: Following implementation, it's essential to conduct regular maintenance and address any bugs or issues promptly. This stage aims to ensure the ongoing optimal performance of the application and provide updates according to user needs and emerging requirements changes.

Manggarai language

Manggaraian language is one of the native languages in Indonesia spoken by the Manggaraian people on Flores Island, NTT (East Nusa Tenggara). The Manggaraian language is the wealth and pride of the Manggarai people and part of the wealth of the Indonesian nation's national language and culture. Until now, the Manggaraian language is still actively spoken by most Manggaraian people, both those in Manggarai Raya and the Manggarai diaspora who live outside of Manggarai.

However, the idea of introducing this language nationally is acceptable and a new Indonesian vocabulary taken from the Manggaraian language Dureng means a continuous and long rainy season has been included in KBBI V, the fifth edition of Indonesian Dictionary, and was published by the NTT Language Office. Thus, this word may be used in Indonesian. For example, `During the dureng season, the water in the wells of the residents of the city of Kupang and its surroundings over flows [8].

Translator

The language translation feature attempts to replace source language text with equivalent target language text. The intended meaning of the author is translated. Essentially, language translators aim to help you look up the meaning of a particular language [9].

The rapid development of technology has enabled the development of electronic dictionary applications that replace the functionality of manual dictionaries. Electronic dictionaries have many advantages and conveniences, such as easy search functions. Simply enter the word of interest and the program will automatically perform a search and display the definition of the word without the need for manual search work [10].

Sequential Search Algorithm

The search process consists of finding a specific value (data) within records of the same type (both base type and form type). A sequential search algorithm broadly refers to a mechanism that takes a problem as input and returns an appropriate solution. This solution is usually found by evaluating different possible solutions [11]. The sequential search algorithm is often called the sequential search method. In this approach, the search starts with the first element and proceeds sequentially to the last element with the goal of finding the desired element. This algorithm can search in sequences without the need for the data to undergo prior data sorting by sequentially comparing the existing data with the data to be searched until the data is found [12]. The advantage of this algorithm is that you can quickly find the data you are looking for when it is in front of you. The downside is that the search takes longer if the data you are looking for is at the end or end [13].

The sequential search algorithm works as follows.

1. Start at the beginning of the record or list.
2. Compare the searched word or search term with the item you are currently looking up.
3. If the current element matches the searched word, the search is successful, and the algorithm returns the corresponding translation or takes the necessary action.
4. If there is no match, move to the next element in the dataset.
5. Repeat steps 2-4 until a match is found or the end of the dataset is reached.

This search method is suitable to use in language translator applications that can quickly translate each word of the search term [14]. For example, searching for the word "makan" as shown in figure 2

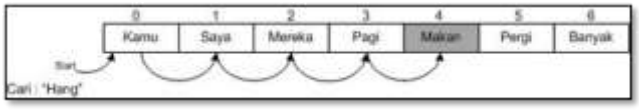

Figure 2. Sequential Search word search

In Figure 2, when using this algorithm in a language translation application, the algorithm will search for the intended word by sequentially examining each word in the dictionary or translation database. The algorithm will compare the searched word with each word in the list until a match is found or the end of the list is reached. This algorithm sequentially checks every element from the beginning to the end, ultimately finding the desired word regardless of its position in the list. In this research, the Sequential Search algorithm is applied to a dataset of Manggarai language vocabulary. The algorithm will sequentially examine each word in the dataset until it finds a word that meets the specified criteria for common vocabulary. Nevertheless, the algorithm's performance can be influenced by the position of the searched word. If the searched word is at the beginning of the list, the algorithm will quickly find it. However, if the searched word is at the end of the list, the algorithm will require more time to reach it.

Indonesian Vocabulary-Manggarai language

The Manggaraian language has a vocabulary seen from the Manggaraian language swadesh list book, Flores-NTT and this study took commonly used vocabularies in Manggaraian people's daily communication [15]. This book is a dictionary or vocabulary list that encompasses basic and common vocabulary in the Manggarai language. This list includes words that are commonly used in the Manggarai language and serves as a crucial reference for selecting vocabulary for the Manggarai language translation application. Below are several words found in this book, described in Table 1.

Table 1. Manggarai vocabulary list

No	Indonesia	Manggarai
1	Aku	Aku
2	Engkau / kau	Hau
3	Kita	Ite
4	Ini	Ho'o
5	Kalian	Meu
6	Siapa	Ceing
7	Itu	Hitu
8	Dia	Hia
9	Jangan	Neka
10	Nonton	Porong

System planning

The design stage provides a clear general picture of the user and the build design of the system to be developed.

1. **Use case**

The use case diagram for the Manggaraian language translator application is as follows:

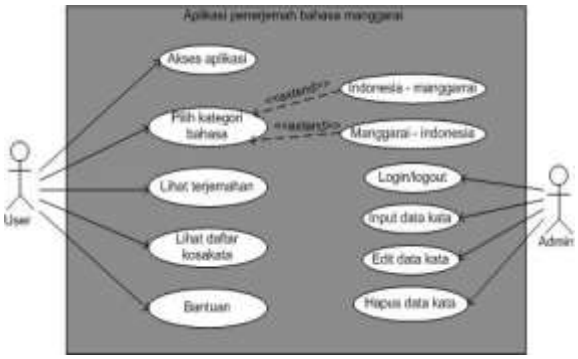

Figure 3. Application use cases

The actors within this system consist of two entities: Users and Admin. Users refer to individuals using Manggarai language translation application, who wish to translate text or voice from a foreign language to Manggarai language, or vice versa. On the other hand, Admin represents a user responsible for managing the vocabulary database used in the system. Several steps in the use case scenario of this system involve interactions between users and the application:

1. Users access the language translation application to initiate the translation process.
2. Users select the language category they wish to use in the translation process, including the source and target languages.
3. After selecting the language category, users can input text in the source language and view the translation results in the target language.
4. Users also have the option to view the list of available vocabulary within the application.
5. A help feature is provided, allowing users to access instructions on how to use the language translation application.

Through these steps, the language translation application facilitates the translation process between Manggarai language and foreign languages by providing a relevant vocabulary list and offering assistance options for users in need.

2. Activity Diagrams

Activity diagram on the Manggaraian language translator application menu.

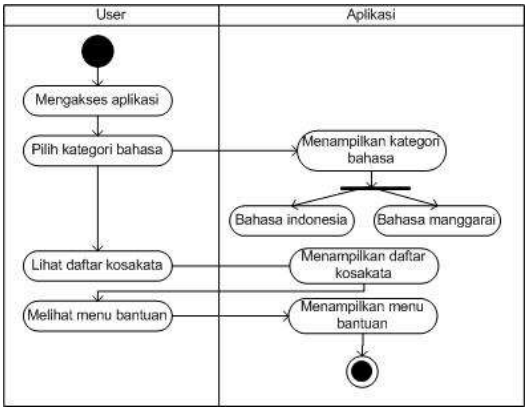

Figure 4. Activity diagram Menu

The developed application encompasses various features, including the ability to explore the available vocabulary within it. Details about this process can be found in the activity diagram illustrated in Figure 4. In the diagram, it is evident that after the user successfully accesses the application and selects the desired category, the system responsively displays a list of relevant vocabulary based on the chosen language.

3. Flowchart Manggaraian language translator application

The flowchart for the designed Manggarai language translation application can be observed in Figure 5.

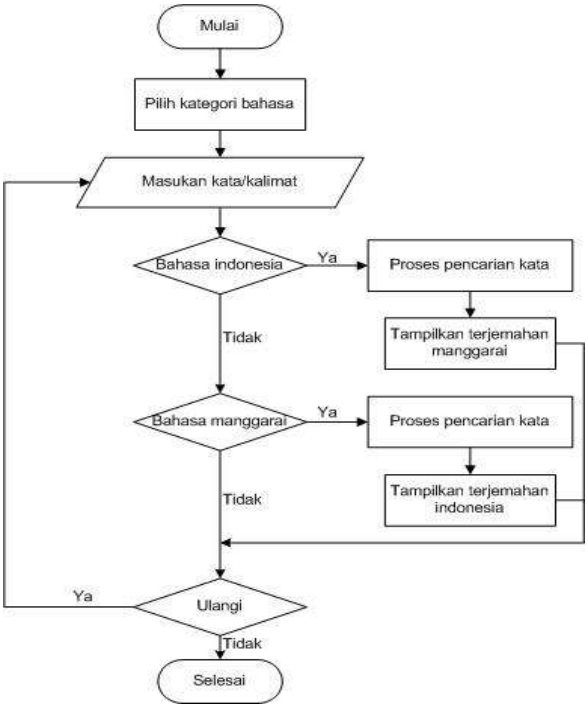

Figure 5. Flowchart of the Manggaraian language translator application

In Figure 5, a detailed language translation process is depicted. The initial step involves the selection of the translation category, namely, whether it is from Indonesian to Manggarai or vice versa. Subsequently, users are prompted to input the word or phrase they wish to translate. If the prior choice is Indonesian to Manggarai, the system will search for the translation of the word within the Manggarai language database. Conversely, if the selection is Manggarai to Indonesian, the system will search for the translation of the word in the Indonesian language. Following the completion of the search process, the translation outcomes per word will be displayed in the output section.

1. Class diagrams

Class diagrams help us visualize the structure of the classes of a system and are the most widely used type of diagram. Class diagrams show the relationships between classes and detailed explanations for each class in the design model (in a logical view) of a system[16]. The class diagram of the designed system can be observed in Figure 6.

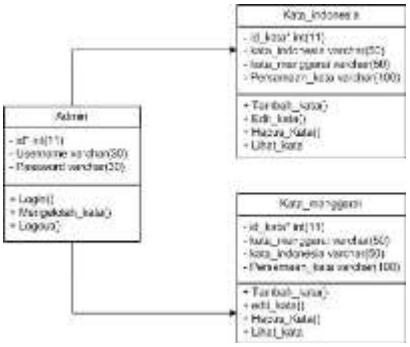

Figure 6. Class diagram of the Manggaraian translator application

The class diagram of the designed system can be observed in Figure 6.

1. The "Translator" class functions as a language translator. Within this class, there exists an attribute called "language" which signifies the language to be translated. The method "setLanguage(source: Language)" is

employed to establish the source and target languages for translation. Furthermore, the method "translate (text: String): String" is utilized to execute the text translation process.

2. The "Language" class represents languages within the system. The attribute "word" in this class contains words in the respective language. The method "getTranslation(): String" is employed to retrieve the translation of the word present in that language.
3. Class Vocabulary manages the vocabulary or word list in the selected language. The "language" attribute indicates the language of the vocabulary, while the "words" attribute serves as a mapping of a set of words in the chosen language to their translations. The method "setLanguage(source: Language)" is used to set the language for displaying the vocabulary. Additionally, the method "getTranslation()" is responsible for displaying the entire vocabulary along with its translations.
4. This diagram only illustrates the relationships between the class and its main attributes/methods. It does not encompass all implementation details and relationships with other classes in the translator application and the Indonesian and Manggarai language vocabularies.

User Interface

Here is the user interface display of the Manggarai language translator application in figure 7.

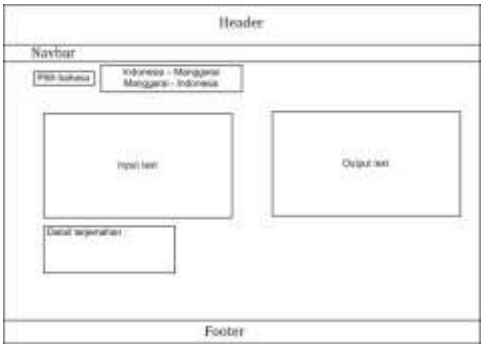

Figure 7. Interface for the Manggaraiani translator application

3. Results and Discussion

A. Research result

With reference to the initial design of the web-based Manggarai language translator application, we have successfully developed an application that aligns with the concept. The main page interface of this application can be seen in Figure 8.

Figure 8. Main Page

As shown in Figure 8, the application presents the visitor with three main menus. First, users can perform translations between Indonesian and Mangarai and vice versa via the “Home” menu or the main page, depending on the category selected. Users simply enter the word or phrase they wish to translate in the left column. Click the "Translate" button to display the translation results in the right column.

The next menu is Vocabulary, where the user can access vocabulary lists in Indonesian and Mangarai. A detailed view of the vocabulary list page is shown in Figure 9.

Figure 9. Vocabulary List Page

See Figure 9 for an alphabetical list of Mangarai vocabulary and the meaning of each word. There is also a "Help" menu that explains in detail how to use the application. We also created an administration page, as shown in Figure 10. This administration page is accessible only after a successful login process.

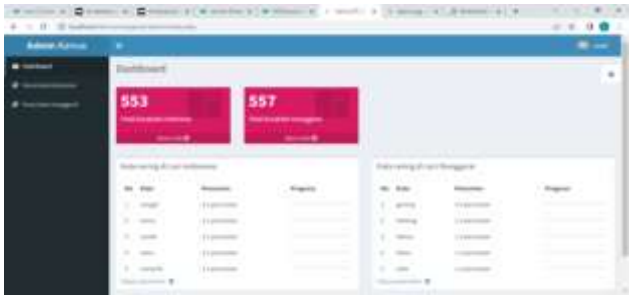

Figure 10. Admin page

Figure 10 shows the three main menus available to administrators. First, there is the "dashboard" as you can see in the image. This page gives an overview of the number of vocabulary entries registered in the application in both Indonesian and Manggarai. Additionally, this page provides information about the most frequently searched or translated words in both languages.

4. Discussion

This study discusses the implementation of the Sequential Search Algorithm and system testing, a process of executing a software system to determine whether or not it matches the system specifications running in the desired environment. System testing is associated with finding bugs. For program imperfections, errors can cause failures in the execution of the software system.

System testing

Program testing is done by black box testing method. The Blackbox Testing method is a method used to test software without having to pay attention to the details of the software. This test only checks the output value based on the respective input value. There is no attempt to find out what program code the output uses(Ningrum et al., 2020).

Table 2. System testing

No	Testing	Data input	Expectation	Response	Result
1	Manggaraian translation	Indonesian	successfully displayed Manggarai translation	1 second	succeed
2	Indonesian translation	Manggaraian	successfully displayed	1 second	succeed

			Indonesian translation		
3	Add words	manggaraian dan Indonesian	Manage to add word	fast	succeed
4	No translation	manggaraian and Indonesian	displays in the output no translation	fast	succeed
5	Translation with one word two meanings	manggaraian and Indonesian	shows only one meaning	fast	succeed
6	Add words with quotation	manggaraian and Indonesian	word with quotation in the database	fast	succeed

Table 2 shows the test results for the six processes that were run. All successful. The first tested the Indonesian to Mangarai translation process, and the second process tested the Mangarai to Indonesian translation process. Both processes successfully translate words and phrases according to the vocabulary present in the application's database. In the third step, the testing of vocabulary management in both languages also went smoothly. The application was able to efficiently add, modify, and delete vocabulary entries. Moving on to the fourth step, accurate information was provided in the translation section when a word was not found in the database.

In the fifth test, the application also successfully provided accurate information when a word had multiple meanings. If there were multiple translation results, all results were displayed in the translation details section. The final test was also successful when entering words with quotation marks into the application.

However, there were some earlier test results that did not meet the expectations. First, during the translation process, the initial results displayed all words with the same meaning in the translation results. After making improvements by adding a stop command after obtaining one translation result, the translation results only displayed one word, and the other translation results were moved to the translation details section.

Second, if a word was not found in the database, the initial results displayed an empty column. This led to a lack of words in the translation results when translating sentences. After the fix, the translation results displayed the same word as the inputted word. Additional information was also added in the translation details section to indicate that the word was not found in the database, as shown in Figure 11.

Figure 11. Missing Translation

Third, there was an issue when entering words with quotation marks into the vocabulary input, even though some words do indeed have quotation marks. However, after the improvement, this process ran smoothly.

In this study, the sequential search algorithm was identified as a method used to find elements in a data set that is organized in order. However, in the context of a language translation application, this approach may not be the most efficient and effective solution. There are several reasons underlying this view, particularly in terms of effectiveness and efficiency.

The effectiveness of the sequential search algorithm generally relies on a linear approach to find matching elements. In other words, this algorithm will check each element one by one until the desired element is found.

In language translation, where there are many words and phrases that require translation, implementing a sequential search algorithm can consume a lot of time. In terms of efficiency, this algorithm has a time complexity of O(n), where n represents the number of elements in the data set. When the number of words or phrases that need to be translated becomes large, this algorithm can run at a limited speed.

However, the designed application is capable of translating languages quickly because the number of words it currently has to handle is limited. Nevertheless, it should be emphasized that the number of words in a language is not a static or definite parameter, as languages continuously evolve and adapt to developments within the communities that use them.

5. Conclusion

This research successfully developed a web-based application capable of translating between the Manggarai language and other languages. During the system testing process, the application consistently provided positive results. Although the Sequential Search Algorithm was used in testing, this article found that this approach has limited efficiency and effectiveness in the context of language translation, especially due to the time complexity and the large volume of words that need to be translated. Therefore, this article encourages alternative approaches such as mapping, natural language processing and machine learning methods to enhance translation speed and accuracy.

Overall, this research reveals insights into the potential and challenges in developing a web-based Manggarai language translator application by focusing on improving performance through the implementation of more advanced technological solutions.

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