

Design and Usability Testing of Android-Based Application Indonesia-Gorontalo Language Translator

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Abstract: The decreasing of Gorontalo language users make the lack of people who can understand the language. Therefore, efforts are needed so that Gorontalo language can maintained its existence as regional cultural preservation efforts. The application of Natural Language Processing (NLP) for handling this problem includes the text language translator application. This research aimed at designing a text translator application Indonesia-Gorontalo language and vice versa can be used on android-based devices. The method of this research is prototype that enables the research to be developed either to increase the translation accuracy or to develop the software technology. The result obtained from this research is the application that is designed to have the size of 1,329 KB, so it is relatively easy to distribute via. the user. Furthermore, in order to know the level of acceptance of its use in the community then in this research conducted usability testing to measure the usability aspect, namely: effectiveness, efficiency and user satisfaction. This test uses a questionnaire System Usability Scale (SUS). The test results obtained usability level overview of the subjective point of view users with a score of 70.900. Android-based text translator is expected to assist the public in learning Gorontalo language and ultimately help the preservation of the local language.

Key words: NLP, android, translator, Gorontalo language, Indonesia language, public

INTRODUCTION

Indonesia consists of various tribes, each of which has a culture. Cultural diversity has become one of the hallmarks of the Indonesia nation. Therefore, it becomes a challenge for the people of Indonesia to maintain the culture of the region especially in an era in which the influence of foreign cultures is very dominant as it is today. One of the cultural elements that need to be maintained its existence is language. In Gorontalo, Bahasa Gorontalo users in everyday life decreased. Even by Dako *et al.* (2013), mentioned that there are three different languages in Gorontalo endangered.

In the field of information technology, Natural Language Processing (NLP) is a science that is most consistent with the issues above. Natural language is a language that can be understood by the individual to the particular circumstances (De Silva *et al.*, 2008). The ability of the computer to perform the processing of the language used by humans in everyday conversation both orally and written is defined as the natural language processing (Natural Language Processing). Certain rules of a language are assembled into symbols that claims to do the computation process (Wijerathna *et al.*, 2012). Natural

Language Translator is sub technology of NLP which does the processing of the text or written language. Natural language translator can also be regarded as a translator from one natural language into another natural language. The ability of a natural language translator is not just a dictionary which merely provide the equivalent word by word but also can translate a sentence structure of a language to the target language. The development of natural language developed since, 1954 with the introduction of Goergetown-IBM systems (Shaalán, 2010). Some of the development of natural language translators are translators bidirectional English-Sinhala (Wijerathna *et al.*, 2012), Arabic-English translator (Shaalán, 2010), Bangla-English translator (Rhaman and Tarannum, 2012), Chinese-Spanish translators (Centelles and Jussa, 2014) and English-Malayalam translator (Rajan *et al.*, 2009). The method used is a rule-based translation method.

Furthermore, in the development of natural language translator engine which developed specifically to translate Indonesia-Gorontalo, i.e. (Dako *et al.*, 2013), desktop application based with the translation method is rule-based. The result of translation accuracy rate was 71%. Furthermore, this text translator developed into two

directions and web based (Ridwan and Dako, 2015). This research uses 4800 sentences as test sentences by translation accuracy rate of 75.06%. Along with current technological developments, need further development, so that this application can be applied to mobile devices (mobile application) that is to android operating system. It is intended that the use of a translator application can be run offline on mobile application without any dependence on the internet. Therefore, in this research will be developed two way text translators Indonesia-Gorontalo language android based.

MATERIALS AND METHODS

Based on the description that has been stated above, the problem in this research is how to apply the rule of translation into programming algorithm-based application for mobile, especially in the android operating system. Application design method used is prototype method and the method of the translator is rule-based. Concept of Indonesia into Gorontalo language translator through several stages.

Analysis of data and information phase: At this stage, the grouping of words based on the data and information obtained from major Indonesia dictionary, Indonesia-Gorontalo language dictionary and Gorontalo-Indonesia dictionary as well as data obtained from interviews as has been done by Dako *et al.* (2013).

Design translator system model: Translator system model is designed in accordance with the mobile devices that will put this application. The rules that have been identified by Dako *et al.* (2013), Ridwan and Dako (2015)

made adjustments during the writing phase into algorithms programming. The addition of the rule of grammar have not been performed but only the adjustment process. This adjustment is made because there are some differences which is in terms of programming language and database application used.

Implementation: Translation procedure is implemented into the program using Java programming language with Android Studio 1.5. The application of translation procedure is made in source code that connects with word group information taken from the database. Based on the word group the process of adjusting the rule of grammar is done by using a programming language syntax.

Testing and modification: The testing phase is done to look for possibilities of either an error or fault error writing programming code and program logic. The next step, if the code is not an error code and program logic which is testing for functionality and operability of application. The next phase is the modification which is to improve the application based on the results at the phase of testing the functionality and operability. Next followed by testing the usability (usabilitas) that is the testing phase conducted to gauge how the image of acceptance of the application by the users. This application usability testing done by distributing questionnaires System Usability Score (SUS) using Likert scale.

RESULTS AND DISCUSSION

The translator system architecture of Indonesia-Gorontalo language is shown in Fig. 1. In Fig. 1 shows that the system is made into seven classes,

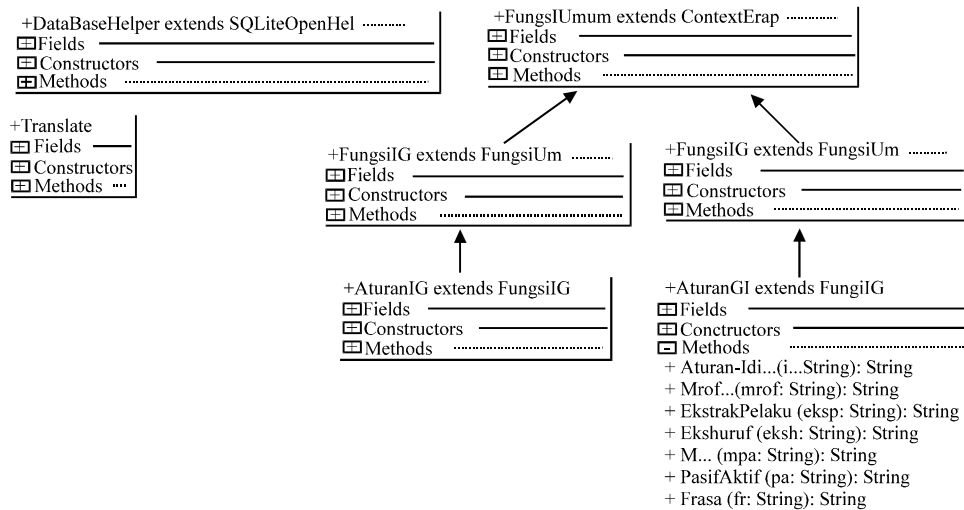


Fig. 1: Class diagram of the translation system

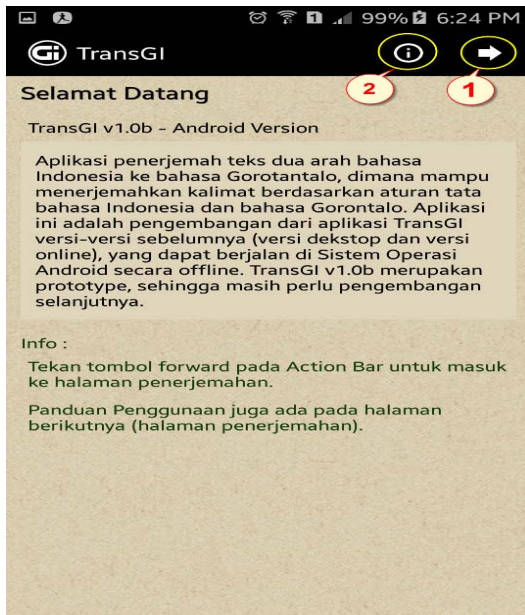


Fig. 2: Start page of the application

Class of Fungsi Umum, Data Base Helper, Translate, Fungsi IG, Fungsi GI, Aturan IG and Aturan GI. Fungsi Umum class is the superclass of Fungsi IG and Fungsi GI where these classes are also a superclass of class Aturan IG and Aturan GI. Translate class has no subclass as it only serves to sort the rules of translation of either direction to Indonesia into Gorontalo language translation or vice versa. Similarly Data Base Helper class has no subclass because its function is only to take synonym from words dictionary or database.

Figure 2 shows the view of Graphical User Interface (GUI) start page of the application that has been successfully designed. This application is named TransGI. Minimal android operating system which can run this application is a smartphone with android Version 4.1.2 (Jelly Bean).

Description of Fig. 2 is as follows. Number 1 shows forward icon that serves to open a page of translation (Fig. 3). Number 2 is the icon to open the application page that contains information of the manufacturer and version of the application.

Figure 3 shows a page of translation which on this page do the translation process from Indonesia to Gorontalo language or vice versa. The numbers shown in Fig. 3a shows the features that have the following functions. Back button which when pressed will redirect to the home page (Fig. 2). Help button, serves to open the page guide app usage. Fairly button to open the page fairly into Gorontalo language. Select the language Button

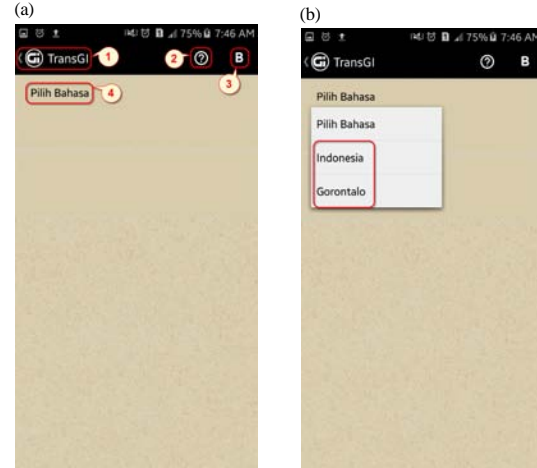


Fig. 3: Translation page of the application

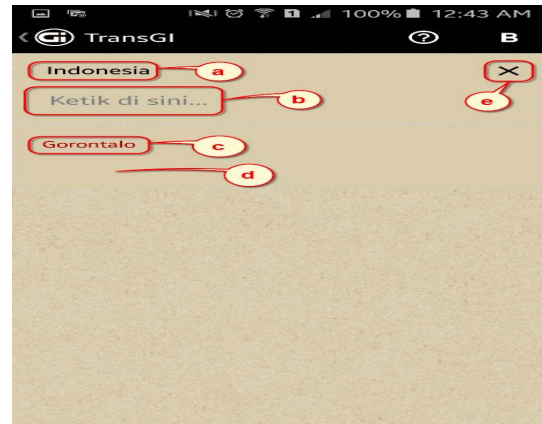


Fig. 4: Features appeared after selecting the input language selection button

which when pressed will bring the tab selected languages input whether Indonesia or Gorontal (Fig. 3b). In this option, the user can select the language input. If the selected language input is Indonesia, it will display the features as you can see in Fig. 4. Figure 4 displays the features as shown by the numbers from a-e whose statement is as follows:

- Source language input selection button
- Edit text input, serves to type word character or source language phrase

Label output: Posts of this label will change according to the source language input selection button. The example in Fig. 4 since the choice of source language is Indonesia then writing of this label printed Gorontalo and vice versa.

Table 1: The results of SUS score

Respondents/Statements	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	SUS score
1	4	4	5	2	4	2	4	1	4	4	70.000
2	4	4	4	2	4	1	5	2	4	2	75.000
3	4	5	4	2	4	4	4	2	2	2	57.500
4	2	4	4	2	4	2	4	2	4	2	65.000
5	2	5	4	2	4	2	4	2	4	2	62.500
6	4	4	4	1	3	2	4	2	4	2	70.000
7	2	4	4	2	4	2	5	2	4	2	67.500
8	2	4	4	1	2	2	4	2	4	2	62.500
9	2	5	4	2	4	2	5	1	4	2	67.500
10	2	4	4	2	2	2	5	2	4	2	62.500
11	2	4	4	2	4	2	4	2	4	2	65.000
12	2	4	4	2	4	1	5	2	4	2	70.000
13	4	4	4	1	4	2	4	1	4	1	77.500
14	2	4	5	2	5	2	4	2	4	2	70.000
15	4	4	4	1	4	2	5	2	5	1	80.000
16	2	4	4	2	4	2	5	2	4	2	67.500
17	4	5	4	1	4	1	4	2	4	2	72.500
18	4	4	4	2	5	2	4	1	4	2	75.000
19	4	4	4	1	4	2	4	2	4	4	67.500
20	4	5	5	1	3	2	4	1	4	2	72.500
21	4	5	4	2	1	2	5	1	4	2	65.000
22	4	4	4	2	4	2	5	2	5	2	75.000
23	5	4	4	2	2	2	5	2	4	2	70.000
24	4	4	4	1	5	2	5	1	4	2	80.000
25	5	4	4	2	4	2	4	2	4	2	72.500
26	4	4	5	1	2	2	4	2	2	2	65.000
27	4	5	5	2	4	2	4	2	4	2	70.000
28	4	4	5	2	4	2	5	1	5	2	80.000
29	4	5	5	1	4	2	4	1	4	4	70.000
30	4	5	4	2	3	2	4	2	4	4	60.000
31	5	4	5	2	4	2	4	2	4	2	75.000
32	4	5	4	2	5	2	4	2	4	2	70.000
33	4	5	5	1	4	2	4	2	4	2	72.500
34	4	5	4	2	4	1	4	2	5	2	72.500
35	4	4	4	2	3	2	4	2	5	2	70.000
36	5	5	5	2	4	2	4	2	5	2	75.000
37	4	4	4	1	4	4	5	2	4	2	70.000
38	4	4	4	2	5	1	4	2	4	2	75.000
39	4	5	5	1	4	1	5	2	5	2	80.000
40	4	4	4	2	4	2	4	1	5	2	75.000
41	4	5	5	2	3	2	4	2	5	2	70.000
42	4	4	4	1	2	2	4	2	4	2	67.500
43	4	5	4	2	5	2	5	2	4	2	72.500
44	4	4	4	1	2	2	5	1	4	1	75.000
45	5	5	4	2	4	2	5	2	4	2	72.500
46	4	4	4	2	4	3	4	1	4	2	70.000
47	4	5	5	1	4	1	4	1	4	2	77.500
48	5	4	4	1	2	3	4	2	4	2	67.500
49	4	5	5	2	4	1	4	1	4	2	75.000
50	5	4	5	2	4	2	5	2	4	2	77.500
SUS score average	-	-	-	-	-	-	-	-	-	-	70.900

Edit text output, serves to show the character of a word or sentence in language target. In Fig. 4, this feature is still empty because edit text input is empty. Clear button. This button serves to clean or clear edit text input.

Figure 5a shows the example of Indonesia to Gorontalo language text translation and Fig. 5b is the example of Gorontalo to Indonesia language text translation. Usability testing done by asking 100 respondents to fill out questionnaires SUS. Respondents who have filled out the questionnaire have

varied education levels and professions that are from the general public who are teachers, students, junior high school students, senior high schools, self-employed and local government employees. From 100 questionnaires distributed there are only 70 questionnaires can be processed because 30 pieces of questionnaires otherwise inconsistent after inspection (Table 1). Data inconsistencies due to the results of the questionnaire respondents which are not filled properly. Errors of this admission filling obtained because respondents did not peruse every item of given statement. For example, there

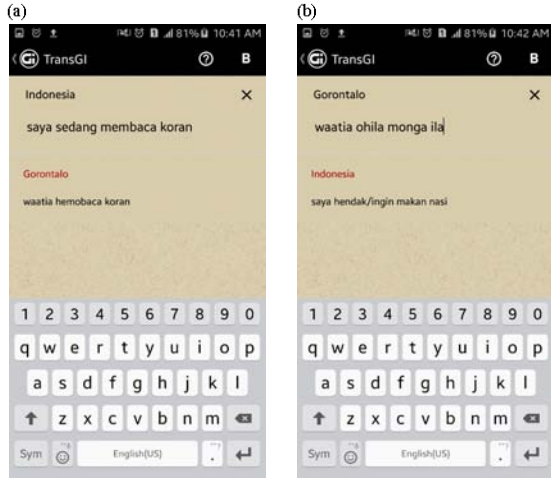


Fig. 5: a-b) Result of Indonesia-Gorontalo language text translator

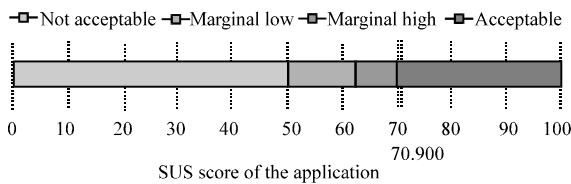


Fig. 6: Acceptability range of the application based on SUS score

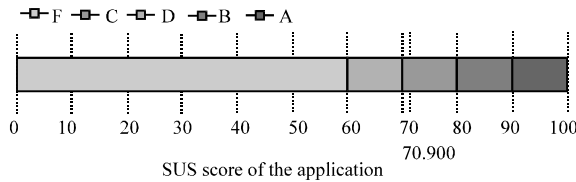


Fig. 7: Grade scale of the application based on SUS score

are people who responded to every question point with the same score. Another example in pairs question point, for example in item number 3 and 8 who should opposing the score is instead given the same score. The average score of the SUS from translator application is 70.900 including marginal high category if it is based on the acceptability range as shown in Fig. 6. Comparisons proposed by Bangor *et al.* (2009), SUS scores can indicate the level of user acceptance. SUS scores should be worth more than 70 that belong to the Acceptable category (Brooke, 1996). Furthermore, if the application SUS score TransGI put in rank or grade scale, the scale will be included in Drank. As seen in Fig. 7. Whereas, if the application SUS score TransGI put into adjective ratings it will belong to the category of good as shown in Fig. 8.

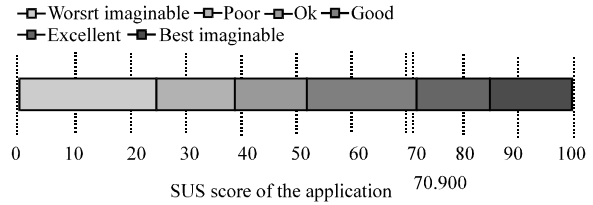


Fig. 8: Adjective ratings of the application based on SUS score

The average score of SUS illustrates that the subjective assessment of the TransGI translator application is effective, efficient and satisfying for the user.

CONCLUSION

This research has succeeded in designing a text translator of Indonesia-Gorontalo language and vice versa for mobile devices on Android based. The procedures applied in the translation of programming algorithms using Java programming and Android Studio v1.5 application. Based on usability testing by using standard questionnaire that is System Usability Score (SUS), result or average score of SUS obtained as much as 70.900 which means that Trans GI translator application still effective, efficient and satisfying for the users.

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