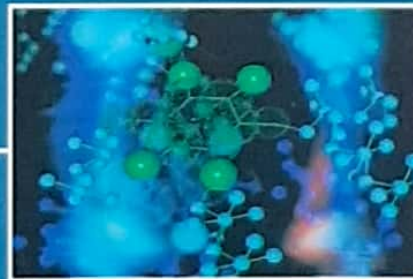
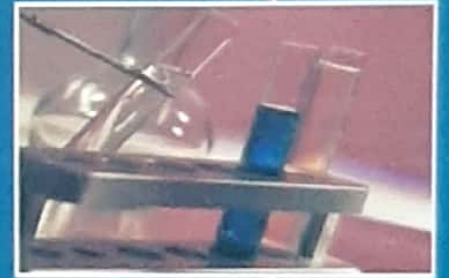
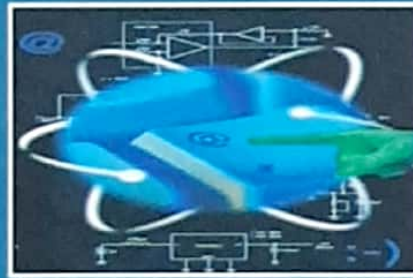
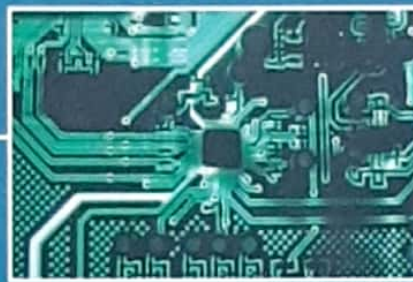


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Source:	International Journal of Research and Reviews in Applied Sciences August 2013 – Vol. 16 Issue 2 – 2013

## INDONESIAN TO GORONTALO TEXT TRANSLATOR

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### ABSTRACT

The objective of this research to design an Indonesian-Gorontalo text translator software. This application is the first Indonesian-Gorontalo text translator which applied the rule-based method. This method is one of machine translation method which applies language knowledge. Rule based approach is used to handle the differences between Indonesian and Gorontalo's grammar. Basically, the differences between Indonesian and Gorontalo grammar's rules are in time rule and subject agreement which influence verbs in active sentences. The other differences are in form of phrase where in Indonesian has two words but in Gorontalo language has formed one word.

The designed translation's system could translate Indonesian text to Gorontalo text where the average error is 28.15%.

**Keywords :** *grammar's rules, Indonesian language, Gorontalo language, rule based.*

### 1. INTRODUCTION

The development of natural language translators have been conducted, including WAP-based (Wireless Application Protocol) software applications Indonesian to Sasak language dictionary [1]. Based on the results of testing the system with a black box test and alpha test showed that the application of Indonesian –Sasak dictionary is otherwise well. Furthermore, it has also developed systems Sinhala language translator into English that use the transfer-based machine translation. The results of the test to get a success rate of 75% to as much as 150 sentence corpus [2].

In an effort to increase the success rate in translation, some researchers applied method or approach to machine translation. An approach such is a framework (framework) Bangla language translator system into English using the case (case) [3]. In this framework, the first is making part of speech tagging for source then perform case analysis framework which in turn is mapped to the target language. After that, use the case frame dictionary to translate into the target language.

Furthermore, Abu Shquier and AL Nabhan compiled test framework with rule-based approach for handling agreement (rules of grammar) and word-ordering (order of words) in the sentence translation from English to Arabic [4]. Some rules is needed for handling translation because the Arabic language has an asymmetrical agreement and sensitive in order words. The results were analyzed with the input sentence translation of certain words to put in some machine translation of which ALMUTARJIM Al Arabi, GOOGLE, TARJIM, SYSTRAN, and RBMT. From the analysis obtained RBMT (Rule Based Machine Translation) produce a translation that better fit than the other machine translation.

Jassem in [5] developed a machine translation Poleng by assumptions. Because system Polengsystem translator is one direction, then the translation algorithm is implemented by applying the rules of grammar to analyze the noun phrase, adverbial phrases and adjectival phrases. Translation algorithms, such as noun phrases is done by assuming that nominal phrase consisting of two nouns separated by a space. Then, it is assumed also that there are only two kinds of translations in the English language is a form  $N1 + N2$  and  $N1 + of + N2$ , where N is a noun. Assuming the translation is done by finding equivalent English text that best describes the input phrase in the corpus.

Utami and Hartati in [6] found that the English to Indonesian text translator with rule-based method is able to translate the words in the "daily conversation" reasonably well with the corresponding translation of the sentence structure and approach the original meaning. Patterns MD (Menerangkan-Diterangkan) are common in the English text can be translated into DM (Diterangkan-Menerangkan) as a general rule of Indonesian language. The first Shortcomings, translator can not translate a title or an extension in the English text when the sentence begins with a capital letter, because the handling of capital letters for more than one word that begins with a capital letter will automatically be displayed as the original. Secondly, it is not able to properly translate the ambiguous words. Third, it is not able to translate adjectives when more than one adjective is used sequentially. Fourth, it has not been able to translate the use of interrogative adverb when used at the position word "when" in sentence.

Application of the rule-based approach with parsing tree method and production rules in English translation - Java can handle differences of grammar of both languages so that produce the corresponding translation [7]. However,

on the other hand, there are still drawbacks such sentences are not acceptable in the Java language, which is the alternative words that have more than one different meanings, idioms consisting of three words like “as soon as”, “as close as” can not be translated. Another drawback, it has not been able to translate sentences with unstructured pattern.

According to the research presented above, the rule based approach is applied in this research. Application of the rule-based method was carried out the difference grammar between Indonesian and Gorontalo language. The fundamental difference of the two languages are Indonesian language is not use form of time, meanwhile Gorontalo language use it. Transformation of the form of time is marked by changes in affix of verbs. The change also affected by verb affixes singular and plural actors in active sentences. Other differences, using the article in the Indonesian language is not mandatory to use it, but in Gorontalo language should be used.

Gorontalo is one of the province in Indonesia, about 4 hours fly to the northeast from Jakarta, the capital of Indonesia. The population of Gorontalo province is about 1.2 millions. They usually use Gorontalo language in daily conversation. This research is aimed as an effort to local culture conservation.

## 2. PROBLEM FORMULATION

The problems to be solved in the research are :

1. Getting the steps or procedures in the Indonesian to Gorontalo text language translation.
2. Implement steps or procedures into algorithm for developing a computer application software Indonesian-Gorontalo language translator.
3. Getting a good translation results with rule-based method.

## 3. DESIGN OF TRANSLATION FROM INDONESIAN INTO GORONTALO LANGUAGE

The concept of translating sentences Indonesian to Gorontalo language performed by several stages, namely

- (1) The analysis and design phases of the system,
- (2) The implementation of translation rules based on grammar rules,
- (3) Testing of the system by entering the input sentence in Indonesian and evaluate results translation in Gorontalo.

The translator system is designed following the steps below:

- 1) **Design of grouping words.** Grouping words in the dictionary meant in a system designed to classify words into different word class specific markers to facilitate the application of the rules of grammar. Table 1 shows some of the words are derived from the classes of words in Indonesian. Number 1 and 2 show as a single and a plural marker respectively.
- 2) **Design of Table of words.** The table is designed for words database. There are six pieces that words table is designed to accommodate the words. The six pieces of this table can be shown from Table 2 to Table 7.
- 3) **Analysis of Sentence Structure in Indonesian and Gorontalo language.** Translating sentences Indonesian to Gorontalo language can be done with linear or one-to-one. To facilitate the synthesis of a sentence or phrase formed from Gorontalo language Indonesian language, it is necessary to compare the analysis of the composition of sentences or phrases Indonesian and Gorontalo language.

**Table 1.** Grouping kind words on the system

type of word	Bookmarks	information
Verb	(k)	Verb for active sentences
	(kp)	Verb for passive sentences, the verb group berimbuhanbe.
	(kk)	Verb form of the command.
Noun	(b)	Noun or noun dead both concrete and abstract.
	(bm), (bm1), (bm2)	Nouns related to people / humans.
	(bb), (bb1), (bb2)	Nouns associated with objects other than the person/people who can serve as agents in a sentence.
	(bo), (bo1), (bo2)	Associated with the noun in kinship
	(bw)	Nouns associated with time information
Pronoun	(a)	General pronoun
	(ao1), (ao2)	Personal pronouns or pronoun for people
Adverb	(e)	
Adjective	(s), (s1), (s2)	
Numeralia	(l), (l1), (l2)	
Words Task	(t)	

Table 2.Kmaster

Field Name	Data Type	Note
kataIndonesia	Text	Primary key
kataGorontalo	Text	
Jkata	Text	

Table 3.Kjamak

Field Name	Data Type	Note
Katagtlo	Text	Primary key
katajamak	Text	
Ketkata	Text	

Table 4.Ktunggal

Field Name	Data Type	Note
Katagtlo	Text	Primary key
katatunggal	Text	
Ketkata	Text	

Table 5.Kpasif

Field Name	Data Type	Note
Katagtlo	Text	Primary key
katapasif	Text	
Ketkata	Text	

Tabel 6.Kperintah

Field Name	Data Type	Note
Katagtlo	Text	Primary key
kataperintah	Text	
Ketkata	Text	

Tabel 7.Kmadiom

Field Name	Data Type	Note
katagtlo	Text	Primary key
katamadiom	Text	
ketkata	Text	

Syntactic analysis is using a notation Back us-Naur Form (BNF). Some examples of grammar can be presented as follows:

- Active Sentence

The sentence *saya akan menyiram bunga* → *waatia mamohuta bunga*, can be presented in parallel with the following BNF notation:

```

<kalimat> ::= saya akan menyiram bunga ^ waatia mamohuta bunga.
<aol> ::= saya ^ waatia.
<e> ::= akan ^ ma.
<k> ::= menyiram ^ momuhuto.
<b> ::= bunga ^ bunga.
<FV> ::= <e><k>.
<kalimat> ::= <aol><FV><b> | <aol><k><b>.

```

In the BNF form, seen that affix *ma* of verb *momuhuto* separated and assumed to be <e> .

- Passive Sentence

Passive sentence in Indonesian language has two forms of structure. The first form is the performer behind the verb. The second form, the performer was flanked by adverbs and verbs. The first form, an example

sentence *kamar ini sedang dibersihkan oleh budi* → *huali botia hepopoberesio le budi*. The BNF form can be written as :

```
<kalimat> ::= kamarinisegangdibersikanoleh Budi ^
           hualiboitohepopoberesio le Budi.
<b>      ::= kamar ^ huali|Budi ^ Budi.
<a>      ::= ini ^ botia.
<e>      ::= sedang ^ he.
<kp>     ::= dibersihkan ^ popoberesio.
<t>      ::= oleh ^ le.
<Fprep> ::= <t><b>.
<FV>     ::= <e><kp>.
<kalimat> ::= <b><FV><Fprep>|<b><kp><Fprep>.
```

Sample sentence for the second form, *kamar itu sedang Budi bersihkan* → *huali botia hepopoberesio le Budi*. The rules for the second form is equated with the first form, because the structure of translation sentence has similar form to the first.

- Nominal Phrase

Some rules of noun phrases can be written as:

```
<FN>     ::= mobilbaru ^ otobohu
<b>      ::= mobil ^ oto|kaki ^ u'ato
<s>      ::= baru ^ bohu
<ao1>   ::= saya ^ laatia
<ao2>   ::= mereka ^ limongolio
<bo>    ::= ibu ^ maama
<bo1>   ::= budi ^ budi
<bb>    ::= anjing ^ apula
<bm>    ::= presiden ^ presiden
<bm2>   ::= bapak-bapak ^ mongotiamo
```

Rules of noun phrases in Indonesian language does not change the order even though its constituent words exchanged positions, but in Gorontalo language should follow the following rules:

```
<FN>     ::= <b>lo<b>|<b><b>|<b><ao1>|<b><ao2>|<b>li<bo>|<b>li<bo1>|
           <b>le<bo1>|<b>lo<bm>|<b>lo<bm2>|<b><s>|<bo><ao1>|
           <bo><ao2>|<bb><s>|<bb>li<bo>| <bb><ao1>|<bb><ao2>|
           te<bo1>|ti<bo>| ti<bo1>.
```

- Prepositional Phrase

The rules for prepositional phrases can be presented as :

```
<Fprep> ::= di depan ^ to dimuka

<t>      ::= di ^ to|ke ^ ode| dari ^ mondo/londo
<b>      ::= depan ^ dimuka
<a>      ::= sini ^ teea
```

Indonesian:

```
<FPrep> ::= <t><b>|<t><a>
```

Gorontalo language

```
<FPrep> ::= <t><b>|<t>mai|<t>mola| <t>ma'o|<t>mota
```

For prepositional phrases <t><a>, pronouns <a> is replaced with a direction morpheme.

#### 4. RESULT

To measure the level of success or accuracy of the translation, the application tested by inserting sentences Indonesian language as input and analyze the results of translation in Gorontalo. Tests conducted by asking 20 respondents to enter some sentences, with each respondent 30 sentences. Beside the sentence entered by the respondent, also entered test sentences taken from the book *Tata Bahasa Baku BAHASA INDONESIA*[8], and the book *Kelas Kata dalam Bahasa Indonesia*[9], total of sentences are 170. Sentences test consists of a single sentence, compound sentence compound either equal or terraced compound sentence. The percentage error is 28.15%, which are one of the 217 sentences total 771 test sentences were included.

## 5. CONCLUSION

From the results of the software design text translation Indonesian to Gorontalo language text with rule-based method can be concluded:

1. Application of the method of rule-based translation application can handle the differences between Indonesian and Gorontalo grammar, which can translate simple sentences and compound sentences which is close to their actual meaning.
2. The percentage error of 28.15% of the tests performed. Errors of translation is due to:
  - Application can not translate the word that contains two meanings.
  - The result of translation semantically unacceptable because :
    - There are words that are dependent on the context of the sentence.
    - There are some basic words in the translation should be glued additive when used in the active sentence.
    - There are words that have syntactic category or class of duplicate words.

For the improvement of the translator designed here, we suggest:

1. Improving the ability of the translator system to be able translate the words that contain aduality of meaning and context dependent.
2. Redesign grouping of words to deal with the error caused the words that have the syntactic category or class of duplicate words.
3. Dictionary (words database) in the application does not include all the vocabulary because of limited vocabulary reference of the Gorontalo language.

## 6. ACKNOWLEDGEMENTS

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