Rule Based English To Marathi Translation Of Assertive Sentence

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Abstract — In proposed system we are dealing with the rule based English to Marathi translation of assertive sentences. This is basically a machine translation. In this system we are going through various processes such as tokenization, part of speech tagging etc. Database of production rules is maintained which plays important role in translation. English to Marathi bilingual dictionary has been formed for the purpose of language translation.

Index Terms — Artificial Intelligence, Language Translation, Lexical Analysis, Machine Translation, Natural Language Processing, Rule based translation, POS tagging.

1 INTRODUCTION

Marathi is one of the richest languages among all the languages exist in the world and one of the largely spoken languages in the world. More than 72 million people speak in Marathi as their native language. It is ranked 19th, based on the number of speakers. Marathi is the mother language of India and also a large number of people in southern area of India (Maharashtra) speak and write in Marathi.

Marathi is a member of the Indo-Aryan languages. It is derived from Sanskrit. It is written left-to-right, top-to-bottom of page (same as English). Its vocabulary is akin to Sanskrit. Though the vocabularies are quite difficult at first, but to some extent there are similarities with English as exemplified by the following words in Table 1.

2 NEED OF TRANSLATION

People of different linguistic background could not able to interact with each other. This concept of translation will help people to communicate comfortably. Also it will help to fill communication gap between two linguistically different backgrounds. It will help to the people in the villages, who have taken education of English.

3 PROBLEM STATEMENT

There are four types of sentences 1.Assertive sentence, 2.Interrogative sentence, 3.Exlamatory sentence.4.Imperative sentence. Any sentence will belong to one of this type. We have taken assertive sentences, to restrict scope of the project.

Purpose of the Natural Language Processing is to convert English sentence to Marathi (Assertive). Firstly the user enters the English sentence the perquisite is user must enter grammatically correct then it undergoes different process such as tokenization, dictionary lookup, POS tagging, rule matching etc. In the end we get the output in the human readable format.

In this system meaning is taken into consideration while translating sentences. It’s not just word to word mapping.

4 SOLUTION PREREQUISITE

To provide solution to above problem, the database of set of rules should be maintained for mapping English sentence to Marathi. These rules are called as production rules. English to Marathi dictionary database is required for fetching Marathi words for specified English words. Also we should have the deep knowledge of grammar of source language and target language.

4.1 Grammar of Source Language and Target Language:

Here source language is English and Target language is Marathi. Every language has parts of speech i.e. Verb, noun preposition, etc.

Structure of language changes depending on the arrangement of parts of speech. For e.g.-“I am going to school”. This is one English sentence. Here “I” is a subject; “am going” is verb phrase. Verb phrase means “auxiliary verb+ subsequent verb” and “to school” is an object. So structure of sentence is “Subject+Verb+Object”. Translation of this sentence in Marathi is “Mi shalet jaat ahe”. ‘I’ is translated as ‘Mi’in Marathi, ‘am’ becomes ‘ahe’, ‘going’ becomes ‘jaat’ and ‘to school’ becomes ‘shalet’in Marathi. Here “Mi” is Subject, “shalet” is an object and “jaat ahe” is a verb. So structure of sentence in Marathi is

<table>
<thead>
<tr>
<th>Language</th>
<th>English</th>
<th>Word</th>
<th>Sanskrit</th>
<th>Marathi</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>month</td>
<td>mother</td>
<td>new</td>
<td>navi</td>
</tr>
<tr>
<td></td>
<td>night</td>
<td>new</td>
<td>nakt</td>
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<td>nose</td>
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<td>naks</td>
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<tr>
<td>Sanskrit</td>
<td>mās</td>
<td>māt</td>
<td>nava</td>
<td>mahina</td>
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<td></td>
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</tr>
<tr>
<td>Marathi</td>
<td>mahina</td>
<td>mata</td>
<td>navin</td>
<td>ratra</td>
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<tr>
<td></td>
<td>naa</td>
<td>ratra</td>
<td>naa</td>
<td>naa</td>
</tr>
</tbody>
</table>
“Subject+Object+Verb”.

For proper language translation, it is necessary to understand the grammar of both languages.

4.2 English to Marathi Bilingual Dictionary

It is necessary to have dictionary. Because with the help of dictionary we get the corresponding Marathi word which plays important role in translation. Dictionary database is endless. Therefore we can extend the database according to need.

In dictionary we store English word, corresponding Marathi word. And transliteration of that word.

4.3 Adding Production Rules To Database

We have shown the production rules in table 2 for both English and the Marathi sentences side by side. ‘r’ represents the rule in English and ‘r’ represents corresponding rule in Marathi. There are individual sentence patterns for English and Marathi sentences. These rules are in pair wise. Because a sentence pattern in English must have a corresponding sentence pattern in Marathi which is used for language translation. These rules are predefined and must be precisely given in the language translation system. For the language translation purpose, an English sentence pattern will change to a Marathi sentence pattern according to a particular rule. This rule is given in the production rule table. In this table there are very few rules represented to give the idea that how the production rule works.

5 TRANSLATION PROCESS

5.1 Tokenization

Input is the assertive sentence, which should be grammatically correct. Then it converts the sentence into tokens i.e. words. We have used “open-nlp” in programming. Open-nlp is the open source tool, provided for performing different processes, which are required in translation. For tokenization have used “tokenize” method from “tokenizer” class.

Input: - Sentence
Output: - Word level Token

5.2 POS tagging:

Part of speech tagging is the process of assigning a part of speech to each word in the sentence. Identification of the parts of speech such as nouns, verbs, adjectives, adverbs for each word of the sentence helps in analyzing the role of each constituent in a sentence.

For this process, we need “tag” method from “tagger” class of open-nlp.

Input: - tokens
Output: - tag to each token

5.3 Search tokens into Dictionary

English to Marathi bilingual dictionary is maintained. Tokens which we got from 1st step are searched into the dictionary and given to translator.

Input: -token
Output: - corresponding Marathi word for each token

5.4 Search Rule into Database

As we have stated above, we are going to store the production rules in database. So the given sentence will be translated according to rule. For this, after pos tagging and getting appropriate Marathi word from dictionary, those Marathi words are arranged according to rule and corresponding Marathi translation is shown to user.

Input: - Source language sentence on which Pos tagging and tokenization is performed.
Output: - Rule matching and corresponding Marathi sentence

6. TRANSLATION PROCESS WITH EXAMPLE

Let us take following example and see the translation process:

E.g.- He gives me a pen.

1. First requirement is these words must be present in dic-
tionary.
If they are not present then enter them in dictionary.
2. To add the production rule for this sentence. We must to-
kenize it.then we get 5 words as 1.He, 2.gives, 3.me, 4.a, 5. Pen
3. Each word will be assigned one tag and index as follows:
He: [0] PRB (means Pronoun)
Gives: [0] VBZ (means Verb)
Me: [1] PRB (means Pronoun)
A: [0] DT (mean determiner/Article)
PEN: [0] NN (Means Noun)
Index indicates how many items are present of particular type.
Here in this example two pronouns are present so for “He”
index is [0] and for “Me”index is [1].
4. Then we add corresponding structure of target language.
If we translate the given sentence manually to Marathi then
sentence in Marathi is: “To mala pen deto”
So we need to add corresponding Marathi rule as –’He me a
pen gives’
Again we need to tokenize the target language sentence.
So we get tokens as follows:
He: [0] PRB (means Pronoun)
Me: [1] PRB (means Pronoun)
A: [0] DT (mean determiner/Article)
PEN: [0] NN (Means Noun)
Gives: [0] VBZ (means Verb)
5. So if we add rule to database it is stored as follows:
PRB-VBZ-PRB-DT-NN | PRB-PRB-DT-NN-VRB
Left part shows structure of English sentence and right part
shows corresponding rule in Marathi.
6. Thus we have words in dictionary and production rule to
database. Now when user will give input to translator as “He
gives me a pen”. This will match with above rule and it will
show output as”To mala pen deto”

7 CONCLUSION

In this paper, we have shown a totally new approach for
language translation. In India, there is very little work on Eng-
lish to Marathi language translation done. Among them this
research is totally a different one. The language translation
architecture that is represented here is not developed before.
The task that we have done in this paper can be extended
more. A lot research is possible in this field. We have tried to
keep variation among the English sentences that we have
translated into Marathi sentences. But we have not completed
all the variety of sentences. Since it is Natural Language Pro-
cessing (NLP) the number of variation is almost unlimited. It
is because the language is changeable according the time.
Many words are expired and not used nowadays. On the oth-
er hand, many new words are added in the language. This is a
Human Language Technology (HLT) that is people are mak-
ing new words of languages. So there is unlimited opportunity
to upgrade the current research.

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