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MT Application for the Translation Agency

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Abstract

We wrote this report in Japanese and translated it by NEC's machine translation system PIVOT/JE.)

IBS (International Business Service) is the company which does the documentation service which contains translation business. We introduced a machine translation system into translation business in earnest last year. The introduction of a machine translation system changed the form of our translation work. The translation work was divided into some steps and the person who isn't experienced became able to take it of the work of each of translation steps. As a result, a total translation cost reduced. In this paper, first, we report on the usage of our machine translation system. Next, we report on translation quality and the translation cost with a machine translation system. Lastly, we report on the merit which was gotten by introducing machine translation.

Introduction

We want to lower a translation cost. And then, at the same time, we want to make the work of the translation delightful. Recently, the economical and cheap machine translation system is developed. We introduced a mane translation system from 1990 and began to use it in earnest for translation business because our staff became able to use a machine translation system effectively. At present, we are using 25 personal computers, four UNIX work stations and four X stations. The translation machine is PIVOT/JE and PIVOT/EJ which is running on UNIX work station. Because these equipment connects each other on LAN, the input of original sentences and translation, laying-out editing (DTP) of a translated sentence the can be efficiently realized by it. In December 1990, we connected this LAN with personal computer communication network PC-VAN and ;an machine translation service between Japanese and English. PC-VAN has 104 access points in Japan and has equal to or more than 550 access points in North America through GEnie. The user transmits the original sences of Japanese or English to IBS using an electronic mail on PC-VAN. This document is downloaded and is sent to a translation machine. The translated document is sent, back by an electronic mail to a user. PC-VAN collects a translation charge with the charge of personal computer communication service and pays it for IBS.

2 The procedure of the machine translation in IBS

IBS receives various translation request. We look at original sentences and do the following decision,

- Does a translator translate?
- Does a translation machine translate first?

For example, a translator translates if the original sentences which were asked for the translation are a contract. To a document except the document which must be very strictly translated, we try to apply a translation machine.

By using a translation machine, the composition of translation work changes. In usual human translation work, a translator translates a source language into the target language. The person the mother tongue of whom is a target language rewrites it. The introduction of a translation machine divides translation work into some small steps. In case of us, the steps and the content of translation work are as follows.

- The registration of unregistered words
- The pre-editing of the original sentences
- The correction of a syntax analysis mistake of machine translation
- Rewriting

Example in case of the Japanese to English translation is shown below.

2.1 The registration of unregistered words

PIVOT is equipped with the technical term dictionary of 600,000 words. It is necessary to register the word which isn't contained in this to a user dictionary. Chiefly, at present, we register a noun.

2.2 Pre-editing

As for the machine translation, the ambiguousness of an expression in the original sentences gives translation quality a big influence. Therefore, there is an effect

greatly to make translation quality improve and pre-editing is important. The pre-editing is done based on some beforehand defined rules. The rule of our pre-editing is the following six.

1. Divide the long sentences of equal to or more than 60 letters into 2 sentences.
2. Don't omit the predicate and the auxiliary.
3. Don't use the idiomatic expression.
4. Rewrite the suedo noun, the equivocal word.
5. Don't write a sentence in the brackets.
6. Don't use the parallel of the unit which is smaller than a word.

A translator doesn't have to do this pre-editing. It is good if being the person who understands a source language (Japanese). A translation is done with a translation machine after doing pre-editing.

2.3 The correction of a syntax analysis mistake

To the input sentence that pre-editing was done according to above-mentioned six rules, a translation machine sometimes fails translating. Chiefly, the mistake of the machine translation is a syntax analysis mistake. PIVOT has the function to correct the result of a syntax analysis. When a mistake is left in a syntax analysis after the pre-editing, it is possible to correct this. And then, it is translated once again.

The rule of the correction of a syntax analysis mistake is as follows.

1. A part of speech
   - a particle/an auxiliary
   - a noun/the form of Japanese verbs and adjectives which has both finite and infinite usages
2. The main structure of the sentence
3. Parallel scope

It is possible to make the quality of the translated sentence improve certainly with this correction. An experienced translator doesn't have to do this correction. The person in charge of this step must understand the translation result right grammatically. A translator translates the sentence which it isn't possible to translate right even if a syntax analysis mistake is corrected.

2.4 Rewriting

It is necessary to rewrite the result with the translation machine to the natural English expression. The person the mother tongue of whom is English rewrites the result which a translation machine translated.

3 Translation quality by the machine translation

In each of above-mentioned translation steps, following translation quality shown in Figure 1 is gotten. This data is the result of the technical sentence of mechanical engineering field. The average number of tetters of original sentence is 38 letters and the average number of words of the translated sentence is 21 words.

By registering the unregistered words of the noun to a user dictionary, 38% of sentences are translated in a slight defect (above B).

It becomes 49% with the pre-editing which followed six rules. The pre-editing is 0.6 minutes per sentence.

It becomes 68% with the correction of the syntax analysis mistake which followed three rules. The correction of a syntax analysis mistake is 5.1 minutes per sentence.

The machine translation repeats a mistake with the same kind. It becomes possible to estimate the cause of a translation mistake by being experienced about the rewriting.

In our experiment, it is possible to rewrite 81% of the translated sentence after correcting the mistake of a syntax analysis without a reference to the original sentences. The rewriting is 1.6 minutes per sentence.

quality rank	registration of unregistered words	+pre-editing	+syntax analysis mistake correction
A:	17.4%	23.0%	32.1%
B:	20.9%	25.9%	35.8%
C:	23.9%	23.3%	15.8%
D:	28.0%	21.4%	12.8%
E:	9.7%	6.4%	3.5%

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A: perfect
B: slight defect
 - an article
 - number
 - spelling
 - the tense of an embedding sentence,
   the analysis of a compound word
C: moderate defect
 - the modifyee and the deep case of
   the free case arguments
 - a tense
 - a voice
D: serious defect
 - the modifyee and the deep case of
   the obligatory case arguments
 - a syntax analysis of comparative
   syntax, emphasis syntax and so on
 - the scope of negation
 - the sentence style analysis of a
   declarative sentence, an imperative sentence,
   a question sentence, a subjunctive
E: fatal defect
 - analysis impossibility/generation
impossibility
 - an entire non-sentence
 - the lack of necessary information
   (meaning obscurity)
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Figure 1. Translated sentence quality

4 The cost of machine translation

A translation cost by the translator and a cost of the translation when using a translation machine are compared. The experienced translator translates 1 page per

1 hour. The time required of the work of each step when using a translation machine is shown in Figure 2. We assume that there are 200words (English) in 1 page. The unit cost of the person in charge of each step is expressed as 1.

steps	(1) required time/page	(2) unit cost	(1) × (2)
pre-editing	5.6 min.	0.34	1.9
syntax analysis correction	48.0 min.	0.49	23.5
rewrite	15.0 min	0.57	8.6
human translation	60.0 min.	1.00	60.0

Figure 2. The required time and the unit cost in translation steps

1. Machine Translation + Human Translation
   81% of a translation sentence with a translation machine is rewritten.
   19% of sentences of the remainder are translated by a translator once again.
   translation cost:
   0.34 X 5.6+0.49 X 48.0+(0.57 X 15.0 X 0.81+1.00 X 60.0 X 0.19) = 43.7
   total required time:
   77.2 minutes(without the dictionary registration)
2. Human Translation only
   translation cost: 1.00 X 60=60
   total required time: 60.0 minutes

By the use of a translation machine, the summation with required time increases by 29% but the translation cost without dictionary registration decreases by 27%. By following improvement, a translation cost will decrease more.

- to choose the document that a translation machine is easy to translate it
- to make pre-editing more efficient
- to change the proportion of work time to use in each step

5 The merit of a machine translation system

An about half year passed after we began to use a machine translation system. Because the person in charge of each translation step does not have to be a translator, the unit cost of each step is small. So, a total translation cost can be reduced by using a translation machine.

Moreover, the following definite advantage is gotten.

- A lot of translators can share translation work because terminology is unified.
- To keep translation quality even if a translator changes becomes easy.
- The translator who doesn't have an enough experience can take it of translation work by translation work being divided into small steps.

The more indirect advantage below is gotten.

- Teamwork is built because a translation work person shares various work.
- Because work management becomes easy, we can introduce production technique like the manufacturer.
- The viewpoint of TQC becomes necessary and all staff begin to have an interest in translation work.

6 Conclusion

The machine translation system divides translation work into some steps.They are registration of unregistered words to user dictionary, pre-editing, correction of syntax analysis mistake of machine translation, rewriting. The person in charge of each translation step does not have to be an experienced translator. In our usage, it is possible to rewrite 81% of the sentences after syntax analysis correction. A translator must translate 19% of the sentences. The summation of required time of each steps increases. However, because a work cost in each step is small, it is possible to reduce a total translation cost by 27%.