The Impact of Machine Translation and Computer-aided Translation on Translators

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Abstract: Under the context of globalization, communications between countries and cultures are becoming increasingly frequent, which make it imperative to use some techniques to help translate. This paper is to explore the influence of computer-aided translation on translators, which is derived from the field of the computer-aided translation (CAT) and machine translation (MT). Followed by an introduction to the development of machine and computer-aided translation, it then depicts the technologies practicable to translators, which are trying to analyze the demand of designing the computer-aided translation so far in translation practice, and optimize the designation of computer-aided translation techniques, and analyze its operability in translation. The findings underline the advantages and disadvantages of MT and CAT tools, and the serviceability and future development of MT and CAT technologies. Finally, this thesis probes into the impact of these new technologies on translators in hope that more translators and translation researchers can learn to use such tools to improve their productivity.

1. Introduction
MT, the abbreviation of machine translation, is a branch subject of computer linguistics that analyzes the usage of computerized tools to translate context or conversation from one human language to another. The study of machine translation is based on the three disciplines of linguistics, mathematics and computer science. Machine translation effect is good or bad, it is entirely dependent on these three aspects of the joint efforts.

![Figure 1. The operators and process of machine translation](image-url)
It can be seen from Figure 1 that the translation process may be described as dictionaries and grammar rules applied by linguists, material formalization employed by mathematicians, software tools and hardware operated by computer scientists into the translation systems and finally lead to the translation results.

Computer-aided translation (CAT), a software using computer to help with translation, is working with the aid of the computer. CAT can help translators to translate better and help people to finish foreign language translation easily and effectively. CAT is a newly emerging study field, compared with other developed fields; the study on this field is relatively late. The CAT is normally made up by four major parts available to translators, including translation memory, terminology management, concordance and alignment programs.

2. The development of MT and CAT in Legal Translation

2.1. Development of MT and CAT in foreign countries
Since their emergence, MT and CAT have embarked on a winding and long path of development, which can be divided into the following four stages: opening period (1947-1964), frustration period (1965-1975), recovery period (1976-1989) and the new period (1990-present). Featuring rapidity and high performance, MT and CAT have revolutionized traditional manual translation. Impressed by its amazing advantages, machine and computer-aided translation have attracted attention from all over the world, which have consequently stimulated their development. On the other hand, machine and computer-aided translation are still confronted with multifarious obstructions to handle. However, it cannot be denied that MT and CAT have achieved tremendous progress and they have a bright future in terms of technologies and applications.

2.2. Development of machine translation in China
Research of machine translation in China has been highly valued by Chinese government since the initial stage. In 1956, MT was introduced in the Outline of National Scientific and Technological Development, and later was included in such major research programs as The Sixth Five-Year Plan, The Seventh Five-Year Plan and 863 Program. In 1957, Institute of language and Institute of Computing Technology in Chinese Academy of Sciences collaborated on a Russian-Chinese translation system and translated nine kinds of different complicated sentences. During the Cultural Revolution, machine translation experienced a 10-year standstill, but came to life again in the mid-1970s. From mid 1980s to early 1990s, there occurred two epoch-making translation systems– KY-1 and MT/EC 863, which indicated the significant progress made in China’s machine translation research. From early 1990s to now, China has witnessed unprecedented achievement in machine and computer-aided translation, and then launched various translation systems such as Transtar, Yaxin, Tongyi etc.

3. Advantages and Disadvantages of Machine Translation

3.1. Advantages of Machine Translation
Machine translation is ideal when you’ve got a large amount of content that requires fast translation, but doesn’t need anything more than a general meaning. Machine is the fastest translation type available and can be instant in most cases. This is because it’s a literal word-for-word translation and doesn’t take any other time-heavy factors into account. Contrast this to a professional translation, which can take quite some time if you’ve got a sizeable website.

The free nature of machine translation represents the biggest attraction for businesses with limited budgets. There is a myriad of free machine translation software available online, with Google Translate is the most popular one. But through research, you can find many other free alternatives. While still far from perfect, machine translation is constantly improving. With advances in technology, it is inevitable that machine translation follows suit and advances with it. One of these advances is neural machine translation, where a large neural network is used to maximize translation performance.
3.2. Disadvantages of Machine Translation

If the content you want to translate is an internal resource, then a machine translation would work. Again, this will depend on whether the content needs 100% accuracy, or is acceptable with some rough edges. As a rule of thumb, if the content will be seen by your customers, then you shouldn’t machine-translate it. Machine translations have poor accuracy as regards sentence construction and using correct words and meanings. Specific and technical terms are also difficult to translate. Often, machine translation looks more like source text than an actual sentence.

Due to their literal, word-for-word nature, machines don’t have the ability to add context or tone of voice to translations. Words have no meaning to a machine and they can’t differentiate the important from the unimportant. The end result resembles a robotic block of text that makes some sense but was written by someone with no understanding of the subject matter.

Using machine translations on all your content can be costly and not just in a monetary sense. Things like online legal documents or instruction manuals need to be 100% accurate. Mistakes here can cost huge sums of money or cause lasting damage to your company’s reputation. As mentioned above, machine translations are always improving as technology gets better. But these aren’t blanket improvements and a decent machine translation to one language may not be the case for another. Testing will show the quality of translation for one language but is no indication of how well other languages will translate. Therefore, machine translations are frequently imprecise because they obtain the words from a dictionary and adhere to the conditional restrictions set by the designer. The rate in different kinds of errors can be checked out in the following chart and analysis table.

![Figure 2. The rate in different kinds of errors in MT & CAT](image)

### Table 1. Effect of alignment models on different error rates, which were obtained by categorizations.

| Alignment Model | CER[%] | SER[%] | C-AER[%] |
|-----------------|--------|--------|----------|
| Model 1         | 6.0    | 7.9    | 16.8     |
| Model 3         | 6.6    | 8.9    | 15.5     |
| Model 5         | 6.1    | 8.0    | 10.5     |
| Model 7         | 6.2    | 8.1    | 10.4     |
| Model 9         | 5.9    | 7.8    | 10.3     |
| Model 11        | 6.1    | 7.9    | 10.2     |

4. The impact of MT and CAT on translators

Since the very beginning, MT and CAT have made tremendous progress. However, what is the development prospect of them? How will it continue to influence the translators? The following analysis from the comparison of machine translation and human translation will approach to the answers.

4.1. Polysemy

The phenomenon of polysemy in English is quite common; that is, a word has different meanings when collocated to different words. For instance, the word “branch” has several different meanings,
such as “a division of a plant’s stem” and “an administrative division of some larger or more complex organization”. Human translation selects meaning according to the context. In contrast, machine translation cannot decide meaning though context. It translates usually through the first meaning appeared in dictionary.

4.2. Part of speech
In English, a word usually has more than one part of speech, which poses another problem for machine translation. For example, “do” and “have” serve both as notional verb and auxiliary verb, but computer usually treats them as notional verb. Especially, those participles which serve as attribute or adverbial modifier but have the same form with predicate verb are usually treated as verbs by the computer. Unlike human translator, machine isn’t able to analyse the grammar of the whole sentence to judge which is predicate verb, attribute or adverbial modifier.

4.3. Syntactic ambiguity
Syntactic ambiguity of English is usually aroused by a modifier, such as a prepositional expression whose application is unclear. A speechmaker can use the same sentence to express different implications. Similarly, as for the same statement, different listeners can also have different reactions. Human to human communication takes place in specific context. Because the ambiguous syntax of language, if without given context or without the ability to analyze context, it will definitely be a challenge for machine translation to tackle syntactic ambiguity.

4.4. Dictionary volume
Natural language is a gigantic system of endless words and new words are being invented constantly. Words and sentences from literature, international affairs, major events and movies etc. are often cited. So even the latest software can’t cover all the new words such as Three Represents, Zip Gate, Webcast and so on. Since machine dictionaries are not able to collect all words, if words which are not collected in these dictionaries appear in the source text, it’s likely to result in ambiguity.

The above analyses show that there is a vast difference of human translators and translation machines when the source text has cultural connotations. Human translators can compensate the omitted information by such flexible ways as notes, paraphrase, and addition etc. In comparison, MT and CAT system lacks understanding of different cultures and is unable to overcome the cultural barriers. Influenced by different cultural conventions, translators convey the same idea in diversified methods. So while translating between various languages, cultures cannot be overlooked by the traditional translators. On the other hand, however, applying the MT and CAT software in translation practice can help the translators improve the operability and exert the efficiency of the designation.

5. Conclusion
From what have been discussed, in the present situation of translation practice and translation teaching, based on the software translation vocabularies database and the translation strategies, applying the MT and CAT on the translation practice, can improve the operability, improve the translation practice quality, speed up translation, and meet the demands of translation practice, accelerating the communications between different countries and different languages. Nevertheless, machine and computer-aided translation is still confronted with a lot of bottlenecks. Consequently we need to properly deal with the relation of human and machine. Human translators cannot totally depend on machine and computerized tools. Nowadays they can just take MT and CAT as a reference or a draft which needs further refinement by translators themselves.

Acknowledgments
This work was financially supported by the 2018 Scientific Research Project of Wuhan Polytechnic University: A Normalized Study on the Chinese-English Translation of Public Signs in Wuhan.
References

[1] S. Seneff, “TINA: A Natural Language System for Spoken Language Applications,” Computational Linguistics, vol. 18, no. 1, pp. 60–88, 1992.

[2] P. F. Brown, S. A. Della Pietra, V. J. Della Pietra, and R. L. Mercer, “The Mathematics of Machine Translation: Parameter Estimation,” Computational Linguistics, vol. 19, no. 2, pp. 260–314, 1993.

[3] F. J. Och, C. Tillmann, and H. Ney, “Improved Alignment Models for Statistical Machine Translation”, in EMNLP’99, pp. 18–28, 1999.

[4] R. Kuhn and R. de Mori, “Sentence Interpretation,” In Spoken Dialogues with Computers (R. de Mori, ed.), pp. 480–525, Academic Press, 1998.

[5] S. Miller, R. Bobrow, R. Ingria, and R. Schwartz, “Hidden Understanding Models of Natural Language,” in Proceedings of the Association of Computational Linguistics, pp. 21–33, 1994.