

Arabic Translation In the Context of Interactivity

الترجمة الى العربية في سياق التفاعلية

Nora, MAHDJOUR

University of Mascara (Algeria), nora.mahdjour@univ-mascara.dz

Received: 29/07/2022, Accepted: 17/09/2022, Published: 10/11/2022

Abstract

المخلص

Modern communication technologies have witnessed a miraculous development that they did not know before, with the emergence of the World Wide Web. What imposed the emergence of a new communication type called: Interactive Communication (IC)? The field of translation, in turn, was not immune to these developments. Scientists and Researchers have contributed to it by providing important data networks in the field of Interactivity through what is known today as Interactive-Neural Machine Translation(I-NMT). This is what we explain and analyze in this paper.

Keywords: Interactive Communication (IC), Machine Translation (MT), Artificial Intelligence (AI), Neural Machine Translation (I-NMT), Arabic Translation.

تشهد تقنيات التواصل تطورا سريعا يصعب التحكم فيه. ولعل أبرز مظاهر هذا الانفجار وأعظمه أثرا في عالم ووسائل الاتصال والتواصل البشري – اليوم- هو ظهور الشبكة العنكبوتية. الأمر الذي حتم ظهور نوع تواصل جديد؛ ألا وهو: التواصل التفاعلي. وحقل الترجمة بدوره لم يكن بمنأى عن هذه التطورات، فقد ساهم العلماء فيه بتقديم وسائل مهمة في مجال التفاعلية؛ من خلال ما يعرف اليوم بالترجمة التفاعلية العصبية، خدمة لمبدأ التواصلية. وهذا ما سنتعرض اليه بالشرح والتحليل في هذا المقال.

الكلمات المفتاحية: التواصل التفاعلي، الترجمة الآلية (MT)، الذكاء الاصطناعي (AI)، الترجمة التفاعلية العصبية (I-NMT)، الترجمة الى العربية.

1. INTRODUCTION

Through this paper, we try to give the different definitions of Neural Machine Translation (NMT) and demonstrate the importance of Interactivity in translation, and its effect on Human Interactive Communication, from the evidence that Neural Machine Translation (NMT) is one of the tools for Interactive Communication between languages in the age of globalization in all its forms and channels (*Sin-wai Chan, 2018*). This requires us to describe the Interactive Neural Machine Translation(I-NMT) process based on Interactivity, i.e. The relationship of Machine Translation (MT) to human translation, and its role in promoting Interactive Communication between languages.

Our dissertation is divided into two parts: the first is specialized that may be difficult for a non-expert in Machine Translation(MT), Programming Languages (PL) , and Artificial Intelligence (AI) to understand, while the second part interested all of us as Scientifics Researchers(SR); it is relates to the Google Translate, how its work and how to deal with it to obtain an acceptable translation, to make the translation process faster, more efficient; what means, a translation close to Interactive Neural Machine Translation(I-NMT) towards Neural Machine Translation (NMT) with the assisting of the Interactive Translator(IT), even machine translation studies talk today about the Deep Interactive Neural Translation Prediction (DINTP) (*Tiehang Duan, 2017*).

2. What does interactivity mean?

In the Cambridge dictionary, “interactivity” means an interactive system or computer program designed to involve the user in the exchange of information involving communication between people. In which the term ‘interactivity’ is closely related to ‘interactive system’ and “communication”. However, in *Quiring & Schweiger’s* terms interactivity’ became a significant buzzword during the late 1980s and early 1990s when the multi-media euphoria fascinated politicians, economists, and researchers alike, considering it an open term. But, the question of whether the meaning of ‘interactivity’ is the same as ‘interaction’ is still exposed in both social communication and man-machine-dialogue (*Quiring & Schweiger, 2008*).

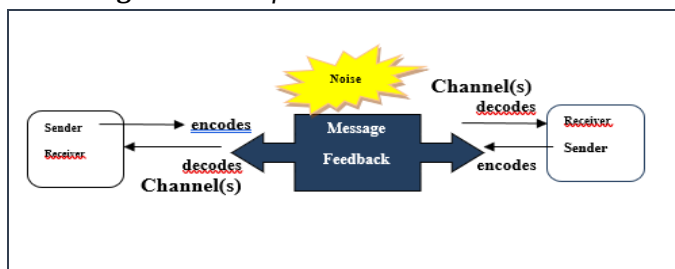
The concept of interactivity has become more and more closely related to multimedia where the internet can be taken as the best way of the interactive

community as reconceived can give feedback as well translator-computer interaction is also now considered interactive communication and it is still evolving.

2.1 What about Interactive communication?

Interactive communication is a modern term that includes developing forms of communication. The communication process occurs between humans or machines in both verbal and non-verbal channels. This is a relatively new model of communication for new technologies like the internet. These developing collaborative technologies, or new media, have rapidly increased the opportunities for interactive communication. Unlike The linear model of communication, the Interactive model of communication (as shown in figure:1), describes communication as a two-way process in which participants alternate positions as sender and receiver and generate meaning by sending and receiving feedback within physical and psychological contexts (Schramm, 1997).

Fig. 1. *Model of interactive communication*



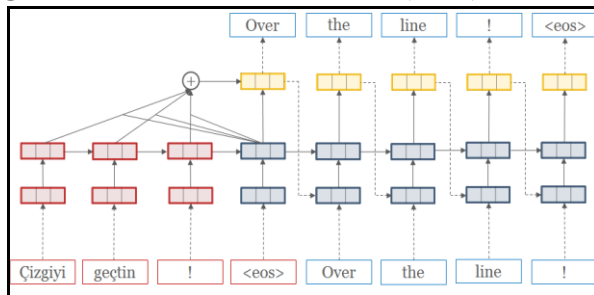
Source: Conceived by the author

2.2 Interactive -Neural Machine Translation (I-NMT) and (NMT):

Neural Machine Translation (NMT) is a recently proposed method of Machine Translation (MT). It is an end-to-end learning approach for automated translation, with the potential to overcome many of the weaknesses of conventional phrase-based translation systems (Yonghui Wu et al.,2016). Unlike traditional Machine Translation (MT), Neural Machine Translation (NMT) aims to build a single neural network (see figure 2) that can be adjusted jointly to maximize translation performance in a possible short time. Neural Machine Translation (NMT) is an extension of Machine Translation (MT), which works without the translator's intervention, but it is not good enough to produce high-quality translations, so it is common for

the translator to interfere in the translation process to improve the machine's translation output (MT output) so that he turns from a Translator in the common sense of the term to an Interactive Translator in the world of interactivity, through a typical intervention at some stage known as post-editing (PE) in addition to Interactive Translation Prediction (ITP), which includes the MT machine translation system and offers to the Interactive Translator (IT) suggestions for translation that he can accept or reject, here appear the true Interactivity of the translator with the programming language, and in this way a new and corrected suggestions are used by the (MT) machine.

Fig. 2. *Neural Machine Translation (NMT) architecture*



Source: (Image obtained from <https://opennmt.net/>)

The previous mentioned study concluded that Interactive- Neural Machine Translation (I-NMT) will be an effective alternative to non-assisted translation in terms of processing time, that is, translation based on (I-NMT) and translator interactivity is faster than what is known as Machine Translation (MT) based on post-PE editing (NMT), and from this the interactive factor speeded up the translation service, as shown by the results of this study, that the translation productivity of (I-NMT) is well compared to PE based on the (NMT) system, with the exception of some cases where the result was counterproductive, it was found that the performance and productivity of the PE-based on (MT) was more than the Interactive- Neural Machine Translation (I-NMT) by some translators who either: they are not a good ability at the interactive function, or that this is due to their position on technology in general, or the failure to recycle their skills in the Artificial Intelligence and technologies of human communication in the world of interactivity.

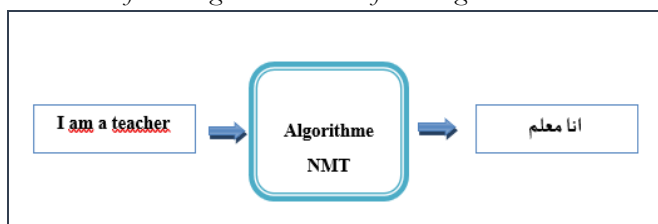
3. EXPERIMENTAL

3.1 English -Arabic NMT mechanism:

NMT uses a complex mathematical formula (represented as a neural network). As described earlier (see figure 2), this formula takes in a string of numbers as inputs and outputs a resulting string of numbers. The parameters of this network are formed through training the network with millions of sentence pairs (e.g. English and Arabic sentence pair translations). Each sentence pair modifies the neural network slightly as it runs through each sentence pair using an algorithm.

To give you a simplified example of an English to Arabic machine translation: "I am a teacher" is encoded into numbers 51, 32, 95, and 2 These numbers are input into a neural translation model and results in output 22, 94, 8, 34 which is then decoded into the Arabic translation "انا معلم" (Each number in the input and output represents a word in the English and Arabic dictionary and are always encoded and decoded accordingly).

Fig. 3. Translation from English to Arabic of the English sentence "I am a teacher"



Source: Conceived by the author

One important difficulty worth mentioning regarding NMT is consistency. Since neural networks are trained to learn upon volumes of data, they are not easy to tame and control. It may translate a particular word 'teacher' as 'معلم' in one scenario and as 'استاذ' in another scenario (both correct Arabic translations). This becomes particularly troublesome when it comes to translating names (people or companies) more examples are illustrated in the table (1) below.

Table 1. Comparison between NMT and I-NMT (English – Arabic) output

Input language	Output NMT	Translator I-NMT output
He will be the first to face the music.	سيكون أول من يواجه الموسيقى.	سيكون أول من سيواجه عواقب أفعاله.
Do you accept credit cards in selling.	هل تقبل الائتمان بطاقات في البيع.	هل تقبل بطاقات الائتمان في الشراء.
She thinks it's time to call it a day.	تعتقد أن الوقت قد حان لتسميته اليوم.	رات ان الوقت حان لتترك هذا الامر.

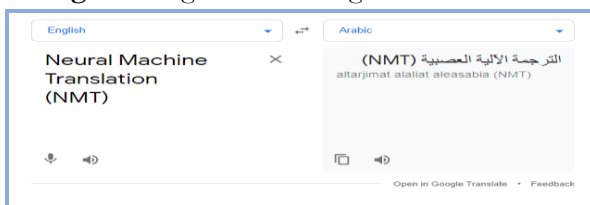
Source: Conceived by the author

3.2 What about Google Translate?

Google Translate is a free translation service developed by Google (see figure: 4), which can translate text, conversations, images, and websites simultaneously, between 103 supported languages in addition to fourteen languages being developed. The service was launched for the first time in April of 2006.

Today, Google Translate is mainly based on Neural Machine Translation (NMT), but without interactivity. Initially, the service started Statistical Machine Translation (SMT), and the research talks today about what is known as the Deep Interactive Neural Translation Prediction (DINTP) that SYSTRAN is developing. Which is one of the oldest companies in the field of Machine Translation (MT) in the defense department in the United States, and this company has provided very sophisticated Machine Translation programs in specialized fields such as media, defense, trade, and finance.

Fig. 4. "Google translate" English – Arabic service



Source: "Google translate" Screenshot

Where "Google translate" depends mainly on the algorithm of the translation program, the algorithm learns from the patterns and iterations in

which the phrases are translated into other languages on the Internet and from users, as it allows them to evaluate its translation whether it is "correct", "incorrect", or even "wrong", and it also provides several other options when you click on the translated phrases, and it learns from the translation chosen by the users. for example: In the past, "Google translate" was providing comical translations that did not take place either in the general context or about meaning, because it was mainly based on the principle of bilingual dictionaries word for word translation, the result for the French word: "Pomme de Terre" (Potatoes) in Arabic was: "تفاح الأرض" (Apple of the earth) instead of: "بطاطس", other than, after Neural Machine Translation (NMT) was approved, the translation given is: "بطاطس".

This is at the level of vocabulary, either at the level of sentences, especially long ones, literary texts and close to the literary style, as well as specialized texts such as the philosophical text, for example, the matter is very complicated, and we may go to the assertion of the impossibility of Google-Neural Machine Translation(G-NMT), and then Google's translate of such kind of texts due to the difficulty of terms and their equivalences in other languages is mostly wrong.

The site worked like other translation sites through statistics, first of all, by entering millions of documents and books that have been translated, in addition to the United Nations documents, which are translated into the six main languages, and then provides the linguistic data, which are already presented - by humans, after which "Google translate" picks the closest, most used, and most popular of these translations.

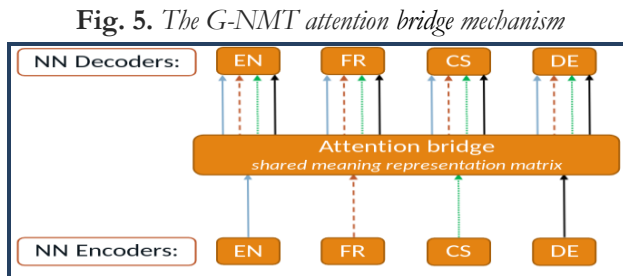
The difficulty is how to automate these huge and multiple linguistic accumulations. For example, you will find that the content written in the English language is more than in any other language, which makes you may find that the translation to and from English gives better results than any other translation between the other two languages.

3.4 Multilingual G-NMT:

In Google-Neural Machine Translation (G-NMT) multilingual system, the English language has been used as a bridge between any two languages, what we called a "Zero-Shot Translation "operation or "language-independent attention bridge" mechanism (see figure 5).

Since if you want to translate a word from Arabic to French, for example, Arabic will be translated first into English, then the translation will

be from English to French, and of course, all this process will happen in the least part of the second. This means that when translating between two languages that are not between them English, the Google-Neural Machine Translation (G-NMT) performs two consecutive operations and this will increase the rate of loss in translation, according to *Gina Abou Fadel*, Professor of Languages and Translation, Saint Joseph University, Ecole de Traducteurs et d'Interprètes de Beyrouth (2005 (جينا ابوفاضل سعد)).



Source: Image obtained from <https://medium.com/>

4. RESULTS AND DISCUSSION

However, the question that presents itself, is why “Google Translate” translation was not as good as that provided by other Machine Translation programs such as SYSTRAN for example. The answer to this question due to three main points:

- Google translate does not know the culture and it is not a specialized translation, therefore it may give you simple translations when you do not need them, and very complex translations when you do not need them
- Google Statistical translation does not have a human mind, as we mentioned earlier, this Google translation system relies on statistics, and the best translation for what has been used by the translators, regardless of the kinds of texts and contexts of these words, why does not, for example, give you the most effective sentence on the reader, or the most attractive sentences and words, but the most commonly used.

- The grammatical rules of languages, another important reason is the weakness of “Google Translate” and other MT programs, because each language has a specific rule, and Google's statistical learning method cannot, unfortunately, be able to learn the grammar of each language, which makes the sentences free of rules when translating into languages that are called romantic languages because of their grammatical distinction between gender (masculine and feminine). In this sentence:

“*They don’t accept to participate in our forum*” since the equivalent of “**they**” in Arabic is: هم or هن or هما (للمؤنث والمذكر).

“رفضوا المشاركة في المنتدى” - “رفضن المشاركة في المنتدى” - “رفضوا المشاركة في المنتدى”
- “رفضنا المشاركة في المنتدى”.

In a paper presented by *Lina Malkawi*, a Ph.D. researcher at the Department of Computer Science at Yarmouk University in Jordan and who graduated from the American University of Information Systems related to “Google translate”, the researcher proposed a guideline for translating from Arabic into English and other languages than English.

4.1 Translating from Arabic into English:

In translating Arabic into English, it is better to use simple, standard Arabic, similar to what may be found on news websites, avoiding rhetoric. It is also recommended to use the sentence structure that begins with the name and then the verb as in the structure of the English sentence,

For example: “مختبر الأنساق والبنىات والنماذج” أقام يوما دراسيا حول التواصلية (The Laboratory of Systems, Structures, and Models set up a study day on communicative action) instead of:

“أقام مختبر الأنساق والبنىات والنماذج” يوما دراسيا حول التواصلية”

In addition, using long Arabic sentences, then the verb may follow more than ten words before the subject arrives, which makes it difficult for “Google translate” to move the verb to its correct place in the English sentence, but many automated translation systems delete the verb completely. It is suggested that in the case of the inability to revise the translation by an expert translator, the phrase “This text translated by “Google translate” « هذا النص ترجم بواسطة ترجمة جوجل » should be added to alert the reader to the possibility of problems in the meaning.

4.2 Translating from Arabic and to other languages than English:

As for translation from other languages (other than English) into Arabic, the researcher indicates that “Google Translate” uses a method called “bridging” (As noted above in *Multilingual G-NMT*), where English is used as a bridge between the Arabic language and the third language, for example for translation from German to Arabic, “Google Translate” translates the German text into English first and then into Arabic. This may cause additional errors. For example, both Arabic and German use the masculine and feminine of the plural, but English does not. Also, words that allow more than one meaning lead to loss of meaning in translation as previously mentioned.

5. CONCLUSION

Despite the disadvantages of Neural Machine Translation (NMT) as provided by “google translate”, this system can overcome the obstacles that were facing human communication in the short possible time and for free, but it is still far from the productivity achieved by Interactive Translator (IT), who has a more ambitious aim, to produce translations that satisfy the linguistic norms of the target culture and are adapted to the assumed knowledge of its readers to overcome language barriers. To serve this end of human communication, Machine Translation (MT) in Neural Machine Translation (NMT) and other technologies such as Interactive Neural Machine Translation (I-NMT), became the first Interactive human requirement in the era of Interactive Communication.

It is also important to mention that while the benefits of NMT have made it an indispensable part of translation management and workflow, NMT still requires human translators to review and post-edit of machine translation between languages. We believe the translator will always play a critical step in machine translation to review the accuracy and context of the machine. Neural Machine Translation (NMT) is essential but Interactive Translator (IT) is not getting replaced in the world of interactivity.

6. Bibliography List :

- **Books :**

- جينا أبو فاضل سعد، (2005). المترجم في عمارة النص، منشورات جامعة القديس يوسف، بيروت، لبنان .

- Koehn, P. (2020). Basics In Neural Machine Translation (pp. 65-66). Cambridge: Cambridge University Press.
- Minako O'Hagan, David Ashworth, (2002). Translation-mediated Communication in a Digital World: Facing the Challenges.
- Schramm, W. (1997). The beginnings of communication study in America. Thousand Oaks, CA: Sage.
- **Journal article :**
 - Barrachina, Sergio, Oliver Bender, Francisco Casacuberta, Jorge Civera, Elsa Cubel, Shahram Khadivi, Antonio Lagarda, Hermann Ney, Jesús Tomás, Enrique Vidal, and Juan-Miguel Vilar. (2008). Statistical approaches to computer-assisted translation. *Computational Linguistics*, 35(1):3–28.
 - Katyanna Quach, (2016). Google's neural network learns to translate languages it hasn't been trained on: First-time machine translation has used true transfer learning,
 - Knowles, Rebecca, and Philipp Koehn. (2016). Neural interactive translation prediction. In *Proceedings of the Conference of the Association for*
 - *Deep Learning Networks and Its Application in Neural Machine Translation*, Proquest LLC.
 - Wuebker, Joern, Spence Green, John DeNero, Sasa Hasan, and Minh-Thang Luong. (2016). Models and inference for prefix-constrained machine translation in the Americas (AMTA), Austin, TX.
 - Sin-wai Chan, (2018), *The Human Factor in Machine Translation*, Routledge, Taylor & Francis Group.
 - Tiehang Duan, et al. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (ACL)*, Berlin, Germany.
 - Yonghui Wu, et al, (2016). Google's Neural Machine Translation System: Bridging the Gap between Human and Machine Translation, arXiv:1609.08144v2 [cs.CL].

- **Seminar article:**

- Green, Spence, Sida I. Wang, Jason Chuang, Jeffrey Heer, Sebastian Schuster, and Christopher D. Manning. (2014). Human effort and machine learnability in computer-aided translation. In Proceedings the Conference on Empirical Methods in Natural Language Processing (EMNLP), Doha, Qatar.
- Lewis-Kraus, Gideon, (2016). "The Great A.I. Awakening". The New York Times. The USA.
- Rebecca Knowles, (2019). A User Study of Neural Interactive Translation Prediction, Marina Sanchez-Torreon, and Philipp Koehn, Machine Translation Journal Special Issue on Human Factors in Neural Machine Translation.
- Wolfgang Schweiger & Oliver Quiring – (2008) -Interactivity: A Review of the Concept and a Framework for Analysis. Communications 33 (2):147-167.

1. Internet websites:

- Nordby, H. (2006). Face-to-face and interactive communication: A perspective from philosophy of mind and language. Seminar. Net, Vol. 2, Issue 2 http://seminar.net/images/stories/vol2issue2/halvor_nordby.pdf, (consulted on 20/03/2021).
- <https://dictionary.cambridge.org/dictionary/english/interactive> (consulted on 11/03/2021).