

Problems of Machine Translation Systems in Arabic

May Al Shaikhli

Department of English Language and Translation, Amman Arab University, Amman, Jordan

Abstract—the human need for language translation has been increasing because of knowledge fields' expansion and open communications across all countries throughout the world. Accordingly, the traditional translation has become insufficient and machine translation is the best alternative. However, despite its astounding development during the past decades, as an inevitable alternative, machine translation still faces many challenges that make it incomparable with human professional translation. This indicates that machine translation in all its types has to be supported by highly-developed tools that can enhance its effectiveness. This study showed the advantages of machine translation, discussed some of its most common challenges, and accordingly introduced some recommendations that should be taken into account to improve its effectiveness regarding Arabic Language.

Index Terms—Machine Translation (MT), Human Translation (HT), source language, target language, translation approaches

I. INTRODUCTION

Language translation is deeply rooted in linguistics as the languages are different and need translation to be understood by foreign people. It is known that languages' translation assisted linguistic communication among people of different civilizations (Prentice & Kinden, 2018). In the past centuries, translation was being needed in some urgent necessary situations, such as the presence of a translator to translate between rulers of different countries, doctors and patients, traders from different nations to facilitate communications between the individuals.

The communications' complexity between different nations in the past entailed the need for translation just in some persistent situations (Zhao, 2021). However, during the 20th century, communications throughout the world have extended and countries' barriers have diminished by globalization (Zong, 2018). In addition, information and communication technology revolutions, especially with the internet prevalence, have appeared astonishingly so that the world has become a small village.

Subsequently, with this accelerating development in telecommunications, knowledge has expanded leading to multiplicity in science fields; e-learning, e-commerce, e-business, and other knowledge branches that affirmed the translation necessity not just between common languages, but also between different languages where human's translation is rarely found and insufficient. In this context, translation has extended so that, it has inevitably been practiced in all science dimensions. Students need translation to get a good understanding of their different academic options in a foreign language, companies need translation for global competition, consumers need translation to know and to buy foreign products that match their requirements and expectations, scientists need translation to increase their scientific knowledge, employees need translation to get new professional skills, etc.

All that has been mentioned above and others assert that multi-language translation has been inevitable today and human translation has been no longer sufficient (Imre, 2015, pp. 99-100). Hereby, Machine translation (MT) was the alternative solution that could be used to solve the problem of multi-language translation (Prentice & Kinden, 2018). Since its appearance, MT's shortcomings motivated language translation developers and researchers to search for improvements to solve its pitfalls. Accordingly, the successive scientists' efforts have paid off, especially for online translation, which depended on highly developed translation techniques, such as statistical translation, Interlingua translation, example-based translation, etc.

Although MT has helped humans in the translation process via having highly developed techniques, they are still incompletely satisfied compared with professional human translation, especially from the rhetoric dimension. MT has been complaining about some linguistic problems that persistently need effective solutions (Adil, 2020). This study focuses on discussing some MT problems, suggestions to solve these problems, in addition to some common advantages of MT with some simple explanatory examples.

II. HISTORY OF MACHINE TRANSLATION

Warren Weaver was the first to use a computer in translation in 1947. Since 1949, MT research in the United States has moved forward at the universities of California, Los Angeles, Texas, and others (Elsayed & Fathy, 2020). The first translation from Russian into English was successfully performed in 1954. In 1955, the first experiment in machine

translation from English to Russian in mathematics was conducted in the Soviet Union (based on a 2,300-word dictionary) (Gaspari & Hutchins, 2007).

During this period, research continued using the so-called first generation of machine translation programs (Wang et al., 2018). Until 1966, the enormous difficulties facing machine translation became clear, which led to a slowdown in machine translation research and perhaps neglecting the topic until 1975 (Gaspari & Hutchins, 2007). However, the interest in machine translation in Europe and Canada between 1975 and 1985 motivated a return to research in the MT field for a decade. During that the second generation of machine translation programs were developed; the appearance of expert systems and the limitations of natural language processing (Alsohybe et al., 2017, p. 14).

During this period, there was the development of scientific research in natural language processing, especially European and Japanese languages (Elsayed & Fathy, 2020). This development included lexical research, grammar, morphology, and semantics. During this period, modern artificial intelligence methods have also developed, which are based on the use of mathematical and computer patterns that simulate the work of humans. The methods of neural networks, expert systems, fuzzy logic, and genetic algorithms all contain mathematical methods that mimic what is happening in the human brain (Schwartz, 2018).

In 1989, a new era began in MT based on statistical information, when the ABM Company established its project "Carded project". The "carded project" was based on translation with examples, translation with the limited subject matter, and the multilingualism of the source and target languages. This project was followed by an unprecedented increase in interest in machine translation. Thus, the 1990s can be regarded the period of the emergence of the 3rd generation of MT programs based on Corpus-based, which is still developing today with some integration with other methods of machine translation.

A. *Why Machine Translation*

There are more than 4000 languages throughout the world (Goetschalckx et al., 2001). The Arabic language is among the top ten languages if we take into account the number of native speakers (Elsherif & Soomro, 2017). Hence, we are witnessing expansive knowledge in different languages, which inevitably require us to know well multiple languages, which is very difficult for most people. In addition, today, there is a huge amount of what needs to be translated, which is not enough for human translators to do.

There are now approximately 1,000 MT programs (especially for European languages) in the market (Tang et al., 2020). Despite MT quality is insufficient compared to human translation; the human's need for MT is generally very persistent. This is attributed to the fact that the Internet has increased the need for MT and it is an easy way to deliver the translated material to those who need it (Zaki, 2008).

Therefore, the process of translating from a language (source language) to another (target language) electronically is very important. Lai and Wan (2021) stated that if we want to see the latest findings of science, then either we have to learn another language (or languages) besides our native language, or have the science issued in other languages in its translated form.

We frequently witness new versions of scientific books determined as accredited courses for teaching in universities. However, we can imagine a scientific book taught in a university in a specific field (maybe genetics, biology, architectural design, pharmacy, etc.) and updated by a new version every year or even two or three years. Such a book needs the human translator to update the book's translation with the latest version of the source synchronously. This behavior needs huge efforts and costs as well as a long time.

In this context, Zaki (2008, pp. 420-421) stated that one year I spent translating an accredited engineering book from English into Arabic language. That is book was one of the scientific books taught in electrical engineering departments of many universities throughout the world, since the nineties in the last century. Nevertheless, when I have just finished the translated version, another version of the original book was issued. At that time, I decided to update the book's translation for the latest original version which also consumed more time and thus led to the delay of the Arabic translated version

This simple example asserts the importance of MT. MT, even as aiding translation tool minimizes the time and efforts needed for language translation where the knowledge in its various fields is very accumulative and expansive and thus the human translation has become insufficient.

The second reason for the importance of MT is that the translation process for human translators is a boring and slow (He et al., 2020); the translators may be exposed to boredom, sickness personal or social problems. Such hard conditions may push translators to change their style, which negatively influences their work, or, at least, delays the translation process.

The translator is often fluent in one language (the mother tongue) from which he or she translates (Omar & Gomaa, 2020). This means that, there is a severe scarcity of those who are also fluent in another foreign language such as: English, Korean, or Japanese besides the mother language. This gives additional importance to machine translation, as the computer can work 24 hours a day, does not take a vacation at the weekend, and can be replaced by another one better in its performance.

Commercial purpose is also a persistent reason for MT. Commercial sectors need translation to provide customers in other countries with a good idea about their products' brands taking into account much information that need translation to multiple languages (Xie et al., 2021).

B. Machine Translation Levels - simulation of the Human Translation Process

According to the efficiency in translation, MT programs can be classified into the following levels (Lindstromberg & Eyckmans, 2020):

1. Low Level

The process of replacing a word with an equivalent word. This needs a huge bilingual dictionary. Here, it should be taken into account that some words have no equivalent, others need more than one word, and the others have more than the corresponding word, and so on (Zaki, 2008).

2. Intermediate Level

It is the level of performing morphological manipulations to get standard expressions for reducing the size of the lexicon required (Elsherif & Soomro, 2017). Accordingly, there is a need to deal with words at a hidden level so that the word can be described morphologically and grammatically (Maruf et al., 2021). Under this level is the method of translation by direct examples, where there is a linguistic corpus of parallel phrases; phrase by phrase.

a. The First Intermediate Level

To get the source sentence correctly, a parsing tree must be formed for the original sentence, and then projected onto the target language. Therefore, there is a need for a grammatical analyzer in addition to a bilingual lexicon (Hasabnis & Sekar, 2016).

b. The Second Intermediate Level

Many linguistic phenomena cannot be transferred from one language to another by mere grammatical and morphological analysis (Rubino & Sumita, 2020). For example, if we say "رأسي يؤلمني" in Arabic language, it could be translated as "I have a headache". Accordingly, it is necessary to understand the meaning and represent it properly so an equivalent that can be found in the target language. Accordingly, the lexicon must be developed to contain a translation of such corresponding meanings. That is why most machine translation programs today contain a morphological and syntactic parser and some kind of semantic representation for such cases.

c. High Level

At this level, deep rhetorical methods should be applied in SL and TL. Research at this level still takes different dimensions and requires linguistic studies and deep computer representation (Zaki, 2008). The achievement of this level reflects a clear shortcoming in MT programs available today.

Machine translation is an automated process of translating one natural language to another one (Alqudsi et al., 2014). MT approaches are classified into three main divisions; direct MT, Rule-based MT, and Corpus-based MT. Further, the Rule-based MT approach can be categorized into transfer based approach and Interlingua approach, whereas Corpus base MT can be categorized into a statistical approach and example-based approach

C. Efficiency

According to Lai and Wan (2021, p. 3), manual translation (human translation) depends on each individual’s linguistic abilities, which indicates that the translation efficiency is different from one to another. Compared with manual translation, computer-based translation is described as fast translation (Gaspari & Hutchins, 2007). In addition, computer-based translation is characterized by ensuring more consistency and comprehensibility than manual translation providing extreme translation efficiency. The table below (Table 1) describes the simple comparison differences between the traditional and computer-based translations.

TABLE 1
COMPARISON OF THE CHARACTERISTICS OF MANUAL TRANSLATION AND COMPUTER-AIDED TRANSLATION

Manual translation	Computer based translation
Low level of accuracy	High level of accuracy
Low level of efficiency	Medium level of efficiency
Inconsistent style of translation	Term and memory base
Human and material resources	Machine based resources

(Source: Lai & Wan, 2021)

1. MT Has Application of Memory and Translation Reference

MT system has a bank memory of terms that can provide translation facilities. By using MT system to translate a text word, the system performs an effective mission by backup function. When an individual uses MT system for translation text word that has been translated in a previous time, the translation system will retrieve the previously translated word from the memory and provide it as a translation reference (Zheng, 2015). This function assists people to achieve translation efficiently; saving human time and effort.

2. Professional Translation Library

MT has a professional library of terminology. During translation process, the system calls the required terms from its terminology database in consistent and fast lexical style (Esplà-Gomis, Sánchez-Martínez, & Forcada, 2015; Xie et al., 2021). Moreover, the system provides helps users to build their terminology library extending the translation database by accommodating new terms not available in the system's database (Adil, 2020). This property is very helpful for scholars and academics interesting research and academic articles providing a more professional translation style.

3. Flexibility of Different Word Vocabularies

The English language includes words that have different vocabularies forms according to English-speaking countries, such as English, American, Canadian, etc. This makes the same text word have different writing forms (e.g. "color" in American English language is "color" in British English language, "center" in American English language is "center" in the English language). However, the MT system can use different vocabularies for the same word according to the user's requirements (Sutopo & Said, 2020). This flexible linguistic property helps users from different countries to use the most proper word in their scientific or business work.

4. Translation Voice Accompanied with Translated Terms

MT system has been developed to include a voice system for the translated terms (Kim et al., 2021). This significant property assists users to learn words' spelling easily; especially it can be applied in dual mode (i.e. the target term and its opposite translation). In this context, students can learn more words' spelling properly with support to split the word into sections based on its pronunciation letters. For instance,

Communication is pronounced as "komm u ni ka shen"

Station is pronounced as "sta shen"

Hours is pronounced as "ours"

Such words are found in hard-copy dictionaries split into sections giving simple linguistic configuration about the English words pronunciations. Therefore, MT saved time and effort exhausted by users to find the proper pronunciations and split the target words into their sections.

5. Translation Capacity for Different Languages

MT system has been developed to accommodate different languages for translation purpose (Zong, 2018).

6. Ease of Access and Little Effort Required

Compared with a manual translation system, MT system needs less time and effort the user to start the translation process (Filmer, 2019; Kim et al., 2021). On the contrary, the manual translation needs the user to prepare a dictionary and search manually and alphabetically to find the target term. This property of MT system is very crucial for students where the time needed for translation is invaluable and sensitive to be invested in other academic activities.

7. Up-to-date Translation Terminology

MT system usually comprises up-to-date terminology (Soum-Paris, 2021). Particularly, online translation systems include the latest version of terminology. In this context, scholars and academics may find the new terms of their fields. Moreover, an online translation system allows the users to practice text translation efficiently; anytime and anywhere. Nowadays, mobile technology added a new merit to MT system; the users can access translation facilities using their mobile phones, tabs, or laptops (Panayiotou et al., 2019). Students can use their mobile technology to perform their academic activities or their scientific articles.

8. Quantity Capability of Translation

Ongoing development of MT system has led to more capacity of terms' translation (Prentice & Kinden, 2018). In its emerging growth, MT system was designed to accomplish word for word translation. This process has led the user to be confused owing to an inconsistent literal translation of the words regardless of their meaning integration and compatibility (Adil, 2020). Recently, computer-aided systems have been developed so that they can support text consistency. Accordingly, online translations have abilities to translate sentences consistently. Therefore, a word processed for translation may be given another suitable meaning when it is included in its original sentence. This translation advantage helped academics, scholars, and business owners to find a suitable scientific environment for their work achievement.

9. Providing Translation of a Paragraph as a Whole

MT systems have been developed to be able to translate a paragraph in a consistent style. This property is very enjoyable for people who are interested in translating a text in a very short time, especially if they like to get a summary or simple concept about the translated text (Soum-Paris, 2021). For example, a consumer from Jordan may use an online translator who knows some information about a foreign product from China or Japan.

III. SHORTCOMINGS OF MT SYSTEM OF ARABIC LANGUAGE DISCUSSION

Despite several advantages that MT systems provide, people face some problems during translation. Such problems are regarded as shortcomings of MT system and require solutions that improve the translation process and develop its tools to be as eligible as the human-mind translation effectiveness.

A. Computer Dictionaries in Other Languages

Dictionaries vary greatly in their contents; there is no universal pattern that computerized dictionaries adhere to (Koul & Manvi, 2021). It differs from one language to another as well as between the scientific and commercial authorities that set the dictionaries' specifications and supply them with linguistic information. Therefore, we may find monolingual dictionaries that describe the vocabulary, inflections, and meanings of a language, and bilingual or multilingual dictionaries. These dictionaries are based on the dictionaries of each of the constituent languages. Therefore, any lexicon that contains Arabic with another language or languages needs essentially a computerized monolingual Arabic lexicon.

Particularly, for the Arabic language, the emergence of a computerized Arabic dictionary has now been delayed, and further delay will prompt commercial companies to build their deficient dictionaries because of their commercial needs (Harrat et al., 2019; Luqman & Mahmoud, 2020). Some companies have already started collecting colloquial speech to be the basis for speech recognition devices, which reduces the use of the classical language and spreads colloquial dialects and their writing. This will lead to the prevalence of dialects to be different languages so that the speaker does not understand one another.

B. Spoken Translation

Up today Thus far, there is no reliable and immediate machine translation for the spoken translation, but what is available does not exceed audio dictionaries or translation of phrases between multiple languages (Freng et al., 2012). Such systems may be found as simple applications used in hotel reservations, airline reservations, participating in conferences, ordering food from restaurants, and reservations at medical clinics, hospitals, car rentals, etc.

The problems of spoken speech translation outweigh the problems of written text because there is usually a lot of circulating speech which includes grammatical errors or incomplete sentences (Kang, 2021). Some of these problems can be solved by specific structural analysis. For example, we can neglect the order of words or neglect some auxiliary words in the sentence. This means laying down flexible grammar for immediate machine translation. This determines the range of words the speaker uses, the way the words are pronounced, the speed of pronunciation, the length of the sentence, and the pauses between sentences.

C. Literal Translation by Word-to-word

Most MT systems depend on word- for -word translation. This type of translation mostly leads the user to get the wrongful meaning of the target text as the literal translation changes the meaning of the translated text (Soum-Paris, 2021). This translation problem seems to be more crucial when the user depends on MT system to make decisions in case of business scientific work results or report some research findings.

D. The Accuracy of Scientific Vocabularies

Most MT systems use general and very simple terms for translation. This may be easy for a user to comprehend the meaning of original words, but at the same time, they lead to broken translated language (Sim & Pop, 2012). In this context, many scientific fields have particular terms that cannot be translated in general meaning, rather they need to be translated to their synonyms in the target language (Zhao, 2021, p. 3). For instance, we may find a term in the English language is translated to a general simple term in English language lacking its value in its specific meaning. Koul and Manvi (2021) mentioned that accuracy of vocabularies translation from language to another by MT system is still low.

E. Difficulty in Calling Synonymous Meaning

Each language has some terminology that cannot be expressed meaningfully to the other languages (Harrat et al., 2019). However, this is not attributed to the shortcoming in the foreign language, but the special properties of the source language. This may be more present in the Arabic language more than in other languages. This characteristic in the Arabic language is highly apparent in the "Quran" more than in any linguistic position. For example,

The word "هيهات" in the Arabic language is translated to "far or no way" in the English language,

Also,

The word "فَأَسْقَيْنَاكُمُوهُ"; in Quran is translated to "we gave you water to drink" in the English language.

Many other words in the Arabic language cannot be sufficiently translated to the other languages.

Generally, maintaining the structure of the original text but providing inaccurate translation from one side or maintaining the similar meaning of the original text but at the expense of the original text, the structure is regarded as a problematic linguistic issue. In this context, some language philosophers see that a sentence in a particular language (target language) cannot be a translation of another sentence in another language (source language), as the translation cannot be a substitute for the original text (Luqman & Mahmoud, 2020). For example:

"رهن الإشارة"

It can be translated as follows to give the similar meaning:

"At one's back and calls"

Similarly, the following sentence in the Arabic language:

سبق السيف العدل”

Can be translated as follows to give the similar meaning in English language

”lock the barn door after the horse is stolen”.

By looking at these two sentences, we find two different structures in two completely different contexts, but in return, they perform the meaning but in two contexts compatible with the culture of each. In this case, the focus was on the meaning at the expense of the sentence structure and using words completely different from those mentioned in the original language text. On the other hand, we find that if an equivalent phrase is used in the original text, taking into account its syntactic structure of the original text, we will undoubtedly obtain an equivalent sentence in terms of pronunciation and structure, but it will be far from being a translation of the sentence of the original language because it will become a meaningless sentence.

Subsequently, which one should we select? maintaining the similar meaning or maintaining the same structure of the original text. However, as we focus in the translation process on the meaning of the source sentence, we must also focus on the context of the source text rather than its structure.

F. Difficulty in Identifying Rhetorical Devices

MT system is unable to identify the rhetorical devices of the original translated text. This indicates that the translation system cannot provide enough description of the emotional expressions (Fan, 2021; Karasaliu, 2016). In this context, The Arabic language is rich in rhetorical expressions that cannot be translated into their original meaning. Alliteration, metaphors are examples of rhetorical expressions in the Arabic language that are difficult to be translated in their accurate meaning in other languages. Typically, as each language has its own rhetorical devices, the translation process by computer-aided systems is usually difficult to be accurate in expressing their core meanings. Additionally, the translation of rhetorical devices is described by a lack of coherence and logic.

Many linguistic issues are tackled in human translation in a way that cannot be done by machine translation. “Linguistic pragmatics” is a science in linguistics that was created to express the meaning of the source language terms based on its intent expressions rather than vocabulary context. Accordingly, a text in the source language may be translated to the target language in its intended meaning regardless of its Tran scripted context. The table below (Table 2) shows some expressions in Arabic, their machine translation, and their intended meaning.

TABLE 2
SOME PROVERBS IN ARABIC LANGUAGE, THEIR CORRESPONDING TRANSLATION, AND INTENT MEANING IN ENGLISH

Source language	Target Language (by MT)	Intent Meaning
رجع بخفي حنين	Come back with nostalgia	Description: One attempts hardly to do a thing but failed to do it
قطعت جبهة قول كل خطيب	I cut off the preparation of every preacher's speech	Description: When a decision comes surprisingly and stops the whole discussion
رحم الله امرء عرف قدر نفسه	May God have mercy on a person who knows his own destiny	Meaning that: Best for a one to not exaggerate his/her abilities
إن غداً لتأخره قريب	Tomorrow is close to seeing it	Meaning that: Waiting is better than preceding what will happen
كل وعاء بما فيه ينضح	Each pot including exude	Meaning that: Everyone reflects his/her real culture

Above were some proverbs in Arabic language and its machine translation in English language. It is clear that direct translation of the text according to the pronunciation does not meet the true meaning of the text. This example clarifies the MT pitfall to express the target meaning of the translated text in relation to human translation.

IV. RECOMMENDATIONS AND CONCLUSION

Based on the discussion and literature review above, the following recommendations can be made:

1. Since no optimal method of translation has been found yet and it may take two decades or more to arrive at an accurate general method for machine translation, adopting more than one method in parallel is what is favored now. There are many types of research based on the adoption of multiple methods simultaneously to translate the same text and then choose between them.

2. The necessity for a computerized Arabic dictionary. Such a dictionary can facilitate the translation between Arabic languages and other foreign languages. Until now, the statistical language translation is regarded as the most effective translation method. Therefore, it is very necessary for the computerized Arabic dictionary that can accommodate as much as possible terminology that can serve all scientific fields.

3. The literature on MT indicated that MT has realized a very developed level of languages translation. Even though, MT cannot achieve the quality level of professional traditional translation. Therefore, it is highly recommended that we cannot depend totally on MT, but partially on feedback and corrections to suit the best terminology we need.

4. Researchers and developers of companies concerned with MT have to devote much more effort to improve and develop MT performance. Many translation tools and techniques are still required to enhance the MT process and provide high-quality translation outcomes.

The accelerating growth that the world has witnessed since the beginning of the 20th century has led to a breakthrough in knowledge in all science fields spheres of life and changed the countries to be much more connected. With this huge change, the translation between multiple languages has become more persistent in terms of quantity and speed, where the traditional translation by humans has no longer been sufficient. Machine translation has been developed to solve this dilemma. Yet, until now, machine translation is suffering from many challenges concerning reliability and consistency. The current study has been focused to discuss some machine translation challenges with manifesting some common advantages and accordingly provided a set of recommendations as solutions for machine translation to be more efficient.

REFERENCES

- [1] Adil, M. (2020). Exploring the role of translation in communicative language teaching or the communicative approach. *SAGE Open*, 10(2), 1-10. <https://doi.org/10.1177/2158244020924403>.
- [2] Alqudsi, A., Omar, N., & Shaker, K. (2014). Arabic machine translation: A survey. *Artificial Intelligence Review*, 42(4), 549–572. <https://doi.org/10.1007/s10462-012-9351-1>.
- [3] Alsohybe, N., Dahan, N., & Ba-Alwi, F. (2017). Machine-translation history and evolution: Survey for Arabic-English translations. *Current Journal of Applied Science and Technology*, 23(4), 1-19. <https://doi.org/10.9734/cjast/2017/36124>.
- [4] Ariana, Sim, M. A., & Pop, A. M. (2012). Managing problems when translating economic texts. *Annals of the University of Oradea, Economic Science Series*, 21(2), 152-157.
- [5] Elsayed, E. K., & Fathy, D. R. (2020). Sign language semantic translation system using ontology and deep learning. *International Journal of Advanced Computer Science and Applications*, 11(1), 141-147. <https://doi.org/10.14569/ijacsa.2020.0110118>.
- [6] Elsharif, H. M., & Soomro, T. R. (2017). Perspectives of Arabic machine translation. *Journal of Engineering Science and Technology*, 12(9) p.p 2315-2332.
- [7] Esplà-Gomis, M., Sánchez-Martínez, F., & Forcada, M. L. (2015). Using machine translation to provide target-language edit hints in computer aided translation based on translation memories. *Journal of Artificial Intelligence Research*, 53, 169-222. <https://doi.org/10.1613/jair.4630>.
- [8] Fan, H. (2021). Application of computer aided translation in technical English manual. *Journal of Physics: Conference Series*, 1961(1), 1-7. <https://doi.org/10.1088/1742-6596/1961/1/012041>.
- [9] Filmer, D. (2019). Voicing diversity? Negotiating Italian identity through voice-over translation in BBC broadcasting. *Perspectives: Studies in Translation Theory and Practice*, 27(2), 299-315. <https://doi.org/10.1080/0907676X.2018.1449871>.
- [10] Freng, J., Ramabhadran, B., Hansen, J. H. L., & Williams, J. D. (2012). Trends in speech and language processing. *IEEE Signal Processing Magazine*, 29(1), 177-179. <https://doi.org/10.1109/MSP.2011.943131>.
- [11] Gaspari, F., & Hutchins, W. J. (2007). Online and free! Ten years of online machine translation: origins, developments, current use and future prospects. In *Proceedings of Machine Translation Summit XI: Papers*. September 10-14, 2007
- [12] Goetschalckx, J., Cucchiari, C., & Hoorde, J. (2001). *Machine Translation for Dutch: the NL-Translex Project - Why Machine Translation?* European Commission. Translation Service. https://www.researchgate.net/publication/228958559_Machine_Translation_for_Dutch_the_NL-Translex_Project_Why_Machine_Translation.
- [13] Harrat, S., Meftouh, K., & Smaili, K. (2019). Machine translation for Arabic dialects (survey). *Information Processing and Management*, 56(2), 262-273. <https://doi.org/10.1016/j.ipm.2017.08.003>.
- [14] Hasabnis, N., & Sekar, R. (2016). *Lifting assembly to intermediate representation: A novel approach leveraging compilers*. <http://seclab.cs.sunysb.edu/seclab/pubs/lisc.pdf>.
- [15] He, S., Tu, Z., Wang, X., Wang, L., Lyu, M. R., & Shi, S. (2020). Towards Understanding Neural Machine Translation with Word Importance. In *Proceedings of the 2019 Conference on Empirical Methods in Natural Language Processing and the 9th International Joint Conference on Natural Language Processing (EMNLP-IJCNLP)*, pages 953–962, Hong Kong, China. Association for Computational Linguistics. <https://doi.org/10.18653/v1/d19-1088>.
- [16] Imre, A. (2015). *Translation problems of legal terms*. https://www.researchgate.net/publication/287912230_Translation_problems_of_legal_terms
- [17] Kang, J. (2021). Automatic translation of spoken English based on improved machine learning algorithms. *Journal of Ambient Intelligence and Humanized Computing*, 4(3), 1-11. <https://doi.org/10.1007/s12652-021-03198-6>.
- [18] Karasaliu, A. (2016). Shaping swift's expressiveness through the translation of his metaphors in albanian language. *CBU International Conference Proceedings*, 4, 325-330. <https://doi.org/10.12955/cbup.v4.775>.
- [19] Kim, J. W., Yoon, H., & Jung, H. Y. (2021). Linguistic-coupled age-to-age voice translation to improve speech recognition performance in real environments. *IEEE Access*, 9, 136476-136486. <https://doi.org/10.1109/ACCESS.2021.3115608>.
- [20] Koul, N., & Manvi, S. S. (2021). A proposed model for neural machine translation of Sanskrit into English. *International Journal of Information Technology (Singapore)*, 13(1), 1-7. <https://doi.org/10.1007/s41870-019-00340-8>.
- [21] Lai, F., & Wan, Q. (2021). Discussion on the problems of computer assisted English translation. *Journal Of Physics: Conference Series*, 1992(3), 1-6. <https://doi.org/10.1088/1742-6596/1992/3/032057>.
- [22] Lindstromberg, S., & Eyckmans, J. (2020). The effect of frequency on learners' ability to recall the forms of deliberately learned L2 multiword expressions. *ITL - International Journal of Applied Linguistics*, 171(1), 2–33. <https://doi.org/10.1075/itl.18005.lin>.
- [23] Luqman, H., & Mahmoud, S. A. (2020). A machine translation system from Arabic sign language to Arabic. *Universal Access*

- in the Information Society*, 19(4), 892-904. <https://doi.org/10.1007/s10209-019-00695-6>.
- [24] Maruf, S., Saleh, F., & Haffari, G. (2021). A Survey on Document-level Neural Machine Translation: Methods and Evaluation. In *ACM Computing Surveys*, 54(2), 1-38. <https://doi.org/10.1145/3441691>.
- [25] Omar, A., & Gomaa, Y. (2020). The machine translation of literature: Implications for translation pedagogy. *International Journal of Emerging Technologies in Learning (IJET)*, 15(11), 228-235. <https://doi.org/10.3991/IJET.V15I11.13275>.
- [26] Panayiotou, A., Gardner, A., Williams, S., Zucchi, E., Mascitti-Meuter, M., Goh, A. M. Y., You, E., Chong, T. W. H., Logiudice, D., Lin, X., Haralambous, B., & Batchelor, F. (2019). Language translation apps in health care settings: Expert opinion. *JMIR MHealth and UHealth*, 7(4), e11316. <https://doi.org/10.2196/11316>.
- [27] Prentice, F. M., & Kinden, C.E. (2018). Paraphrasing tools, language translation tools and plagiarism: An exploratory study. *International Journal for Educational Integrity*, 14 (11), 1-16. <https://doi.org/10.1007/s40979-018-0036-7>.
- [28] Rubino, R., & Sumita, E. (2020, December). Intermediate self-supervised learning for machine translation quality estimation. In *Proceedings of the 28th International Conference on Computational Linguistics* (pp. 4355-4360).
- [29] Schwartz, L. (2018). The history and promise of machine translation. In *American Translators Association Scholarly Monograph Series (Vol. 18, pp. 161-190)*. John Benjamins Publishing Company. <https://doi.org/10.1075/ata.18.08sch>.
- [30] Soum-Paris, P. (2021). La Tour de Babel, 35 years later: Challenges and tools relating to the translation of archival terminology from English to French. *Archives and Manuscripts*, 49(1-2), 8-36. <https://doi.org/10.1080/01576895.2020.1833226>.
- [31] Sutopo, A., & Said, R. R. (2020). The influence of reading comprehension and vocabulary mastery toward translation skill. *International Journal of Scientific and Technology Research*, 9(1), p.p 1-8.
- [32] Tang, G., Müller, M., Rios, A., & Sennrich, R. (2020). *Why self-attention? A targeted evaluation of neural machine translation architectures*. In: Conference on Empirical Methods in Natural Language Processing (EMNLP), Brussels, 2 November 2018 - 4 November 2018. <https://doi.org/10.18653/v1/d18-1458>.
- [33] Xie, W., Feng, Y., Gu, S., & Yu, D. (2021). *Importance-based neuron allocation for multilingual neural machine translation*. <https://doi.org/10.18653/v1/2021.acl-long.445>.
- [34] Zaki, M. (2008). *Arabic language and machine translation problems and solutions*. The Eleventh Arabization Conference, Arab Educational, Cultural and Scientific Organization - Amman, 417-447.
- [35] Zhao, Z. (2021, February). Research on English translation skills and problems by using computer technology. In *Journal of Physics: Conference Series (Vol. 1744, No. 4, p. 042111)*. IOP Publishing. <https://doi.org/10.1088/1742-6596/1744/4/042111>.
- [36] Zheng, H. (2015). A case study of machine translation: Problems and suggestions. *International Journal of English Linguistics*, 5(2), 92-99. <https://doi.org/10.5539/ijel.v5n2p92>.
- [37] Zong, Z. (2018, September). Research on the relations between machine translation and human translation. In *Journal of Physics: Conference Series (Vol. 1087, No. 6, p. 062046)*. IOP Publishing. <https://doi.org/10.1088/1742-6596/1087/6/062046>.



May Al Shaikhli has a Ph.D. degree in translation since the year 2005 from Al – Mosul University, College of Arts / Translation Department. She worked in different Universities since that time. Currently she is the director of translation center at Amman Arab University, beside that she is the director of training and consultation center at AAU.