The Role Played by Machine Translation Platforms in the Development of Kiswahili Literature

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Abstract

Machine translation is the translation of a text by a computer, with no or limited human involvement. Pioneered in the 1950s, machine translation can also be referred to as automated translation, automatic or instant translation. This is the process by which computer software is used to translate a text from one natural language (such as English) to another (such as Kiswahili). It is embedded in the areas of Computer Science, Artificial Intelligence, Computational Linguistics and Translation. Automatic translation of human languages is one of the earliest applications suggested for digital computers but turning this dream into reality has turned to be much harder, and in many ways a more interesting task than it appeared. Nevertheless, some degree of progress is being made every day and automatic translation is slowly moving towards becoming a daily reality. The aim of this paper is to show the progress that has been made in machine translation. We know that machine translation traditionally aimed at the translation of technical texts. However, in recent years there have been trials to use machine translation in translating texts from other spheres. Literary translation represents perhaps the strongest formulation of the of the machine translation problem. This paper aims to make a contribution in this specific area of machine translation.

Key Words: Machine Translation, Kiswahili Literature, Lierary Translation

Introduction

There has been a limited amount of work on applying machine translation to literature. This is brought about by the negativity about the potential of machine translation being used to render correct literary texts (Toral & Way, 2015). The perceived wisdom is that machine translation is of no use for the translation of literature. While it is true that literary translation is one of the hardest tasks even

for the human translator, our contention in this paper is that machine translation can be useful in the translation of literary works, albeit to some degree. We know that literary translation is not just about preserving meaning but it is also about preserving the reading experience and the subjective interpretation of the text. In literary translation, the language transcends mere communication. This paper explores the feasibility of applying machine translation to literary texts.

This paper is organized as follows: First, it looks at the basic features and terminology used in machine translation, then it gives a brief history of machine translation and its benefits. It also presents a review of known studies and research done on the machine translation of literary work. It then proceeds to give an example of how machine translation in a literary work with the language pair of English and Kiswahili will fair. There is also a section on the challenges of machine translation of literary texts followed by a conclusion.

Basic Features and Terminology

Several terms are used in this paper. The purpose of this section is to make them clear so that the sections that follow may be easy to understand. The first term to be define here is **machine translation**. Akpor (2014) says that machine translation is a subfield of Artificial Intelligence which refers to the application of computers to the task of translating texts from one natural language to another. While some scholars such as Fernández-Parra (2009) refer to machine translation as full automation of the translation process, others see it as automated translation that may be done with or without human assistance.

Different types of machine translation are available in the market today. Akpor (2014) indicates that these may be classified according to their core methodology. The most common are the rule based approach and the corpus-based approach. A combination of these two leads to a hybrid machine translation approach. The rule based machine translation (RBMT) relies on in-built linguistic rules and bilingual dictionaries for each language pair. The corpus based machine translation (CBMT) uses a large amount of raw data to form a corpus which is used to acquire translation knowledge. The corpus based machine translation is further classified into the statistical machine translation (SMT) and the example-based machine translation (EBMT). The statistical machine translation utilizes statistical translation models generated from the analysis of monolingual and bilingual training data. The data models are used to translate one source language to another. The example based machine translation is a method of machine translation often characterized by its knowledge base at run time. The hybrid machine translation approach takes advantage of both rule based and corpus based machine translation approaches.

Machine translation can be viewed from two perspectives: first, is the **human-assisted machine translation** (HAMT) which refers to a system where the

computer is responsible for producing the translation, but may interact with the human being at various stages like in the editing. At a basic level, machine translation performs a simple substitution of words in one natural language for words in another. The translations produced in this way are very fast but typically of low quality (Fernandez-Parra (2009). These systems provide a rough translation, sometimes called gist translation. Machine translation is therefore not suitable unless followed by careful human editing. Second is the **machine-assisted human translation** (MAHT) which refers to a system where the human is responsible for producing the translation, but may interact with the system in certain prescribed situations (Slocum, 1984). Available to him are various operational computer facilities such as a terminology database, text glossary, a translation memory, and facilities to revise text after translation. Simply put, translation can be viewed as either machine translation or human translation.

Some scholars, such as Stein (2013), have made a difference between machine translation and **computer aided translation** (CAT). They see machine translation as a fully automated high quality translation and computer aided translation as the methods and tools that assist human translators in the translation process. A CAT tool is a computer program that helps to translate text documents more efficiently by segmenting the text to be translated in smaller units called segments (corresponding to sentences and usually delimited by punctuation) and presenting the segments in a convenient way, and making translating easier and faster. The CAT tools match the content of each segment to the source segments contained in the translation memory. The ideal match (100%) and also fuzzy matches (partial matches) can thus be found. Translators then translate one segment at a time and make use of the automated suggestions provided by the CAT tool in form of matches.

Most CAT tools contain two types of database, one for terms (term base or terminology database) and one for sentences (translation memory or TM) for their efficient storage and reuse in subsequent translations. On a more sophisticated level there are workstations which are single integrated systems that are made up of a number of translation tools and resources such as a translation memory, language search engine, tag filter, electronic dictionaries, terminology management system, alignment tool, and spell and grammar checkers. Examples of such workstations include SDL Trados Studio, MemoQ, and Google Translate.

History of Machine Translation

Machine translation has a long history. The concept of automatic translation has been around since the 17th century. However, serious machine translation work began in the 1940s just after the Second World War. The idea of using computers for translation of natural languages was proposed as early as 1946 by A.D. Booth. In 1947 when the first non-military computers were being developed, the idea of

using a computer to translate was proposed (Hutchins, 2003). The actual development of machine translation can be traced to conversations and correspondences between Andrew D. Booth and Warren Weaver in 1947. In 1949 Warren Weaver wrote an influential paper (Warren Weaver's Memorandum on Translation) which introduced Americans to the idea of using computers for translation. From this time on the idea spread quickly and serious research on the issue started. The first researcher in the field, Yehosha Bar-Hilel, began his research at MIT in 1951 (Akpor, 2014). The first conference for machine translation was held in 1952 and a Georgetown University machine translation research team was formed in 1951 with a public demonstration of its system in 1954. The following year (1955), machine translation programs were started in Japan and Russia. The Association of Machine Translation and Computational Linguistics was formed in the U.S.A in 1962 and the National Academy of Sciences formed the Automatic Language Processing Advisory Committee (ALPAC) to study machine translation in 1964.

The first machine translation systems operated on the traditional large-scale miniframe computers in large companies and government organizations. The outputs of these systems were then revised by human translators or editors familiar with both source and target languages. For example, the French Textile Institute used machine translation to translate abstracts from and into French, English, German and Spanish in 1970. In 1971 the Brigham Young University started a project to translate Mormon texts by automated translation; and Xerox used SYSTRAN to translate technical manuals in 1978.

With the development of modern computer systems as well as advances in linguistic theory, automatic translation has become a reality. Hutchins (2009) notes that it is during the 1980s and 1990s, when the computational power had increased, that translators were offered an increasing range of computer aids such as text related glossaries and terminological resources on computer databases. After this, various machine translation companies were launched, including Trados (in 1984), which was the first to develop and market translation memory technology in 1989. The 1990s therefore witnessed acceleration in machine translations propelled by the development of corpus linguistics (Zheng, 2015). Machine translation on the web started with SYTRAN and most recently machine translation systems such as Bing Translator have been developed. Machine translation has traditionally focused on the translation of technical texts.

Benefits of Machine Translation

Several studies have shown the benefits of a combined use of machine translation and manual post-editing for a document of translation work. Zhechev (2015) carried out an experiment to test whether the use of machine translation would improve the productivity of the translators. The results from that experiment

showed that post-editing machine translation increases productivity when compared to translating a document from scratch. The other benefit of machine translation is that there is just too much work that needs to be translated and as such human translators alone may not cope. Big companies and institutions may require bulk translation due to the nature of their work. For example, operational manuals often have thousands of pages to be translated and they are often needed in many languages. In such cases, machine translation will help speed up the work. Furthermore, manuals are usually repetitive and they require frequent updates. Also, the large corporations require that terminology be used consistently. Computers are more likely to be consistent unlike human beings who will tend to seek variety. Furthermore, no two translators can translate the same work in the same way in the same language pair. The machines will therefore bring consistency.

Hutchins (2003) also notes that companies want to reduce translation costs in terms of time and money and machine translation and translation tools can help them achieve this. Machine translation comes with various translation aids which provide linguistic help for translators such as dictionaries, grammars and translation memories. Furthermore, CAT tools liberate the translator from many tedious tasks such as formatting document layout etc. leaving the translator cto concentrate on the translation aspect. Machine translation has been known to be successful in translating restricted texts such as legal, technical, scientific abstracts, instructions etc. This is because these texts are highly repetitive and have a specific technical or scientific jargon.

Machine Translation of Literary Texts

In this section, we review research and actual attempts done in the area of machine translation of literary texts. The traditional genres of literature are poetry, prose and drama. It is true that there has been growing interest in this area. A popular strand of research in this area has been about automatic identification of text snippets that convey figurative devices, such as metaphor (Ghosh et al., 2015), idioms and irony. These are some of the aspects that make literary work different from technical texts.

In literary studies, poetry has always been regarded as impossible in machine translation. That might explain why a lot of studies have been done in the area of machine translation of poetry. These papers look at the possibilities and difficulties of translating poetry. Genzel et al. (2010) explored the possibility of using statistical machine translation systems to produce translations that obey particular length, meter and rhyming rules. He realized that form was preserved at the expense of producing worse translations. Greene et al. (2010) also attempted to translate poetry, choosing target realizations that conform to the desired rhythmic patterns. They first applied unsupervised learning to reveal word-stress patterns in

a corpus of raw poetry, then used these word-stress patterns to generate English love poetry. Specifically, they translated Dante's *Divine Comedy* from Italian sonnets into English iambic pentameter. They used statistical methods to analyze, generate, and translate rhythmic poetry. Jones & Irvine (2013) used existing machine translation systems to translate samples of French literature (prose and poetry) from English into French. They however noted that there were challenges. The main errors had to do with using syntactic structures and expressions instead of their French equivalents and not taking into account certain cultural differences.

Song is a special literary work that is closely related to the poem but is different in that it is inseparable with music. Zheng (2015) did a case study of a song *My roots in the grassland*. This song was translated using 12 different translation tools. The results were not satisfactory and they led to the author of the study concluding that machine translation is better suited for translating technical texts and rather than literary texts. It seems that literary translation requires good appreciation, flexibility and elegance which are impossible for machine translations. Literary texts are emotional and creative. Even the same word or experience may have a new meaning in different texts. Haque (2012) looked at the issue of translating literary prose. Prose translation is the translation of novels, essays, fiction, short stories, comedy, folk tale, fiction science etc. Although this study was not on machine translation, it offers a glimpse of the kind of challenges the translator faces. Among other problems is the difficulty in rendering ambiguous puns, feelings, cultural nuances, and humor correctly.

Voigt and Jurafsky (2012) examined how referential cohesion is expressed in literary and non-literary texts and how this cohesion affects translation. To evaluate the impact of cohesion on machine translation segments, they compared conference translations of human and machine translations of literary and informative texts in Chinese. They used Google Translate as their machine translation engine to produce translations of both the literary and magazine texts. They found that literary texts have more dense reference chains and concluded that incorporating discourse features beyond the level of the sentence is an important direction for applying machine translation to literary texts. Toral & Way (2015) assessed the usefulness of machine translation in translating a novel between closely related languages. The results showed that novels are less predictable than technical texts. However, evidence showed that machine translation can be useful in the translation of novels between closely related languages.

Finally, Haque (2012) gives tips on how to go about translating literary texts. He says that initially, the translation of literary works - novels, short stories, plays, poems, etc. - was considered a literary recreation in its own right. He suggests that a translator should have a great understanding of the source language, have an excellent control of the target language, be aware of the subject matter of the book being translated, have a deep knowledge of the etymological and idiomatic

correlates between the two languages, and have a delicate common sense of when to translate literally and when to paraphrase, in order to guarantee exact rather than fake equivalents between the source- and target-language texts. Haque (2012) notes that a literary translator must be skilled enough to translate feelings, cultural nuances, humor and other delicate elements of a piece of work. It seems that the problems in translating literary texts can be reduced if the translator is both bilingual and bicultural.

Machine Translation of Kiswahili Literary Text

As far as I know, there has not been any study of machine translation of literary texts from another language into Kiswahili. This section attempts such a translation and a commentary on what actually happens. The first page of the novel *So Long a Letter* (English) is taken and translated into Kiswahili by using Google Translate. The outcome is aligned paragraph by paragraph with the English source text, as shown below:

So Long a Letter (Mariama Ba)

Dear Aissatou,

I have received your letter. By way of reply, I am beginning this diary, my prop in my distress. Our long association has taught me that confiding in others allays pain.

Your presence in my life is by no means fortuitous. Our grandmothers in their compounds were separated by a fence and would exchange messages daily. Our mothers used to argue over who would look after our uncles and aunts. As for us, we wore out wrappers and sandals on the same stony road to the Koranic School; we buried our milk teeth in the same holes and begged our fairy godmothers to restore them to us, more splendid than before.

If over the years, and passing through the realities of life, dreams die, I still keep intact my memories, the salt of remembrance.

I conjure you up. The past is reborn, along with its procession of emotions. I close my eyes. Ebb and tide of feeling: heat and dazzlement, the wood fires, the sharp green mango, bitten into in turns, a delicacy in our greedy mouths. I close my eyes. Ebb and tide of images: drops of sweat beading your mother's ochre-coloured face as she emerges from the kitchen, the procession of young wet girls chattering on their way back from the springs.

We walked the same paths from adolescence to maturity, where the past begets the present.

My friend, my friend, my friend. I call on you three times.

Yesterday you were divorced. Today I am a widow.

Google Translate

Aissatou wapendwa,

Nimepokea barua yako. Kwa njia ya jibu, ninaanza darasani hii, nipitie katika dhiki yangu. Ushirika wetu wa muda mrefu umenifundisha kwamba kuwa na siri kwa wengine kunapunguza maumivu.

Uwepo wako katika maisha yangu ni kwa njia yoyote isiyofaa. Ndugu zetu katika misombo yao walitenganishwa na uzio na wangelipatanisha ujumbe kila siku. Mama zetu walitaka kumshtaki juu ya nani atakayewatunza ndugu na shangazi zetu. Kwa upande wetu, tulivaa vifuniko na viatu kwenye barabara moja ya mawe kwenye Shule ya Koranic; Tulizika meno yetu ya maziwa katika mashimo sawa na kuomba watoto wetu wa kimungu ili kutuwekea kwetu, zaidi ya ajabu zaidi kuliko hapo awali.

Ikiwa zaidi ya miaka, na kupitia njia halisi za maisha, ndoto zinakufa, bado ninaendelea kukumbusha kumbukumbu zangu, chumvi la kukumbuka.

Ninakuhuzunisha. Zamani zimezaliwa upya, pamoja na maandamano yake ya hisia. Ninafunga macho yangu. Ebb na wimbi la hisia: joto na mshangao, moto wa kuni, mango mkali wa kijani, hupigwa ndani, hutoka sana katika vinywa vyetu vya tamaa. Ninafunga macho yangu. Ebb na wimbi la picha: matone ya jasho yanasababisha uso wa rangi ya ocher yako kama mama anapojitokeza kutoka jikoni, maandamano ya wasichana wadogo wachanga wanapozungumza wakati wa kurudi kutoka kwenye chemchemi.

Tulitembea njia sawa kutoka ujana hadi ukomavu, ambapo zamani huanza sasa.

Rafiki yangu, rafiki yangu, rafiki yangu. Ninakuita mara tatu.

Jana ulikuwa talaka. Leo mimi ni mjane.

The results from the Google Translate were surprising because the computer missed translating only two words from English into Kiswahili and the word order in the target language was well maintained. This is likely to happen when the words and phrases of this poem are already part of the corpus in the Google Translate translation memory. The following issues were noted from the Kiswahili text.

Title - The Kiswahili translation addresses the letter to multiple people (plural) while the English version had directed it to one individual.

Paragraph 1 – The choice of the word *darasani* for 'diary' is not correct. This is a lexical mismatch. There is also an issue with the grammar …*ninaanza darasani hii*.

Paragraph 2 – There is an issue on the choice of lexicon, *ndugu* for 'grandmother', *patanisha* for 'exchange', *shtaki* for 'argue' and *vifuniko* for 'wrappers'. An issue of ungrammatical phrases also comes up: *juu ya nani* and *kwenye Shule ya Koranic* for 'to the Koranic School'. There is an unintelligible translation in the phrase: …*ili kutuwekea kwetu, zaidi ya ajabu zaidi kuliko hapo awali*.

Paragraph 3 – The phrase 'dreams die' has been rendered in a literal sense as *ndoto zinakufa* and the imagery in 'salt of remembrance' was not well captured in the translation *chumvi ya kumbukumbu*. Also, "I still keep intact my memories" was translated as *Bado ninaendelea kukumbusha kumbukumbu zangu*. The machine translation has failed to capture well the figurative language in these phrases and sentences.

Paragraph 4 – The machine translation uses incorrect grammar in the phrase *zamani zimezaliwa upya*. The concordial agreement used belongs to nouns in a different noun class. The clause 'along with its procession of emotions' has been given a direct translation as *pamoja na maandamano yake ya hisia* and the word 'ebb' is not translated, it is maintained in its present form. 'Heat' has been translated as 'mango'.

In the second phase of this analysis, the results of Google Translate are then compared with a human translation done by Clement Maganga.

Barua Ndefu Kama Hii (Maganga, C.)

Aisatu,

Barua yako fupi nimeipokea. Ili nikujibu, nafungua hili daftari ambalo nalifanya kama nguzo ya kujiegemeza katika vurumai lililonipata. Uzoefu tulioupata kwa muda mrefu umenifundisha kwamba ukimwamini mwenzako na kumweleza matatizo yako, uchungu ulio nao utapungua.

Kushiriki kwako katika maisha yangu hakukuanza kidharura. Hata nyanya zetu walikuwa wanawasiliana kila siku ingawa walikuwa wakiishi mbalimbali. Mama zetu nao walikuwa wakali kwa wajomba na shangazi zetu mintarafu ya utunzaji wao wa vitu. Nasi tulitumia nguo na kanda mbili zetu mpaka zikachakaa tulipokuwa tukienda kwenye madrasa ya kurani tukipitia njia ile ile ya changarawe. Meno yetu ya utotoni yalipokuwa yaking'oka tuliyachimbia katika mashimo yale yale na tuliomba msaada wa panya ili aturudishie meno mengine mazuri zaidi.

Kama ndoto hupotea kutokana na kupita kwa wakati na matukio mbalimbali, kumbukumbu zangu bado ninazo, na kila kilichotokea nakikumbuka wazi akilini mwangu.

Nakuita. Enzi ya nyuma inazaliwa upya huku ikiambatana na maafa yake. Nafumba macho. Mawazo mengi yananijia na kutoka: nasikia joto na kizunguzungu, naiona mioto ya kuni, nasikia utamu mdomoni, mara nasikia ugwadu wa embe mbichi tuliyokuwa tunauma kwa kupokezana. Nafumba macho tena. Mara picha nyingi zinanijia na kutoka; naiona sura nyekundu ya mama yako iliyoenea matone ya jasho anapotokea jikoni; nawaona wasichana wakiongozana kwa ukakamavu huku wakipiga kelele wakati wakirudi kutoka kwenye chemchemu.

Wote tumepitia njia hiyo hiyo tangu wakati wetu wa balehe hadi utu uzima, na hali tuliyo nayo hivi sasa hutegemea jinsi tulivyoanza hapo awali.

Shoga! Shoga! Shoga yangu! Nakuita mara tatu.

Jana, ulitaliki. Leo, name pia ni mjane.

Google Translate

Aissatou wapendwa,

Nimepokea barua yako. Kwa njia ya jibu, ninaanza darasani hii, nipitie katika dhiki yangu. Ushirika wetu wa muda mrefu umenifundisha kwamba kuwa na siri kwa wengine kunapunguza maumivu.

Uwepo wako katika maisha yangu ni kwa njia yoyote isiyofaa. Ndugu zetu katika misombo yao walitenganishwa na uzio na wangelipatanisha ujumbe kila siku. Mama zetu walitaka kumshtaki juu ya nani atakayewatunza ndugu na shangazi zetu. Kwa upande wetu, tulivaa vifuniko na viatu kwenye barabara moja ya mawe kwenye Shule ya Koranic; Tulizika meno yetu ya maziwa katika mashimo sawa na kuomba watoto wetu wa kimungu ili kutuwekea kwetu, zaidi ya ajabu zaidi kuliko hapo awali.

Ikiwa zaidi ya miaka, na kupitia njia halisi za maisha, ndoto zinakufa, bado ninaendelea kukumbusha kumbukumbu zangu, chumvi la kukumbuka.

Ninakuhuzunisha. Zamani zimezaliwa upya, pamoja na maandamano yake ya hisia. Ninafunga macho yangu. Ebb na wimbi la hisia: joto na mshangao, moto wa kuni, mango mkali wa kijani, hupigwa ndani, hutoka sana katika vinywa vyetu vya tamaa. Ninafunga macho yangu. Ebb na wimbi la picha: matone ya jasho yanasababisha uso wa rangi ya ocher yako kama mama anapojitokeza kutoka jikoni, maandamano ya wasichana wadogo wachanga wanapozungumza wakati wa kurudi kutoka kwenye chemchemi.

Tulitembea njia sawa kutoka ujana hadi ukomavu, ambapo zamani huanza sasa.

Rafiki yangu, rafiki yangu, rafiki yangu. Ninakuita mara tatu.

Jana ulikuwa talaka. Leo mimi ni mjane.

Clement Maganga, the human translator of the poem *So Long a Letter* into Kiswahili, starts the translation by omitting the word 'dear'. He then precedes to mention that the letter is short while in the Google Translate the length of the letter is not mentioned.

Paragraph 1 – While Maganga has translated 'diary' as *daftari*, Google Translate has rendered it as *darasa*. The correct word to use would have been *shajara* but Google Translate's translation is further removed from what is expected.

Paragraph 2 – Generally, the human translation makes sense but the machine translation does not capture well the flow of the language and there are meaning gaps. The first sentence in Google Translate does not make sense. In the second sentence, 'grandmother' is translated as *ndugu zetu katika misombo*. Also 'to communicate' has been rendered as *kupatanisha ujumbe*. This looks like a mechanical translation which translates word for word without considering the overall message. The next sentence in the Google Translate, *Mama zetu walitaka kumshataki juu ya nani atakayewatunza ndugu na shangazi zetu*, lacks the natural grammatical flow. The message in the source text is lost in this translation. As for the lexical choice, the word *vifuniko* is used for wrappers, which is not correct. The last sentence also has the phrase *zaidi ya ajabu zaidi kuliko hapo awali* which does not represent the natural flow of language.

Paragraph 3 – The last sentence in this paragraph: "I still keep intact my memories, the salt of remembrance" is translated in the Google Translate as *Bado naendelea kukumbusha kumbukumbu zangu, chumvi la kukumbusha*. The part of *kukumbusha kumbukumbu* may have introduced a slightly different nuance and 'the salt of remembrance' is figurative language which should not be translated verbatim.

Paragraph 4 – Maganga makes a good attempt at translating this paragraph but Google Translate has a lot of issues in its translation. First, there is an issue of concordial agreement in *Zamani zimezaliwa upya…* The sentence ends with *…pamoja na maandamano yake ya hisia*, which one may think is an attempt at personifying the past. Also, it translates 'Ebb and tide images' as *Ebb na wimbi la hisia*. The reason Maganga got this translation right and Goole Translate did not is that Maganga realized that this is a figurative speech of language which is a simile that creates an imagery of the act referred to. Google Translate failed to translate 'Ebb' and maybe treated it as a proper noun. 'Ochre' has also been rendered as *ocher* by Google Translate.

Paragraph 5 – Google Translate's translation is shorter than that of Maganga. However, the last clause 'where the past begets the present; has been translated as *ambapo zamani huanza sasa*. The aspect the present being a product of the past is missed out in the translation.

Paragraph 6 – While the human translation uses *shoga*, the machine translation uses *rafiki* for friend.

Paragraph 7 – The Google Translate uses *talaka* incorrectly to refer to a divorced person. In Maganga's translation, *nami* is misspelt as *name*.

A comparison between the two translations shows that the human translation is a better representation of the message in the source text (English) as compared to the Google translation. However, despite all the weaknesses pointed out in the Google Translate version, what is surprising is that it is more compact and shorter than the human translation.

From the foregoing analysis, it can be said that machine translation can be used to translate literary text but to some degree. As seen above, challenges are realized in the areas where figurative language is used. The computer is not yet clever enough to be able to interpret texts it the way a human being would. We can conclude that the application of machine translation to literature is still at its infancy and many changes need to be done for the machine to interpret literary texts before rendering them in the target language. As Toral & Way (2014) hypothesize, machine translation may bear more fruit for related languages, but for unrelated languages (like English and Kiswahili) it is still a challenge.

The next section deals with problems that are likely to be encountered when using machine translation generally and specifically to translate literary texts.

Challenges

The challenges of literary machine translation emanate from the very nature of literary texts. Hassan (2011), quoting Belhaag (1997) summarizes the characteristics of literary translations as expressive, connotative, symbolic, focusing on both form and content, subjective, allowing multiple interpretation, timeless and universal, using special devices to heighten communicative effect and having a tendency to deviate from the language norms. In addition to that, we know that literary translation is creative translation which involves synthesizing a number of elements such as rhythm, punctuation, mood and meaning. These elements work together within a literary work and this is what is to be reproduced in the translated work. This may be difficult to fully achieve in machine translation.

A general challenge in machine translation, as noted by Akpor (2014) is how to program a computer that will 'understand' a text as a person does, and that will 'create' a new text in a target language that 'sounds' as if it has been written by a person. Relying on machine translation exclusively ignores the fact that communication in human language is context-embedded and that it takes a human being to comprehend the original text. The solution to this problem is to improve on the weak aspects of mechanical translation such as the treatment of cohesion and figurative language. As Toral & Way (2015) say, in order for machine

translation to be used to assist with the translation of literary text, there is need to improve its performance and also find out suitable literary machine translation-assisted translation workflows. Another challenge that machine translation of literary work faces is that of the literary license, which allows authors to break grammatical rules and create new words or forms. This may not be easy to be replicated through machine translation because machine translation performs simple substitution of words in one natural language for words in another. Also, the source and target languages may be spoken by people from different cultural groups and backgrounds. Literary translation should in itself help these different cultures to reach a compromise. Machine translation of literary texts will be slightly successful if the source and target languages are related or from the same family, for example Bantu languages.

Conclusion

This paper has given a background of machine translation and shown how it has developed since its inception. It also carried out a review of work done in the machine translation of literary texts. Using the language pair of English-Kiswahili, it further explored the feasibility of applying machine translation in the translation of literary texts. The results show that poetry, song and the novel are less predictable than maybe texts in the technical domain. Although we have seen that machine translation is still not a perfect tool in the translation of literary works, it has the potential and once a few modifications are implemented, it will be able to carry out these translations.

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