

Translating Illustrated Technical Texts by Machine Translation

ترجمة النصوص التقنية المصورة آليا

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ملخص:

يُقدم هذا المقال إطاراً نظرياً مؤسساً حول ترجمة النصوص التقنية لاسيما المصورة منها، حيث تركز ترجمتها بين الترجمة البشرية العادية والترجمة الآلية. إذ لا تكمن الوظيفة الإرشادية للنصوص التقنية في جزئها اللغوي فحسب، بل تلعب الصور المدرجة دورها في ذلك أيضاً. لذا، يطرح هذا المقال إطاراً نظرياً قصد محاولة تمحص مدى إمكانية تطبيق قطبي العملية الترجمية الآلية لهذه النصوص، أي الترجمة الآلية الإحصائية والترجمة الآلية التفاعلية، ومدى فاعلية كل واحدة منها في معالجة النصوص التقنية المصورة لدى ترجمتها، من خلال عقد مقارنة وصفية بين المستويين. يتقضى المقال أيضاً مدى ارتباط النصوص التقنية المصورة بعالم تعدد الوسائط ومدى تأثير ذلك على ترجمتها آلياً. في حين تُختتم الدراسة بتقديم حجج داعمة لاعتماد نموذج الترجمة الآلية التفاعلية في العملية الترجمية للنصوص التقنية المصورة على وجه التحديد.

كلمات مفتاحية:

النصوص التقنية المصورة، الوظيفة الإرشادية، الترجمة الآلية الإحصائية، الترجمة الآلية التفاعلية، تعددية الوسائط.

Abstract:

This paper provides a grounded theoretical framework for the translation of technical texts, mainly illustrated, being situated at the broker of human cognitive translation and machine translation. It argues that the instructive functionality of technical texts is not always underlied in the linguistic elements, but also in the illustrations provided, which is the case of illustrated technical texts. The paper outlines a theoretical framework to examine the applicability and effectiveness of two extreme levels in machine translation, namely statistical and interactive, in the processing of illustrated technical texts, through a descriptive comparison between the two levels. Furthermore, the paper discusses the pertinence of such illustrated texts in the realm of multimodality and its effect on the automated process of translation. The current paper provide supporting arguments for the interactive machine translation as a model to adopt in further translation processes of illustrated technical texts in particular.

Keywords:

Illustrated technical texts; instructive function; interactive machine translation; multimodality; statistical machine translation.

1. Introduction:

Amid a world significantly heading towards technological development dominance, it is generally agreed that translation shall not to be marginalized from the new digital materials provided by computers and data processors. However, a question has recently been raised on the capacity of translation to meet the needs in the scope, and whether human translation exclusively is purposefully sufficient. As a response, in a way or another, technical texts (that are an outcome technological advancements) have always been linked to machine translation, the fact that shows the human translation inability to meet all the needs in this regard. Besides, human translation of such texts is claimed to be extremely expensive considering the effort of translation required. The latter can be quite justifying to the tendency towards machine translation as a means of less expense and of a better speed.

However, the question has been raised about the reliability of machine translation outputs. Technical texts, of whatever domain they belong, have literally been merely translated via basic machine translation systems, i.e. using statistical machine translation (this will be discussed further in this paper), which is already subject for high potential of erroneous renditions. The issue complicates when these technical texts are illustrated with images, charts, diagrams and other drawings that contribute to the creation of the text’s function, which technical texts are fundamentally drawn upon. Therefore, it is argued here that illustrated technical texts have to be viewed from the perspective of multimodality at large.

Recently, translation studies have received a wide range of interests with regard to multimodality and multimodal texts examination. However, such interests remained circulating around specific genre of texts and purposes, and relatively no study has concluded with a generalized method dealing with multimodal, or illustrated texts as termed in this paper. In this manner, illustrated technical texts were not viewed as multimodal texts, the illustrations accompanied to words inside a technical text were merely viewed as playing a supplementary role in the overall process of instructing the reader, up until the last few years in which a set of discussions started to appear in this area.

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The present paper sets about to explore the realm of technical texts, with a close focus on illustrated ones, linking them to machine translation as a whole. It discusses the applicability of two stages (or levels) in machine translation, namely statistical and interactive, when rendering the instructive nature of technical texts, focusing attention on illustrated ones. Hence, an investigation of involving the visual mode presented by illustrated technical texts is held. However, this paper revolves around a major question: Is the human cognitive process necessary when dealing with illustrated technical texts in translation? And does it guarantee less efforts and less time consumption to actually share the process with machine translation processing systems?

This paper has a binary purpose. First, it seeks to provide a theoretical framework that contributes to further discussions in development of automated processing of illustrated technical texts in translation studies. Then, it seeks to link such illustrated texts to the realm of multimodality. Second, it attempts to introduce the paradigm of Interactive Machine Translation as keen alternative for the exhausting pure human cognitive process dealing with the momentum of technical texts nowadays. It avers that such a paradigm provides a solution to the heated debate of error-bound machine translation programs dealing with technical texts, mainly illustrated ones.

1. Perspectives

1.1 - Technical and Automated Translation Studies

Technical texts have been subject for a set of definitions all along the research in this field. However, a definition provided by Franco Aixelà would be comprehensive in this regard; he states that a technical text is “any text or text type where there is a specific terminology belonging to a professional and academic field” (Franco Aixelà, 2004, 32.). Whereas Jody Byrne links technical text directly to its primary function, arguing that it includes documents seeking to assist a particular audience to understand how something is actually done or how it works (Byrne, 2012). On one hand, this paper focuses attention on instructive texts, under the umbrella of illustrated technical texts, which provide a second mode other than the linguistic, notably visual, in the core process of instructing the reader about something. Thereupon, examples of which would notably include user guides, brochures, physics textbook and so on. On the other hand, this paper aims at describing the automated process in the translation of technical texts, mainly the illustrated ones.

Any machine translation process is basically operating on two main stages and levels. It all starts with a morphological analysis, in which a text is analyzed using only the morphological systems of both, source and target languages, to at last come up with fully projected morphological items. Then it passes to the syntactic analysis, in which both syntactic systems of both languages in use are compared, to produce a text that is syntactically appropriate for target text readers (using artificial intelligence). Basic machine translation processes merely use the above-mentioned stages, or what is called “direct machine translation”. However, others tend to go further through what is called “denotative generation” or “interactive machine translation” (Peter Newmark, 1991, p 50). This term is used here to describe the comprehensive analysis held by both, human and machine translations, trying to browse the target language special denotations, aiming at finding the most appropriate equivalents for those in the original text. In this manner, the translator here is not only copying a text into a machine translation program or software, but rather accompanies the process from the very beginning to the very end. The translator’s role here is crucial and their decisions are of utmost importance in both the translation process and output.

Linking this process to our domain of inquiry (technical texts) would likely end up with the following questions: how quality-reliable are all these machine translation stages when dealing with technical texts? and are they applicable to illustrated technical texts as well? And at which level should multimodal technical texts translation operate?

The first attempt to answer these questions would require a clear understanding of the automated process of translation - what it takes and what it makes - and a full awareness of how technical texts, mainly the illustrated ones actually work.

In this sense, technical texts, claiming their dry and rigid nature, are likely translated merely by means of direct machine translation. In fact, this could be working with linguistic mode centered technical texts, but would be lacking of reliability when it comes to illustrated technical texts.

2.2- Machine Translation and Technical Texts Multimodality

Translation is, as it were, a process of analyzing a set of factors of whatever type and mode. However, visual information had always been falling outside this process up until the beginning of the 1990s, with Text Analysis model provided by Nord including the analysis of non-verbal elements together with other factors (intra-textual, intertextual). This model provided a clear description of text functions including the sender's intention and target text reader's reception and response. In this sense, Christiane Nord contends that images and other illustrated elements are of utmost significance and have an integral role to play in technicality at large, stating that manuals and operating instructions can be the mainland of such text type (Nord, 1991).

The aforementioned points out to a specific harmony between all such elements contributing to the construction of a technical text, adding therefore to the peculiarity of its translation as a whole, and to its machine translation in particular. In this regard, automatedly translated technical texts from English into languages such as Arabic (or any other language way different from English) would be jeopardized for a set of fallacies and even no meaning outputs. Issues such as reading direction, for instance, in highly illustrated technical texts would be crucial for the overall understanding of the text and its intended technical purposes, namely its instructive purport.

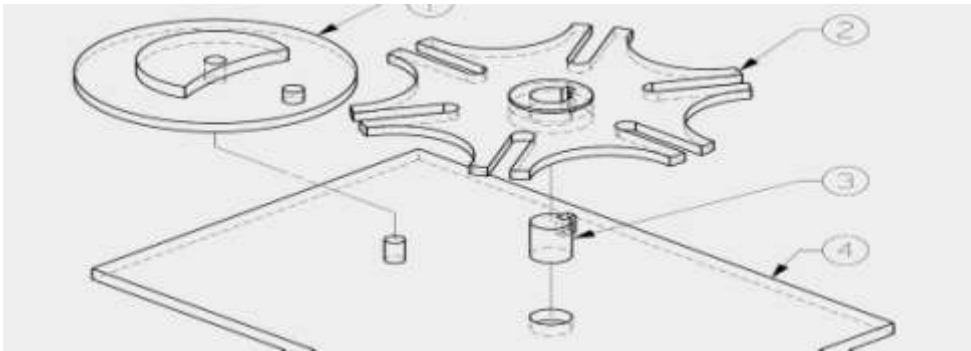
In fact, linguistic-mode centered technical texts can finely be translated using basic machine translation programs, i.e. direct machine translation. Arguably, information in this case are intended to be communicative merely through the linguistic mode. Direct machine translation, considering the description of technical language as a plain and mere communication of informational steps, would offer a good translation at first insight, but it remains subject for readers' own expectations. Receptors in this sense are the defining factor of how successful this direct machine translation actually is.

Multimodal technical texts, or as it is termed here illustrated technical texts, offer a clear divergence. The interaction of both modes, verbal and visual, is deemed to be high leveled from direct machine translation in order to be adopted. Therefore, automated translation of such multimodal texts has to be operated at a higher level, namely interactive machine translation. The driving force of this method underlies in the cognitive intervention of the translator, offering a set of interpretations and options to choose from while dealing with this technical multimodality. This, in fact, would open the floor for a more consideration of target text readers' expectations,

considering the fact that instructing a reader through a written text, is a meticulous process that requires a text truly speaks through its readers' view and aspirations. This process gets further peculiarity when this instructive text is in fact multimodal.

Some technical texts use only visual mode and tend to be quite instructive. Examples of which can easily be seen in catalogues and how to construct/deconstruct texts (see figure 1 below). It is averred that such texts are understood worldwide, for they persistently preserve their adequate function in whatever surrounding environment.

Figure 1: Visual Mode Centered Technical Text



A Page Extracted From a Mechanical Machine Guide Book

Such instructions, as can be noticed, are clarified by the image itself with the help of numbers and out of any single linguistic element. Such texts do not merely fall aside of the realm of machine translation, but rather can be subsumed under the umbrella of untranslatability in whole. What actually occurs here is a mere transmission of these images into the target text.

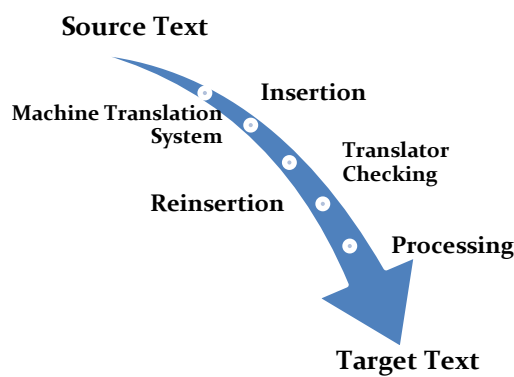
Furthermore, it is noteworthy that such multimodal complementarity in technical texts has to be perceived at once, that is to say, it could be of little reliability to perceive a mode differently from the other. This should be gaining a particular significance in machine translation at large. As this paper recommends, using interactive machine translation as a method translating multimodal technical texts, would require a translator with high competencies in understanding this specificity understanding, along with a range of tools and techniques that, upon their decision and consideration, would be useful rendering this function-driven specified text type.

2.3 - Interactive Machine Translation as a Paradigm to Translating Illustrated Technical Texts

Amid the vast prevalence of different phenomena controlling various aspects of life, translation needs have increasingly been overwhelming. In this regard, human translation becomes clearly insufficient, and the intervention of machine systems is nowadays a necessity. On this basis, direct machine translation systems (translation systems using word-for-word algorithms in the core process of translation) would be lacking of reliability and would jeopardize the translation process for erroneous outputs, the fact that requires a human intervention aiming to achieve high-quality renditions. This human-machine complementarity is discussed in this paper through integrating statistical machine translation systems to the concepts of interactive machine translation in the processing of illustrated technical texts.

In the scope of machine translation, interactive machine translation is deemed to be the highest level as such. However, considering the hierarchical development of machine translation systems, interactive machine translation actually is an evolution of basic statistical machine translation (direct machine translation discussed earlier is a keen example). For translation, in general, this model has proved to produce high-quality translations. This harmony between the human translator and the machine offers a set of solutions to covering the translation needs. However, this process is in fact not as simple as it seems, and requires more attention. Figure 2 below provides an illustrated explanation of how interactive machine translation operates:

Figure 2: Interactive Machine Translation Process Explanation



Source: Figure elaborated by the researcher

The figure offers a comprehensive view about the processing of interactive machine translation. As can be shown, the translator contribution is crucial particularly in the final output of this process. The translator here uses the algorithm systems embedded in any machine translation as a substitution for the core exhaustive cognitive process of human translation, but with a final touch that includes interpretations and choices selection of what suits the final output's need and function.

It also should be noted that the aforementioned process operates, mainly, at the sentence level. The translator divides the source text into segments (sentences), before inserting them one after the other with necessary refinement for each, until the whole text is fully inserted and refined. After all, a revision by the translator is held to combine all sentences in a cohesive and coherent manner.

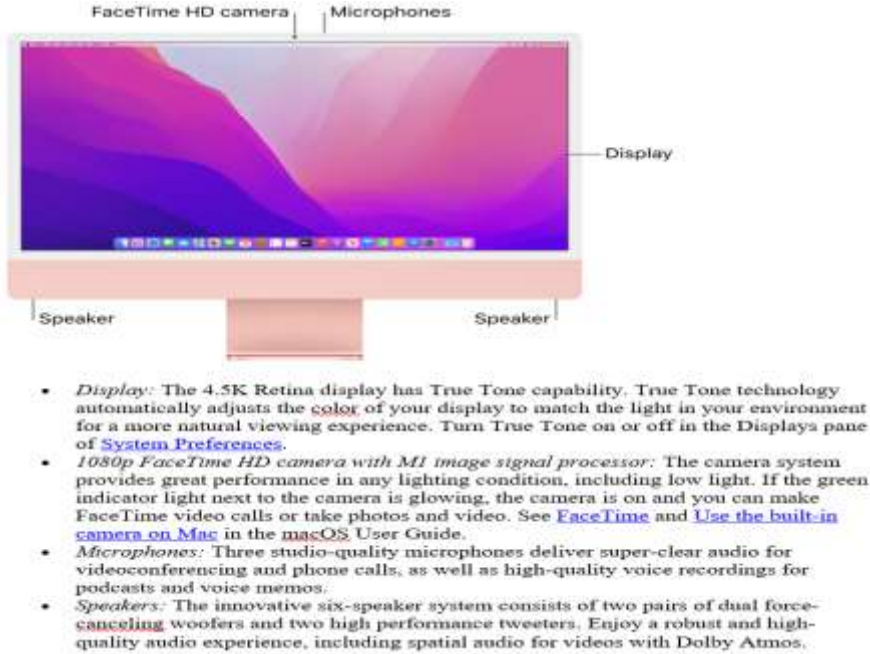
In this process and with regard to illustrated technical texts, illustrations (images, charts, diagrams ... etc.) are excluded. It is only the verbal (linguistic) mode that is in use, but this time with the translator's appropriate interpretation and consideration for what truly is needed, and hence inserted and integrated with the existing unprocessed illustrations provided by the source text.

The following example shall further elucidate the process into practice:

Example:

Original text:

Figure 3: Example of an original illustrated technical



Source: Apple apparatuses website, see the link¹

¹ <https://support.apple.com/en-gb/guide/imac/apd2e7352054/2021/mac/12>

This illustrated text, extracted from the official website of Apple on one of its monitor's characteristics, has been fully inserted into a statistical machine translation (Reverso) in order to render it into Arabic (as the target language). The choice for Arabic as a target language embarks from the fact that English and Arabic do differ in terms of structure and writing direction in particular, which fiercely challenge the system. The translation output has been as follows:

Target text:

Figure 4: Target text resulted from SMT Translation System



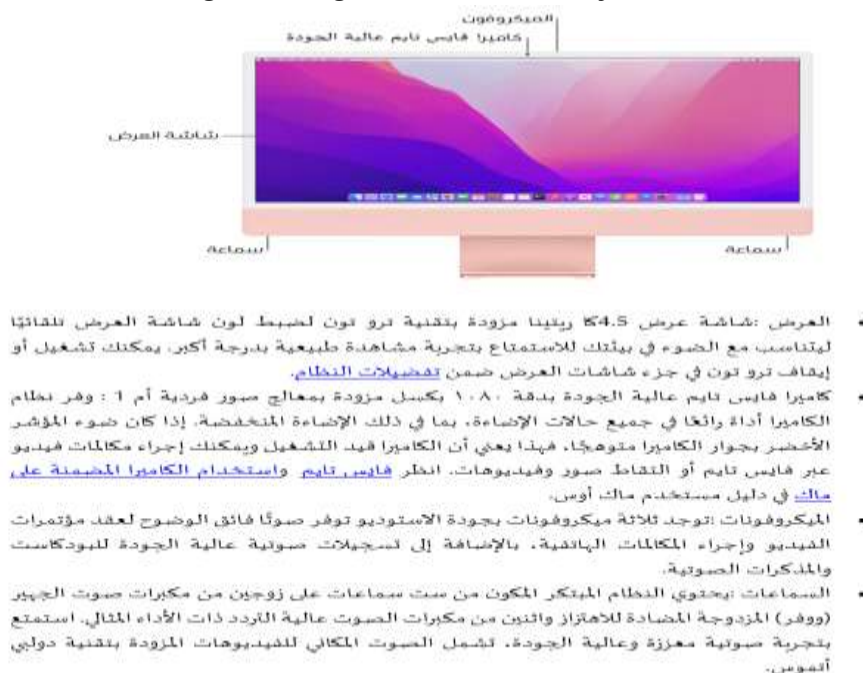
- الشاشة: تتمتع شاشة Retina التي تبلغ 4.5K بدقة ملئين حقيقية. تقوم تقنية True Tone بتلقائياً بضبط لون الشاشة لمطابقة الضوء في بيئتك للحصول على تجربة مشاهدة أكثر طبيعية. تشغيل أو إيقاف تشغيل نغمة True Tone في جزء "شاشات العرض" في System Preferences (تفضيلات النظام).
- كاميرا عالية الوضوح بدقة 1080p وبمعدل FaceTime مزودة بمعالج إشارات الصور M1: يوفر نظام الكاميرا أداء رائعاً في أي ظروف إضاءة، بما في ذلك الإضاءة المنخفضة. إذا كان ضوء المؤشر الأخضر الموجود بجوار الكاميرا مضيئاً، فإن الكاميرا تكون قيد التشغيل ويمكنك إجراء مكالمات فيديو في FaceTime أو التقاط الصور والفيديو. راجع FaceTime واستخدم الكاميرا المضمنة على Mac في دليل مستخدم macOS.
- الميكروفونات: توفر ثلاثة ميكروفونات بجودة الاستديو صوتاً قاتق الوضوح لعقد مؤتمرات الفيديو والمكالمات الهاتفية، بالإضافة إلى تسجيلات صوتية عالية الجودة لبودكاست ومذكرات صوتية.
- مكبرات الصوت: يتكون النظام المبتكر المكون من ست سماعات من زوجين من وحدات الصبوبر مزدوجة إلغاء القوة ومجهاري ترددات عالية الأداء. استمتع بتجربة صوت قوية وعالية الجودة، بما في ذلك الصوت المكاني لملفات الفيديو باستخدام Dolby Atmos.

Source: Accomplished by the researcher

As can be noticed, the Reverso system successfully managed to translate the overall text into Arabic. However, some key terms remained utterly untranslated and re-expressed in the original language. What is of utmost significance here is the image that is merely transmitted, with no modification at the language level, into the target output. This expresses how thorny is the task for the translation systems (statistical in particular in this case) to deal with text-accompanying images.

At this stage appears the role of interactive machine translation model proposed in this study. Certain refinements shall be made on this translation system output, which contribute to a better consistency when it comes to Arabic stylistics and structure in particular dealing with the textual components, and more importantly a translation of the text elements accompanying the illustrating image. This would result in the following:

Figure 5: Target text after human adjustment



Source: Accomplished by the researcher

All and every untranslated element in the SMT output has been rendered accordingly. The image textual elements have translated adequately in Arabic. This ultimate output shall be applied to every similar example appearing in the whole text or corpora, and then be reinserted into the translation memory systems to parallel the English source text in a single user manual.

Overall, it can be argued that interactive machine translation can be a useful solution in the scope of translation needs. This bilateral, human and machine, processing of illustrated technical texts is judged here to be effectively guaranteeing the preservation of the profound meaning distributed across the multimodal nature of such texts on one hand, and, more importantly, contributing to the functional

communication of technical texts in general on another had. This last has to be the main objective of any technical text translation process. Besides the faster processing it provides compared to the unilateral human translation keeping up with the momentum of technical texts nowadays.

2. RESULTS AND DISCUSSION

The present paper aimed at discussing translation implicatures of translating the instructive function of technical texts, mainly illustrated ones, using machine translation in general. It revolved around providing a model to translating illustrated technical texts automatically, trying to ensure high-level rendition though. The model presented here adopts concepts from interactive machine translation, aiming to substitute the exhaustive human cognitive process dealing with such texts, amid their increasing probation worldwide. Hence, this model is expected in this paper to pave the way for further alternatives to share the translation burden with machine as well. The multimodal nature of illustrated technical texts has been a significant topic of discussion in this paper, referring to the fact that illustrated technical texts are in fact multimodal, and should be viewed from the perspective of multimodality. Subsequently, images play not merely a significant role in the meaning construction of technical texts, but rather a crucial role in shaping the instructive purpose of such texts. Hence, their automated translation has to be meticulously processed. Interactive machine translation supported by this paper in the overall rendering of technical texts, remains one tool of many needed in this domain, seeking better renditions and particularly avoiding clumsy ones which basic machine translation softwares are likely producing. Using the aforementioned, the following conclusions are outlined:

- Technical texts are not always linguistic-mode centered, they can be provided with a set of illustrations that would share the same function that the linguistic mode applies.
- Some illustrated technical texts are in fact visual mode centered, being free of any linguistic components and tend to be fully instructive.
- Translation of verbal mode technical texts differs from translation of illustrated technical texts.
- Basic machine translation programs can be acceptable dealing with verbal mode technical texts, but a higher level is required processing illustrated technical texts.

- Interactive machine translation model provided in this paper is one tool of many that would contribute to improve the renditions of illustrated technical texts.
- Interactive machine translation model would contribute to mitigate the burden borne on human translation shoulders through rapid and high-quality outcomes.
- The multimodality of illustrated technical texts shall be subject for further investigation and research.

3. CONCLUSION

To conclude, technical texts remain a fertile and ongoing domain of research inasmuch as the persistent technological advancement in numerous fields of life. Their translation gains further peculiarity regarding these texts’ special characteristics at the level of structure, build up, and composition of different types of communication. Illustrated technical texts generally are predominant compared to text-centered technical texts. The instructive function can sometimes be image-centered and the accompanying texts may play a side role in the meaning production of these texts. Therefore, illustrated technical texts have to be viewed using a different lens, mainly a multimodal one. Upon this, machine translation of illustrated technical texts shall be of similar significance and specificity to meet the required characteristics in the overall production of the target text. The human intervention is arguably more than necessary to provide a quality-level for the machine translation output. This machine-human interaction shall be the key to override the barriers of quality when it comes to an illustrated technical translation using MT systems.

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