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Using AI in Translation, a Technological Leap, or a Translator's Nightmare

Mohammed Tewfik BOUGUESMIA[1]
[1]*University of Oran 2 Mohamed Ben Ahmed, Algeria*
bsmmhdtfk@gmail.com

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ABSTRACT: *A dream to many, the idea of using machines for rapid, effortless, and accurate translation has allured both tech-enthusiasts and translation aficionados for a long time. Sadly, the technical limitations that inhibited computers from looking beyond the word, thus affecting their ability to offer much more than literal translations void of contextual meanings, have prevented that fantasy from becoming a reality. However, the recent rise of Artificial Intelligence (AI) has once again sparked interest in such utilization of technology. While admittedly still in its beta version, and still reliant on the contribution of translators for its enhancement, the primary results of the use of AI for translation look promising to say the least. As a result, a heated debate, buried for years, has re-emerged about whether this technological development represents a threat to the future employability of translators, or an opportunity to innovate the field of translation, and bring it to the digital age. The aim of this research is to investigate the awareness of the Algerian translation teachers of the advances made in this regard, capture their opinions regarding the matter, and report their willingness or reluctance to contribute in the development of this technology. Therefore, open-ended questionnaires are administered to 10 teachers from the Djillali Liabes university. The findings reveal a variety of viewpoints and attitudes towards the matter.*

KEYWORDS: Artificial Intelligence, Technology, Translation.

Introduction:

Artificial intelligence (AI) has recently been the centre of international media coverage, a rise in popularity it owes to the technological and commercial success Tesla, the self-driving cars' company, managed to achieve in a record time. However, while the general mass of people was standing in awe, admiring a complex and intriguing technology they knew little of, but craved nevertheless, translators were contemplating the

repercussion of this very technology on their field, wondering whether the future of translation even holds a place for them. The aim of this research is to confirm whether or not the Algerian translation teachers are up to date regarding the development made in the use of AI in translation, capture the emotions they harbour towards its advancement, be it positive or negative ones, and reveal the extent to which they are prone to participate in its enhancement. To achieve these objectives, ten university teachers from the Djillali Liabes university at Sidi Bel Abbes are randomly selected to represent the professorial body by answering an open-ended questionnaire. In addition, for an in-depth look from both ends of the spectrum, a computer science teacher from the same university is urged to respond to another open-ended questionnaire as well. Both questionnaires serve as data collection tools to address the following posed research questions:

- To what extent are the Algerian translation teachers aware of the advances made in the use of artificial intelligence in the field of translation?

- Are the Algerian translation teachers in favour of the use of artificial intelligence in translation?

- How willing are the Algerian translation teachers to contribute to the development of artificial intelligence?

The aforementioned research questions are counterparted with these hypotheses:

- The Algerian translation teachers are well-aware of the advances made in the use of artificial intelligence

- The Algerian translation teachers are in favour of the use of artificial intelligence in translation

- The Algerian translation teachers are extremely willing to contribute to the development of artificial intelligence

The present research paper is divided into two main sections, a theoretical one, and a practical one. The theoretical part, a literature review, focuses on understanding artificial intelligence by exploring its

numerous definitions, scrutinizing its various types, and examining its historical use in the translation domain. The practical part on the other hand, describes the methodology utilized throughout this investigative pursuit by detailing the sampling as well as the data collection processes, and provides an interpretive analysis of the findings.

Definition of artificial intelligence:

The complexity and versatility of artificial intelligence made defining it a challenging endeavour, however, fortunately, this did not discourage many field specialists, artificial intelligence service providers, and tech journalists as well as connoisseurs from trying. Britannica for instance, the famous encyclopaedia, states that AI refers to the capability of digital devices commonly known in the field as intelligent agents, such as computers, to perform tasks, usually of an intellectual nature like reasoning or learning from past experiences, which often require and are associated with human intelligence. For further clarification, this latter one is explained as one's adaptability to unfamiliar situations, which encompasses a combination of numerous traits and abilities, including problem solving and perception of the environment. Such description of AI is reinforced by Search Enterprise AI, a detail-packed website that claims to aim at providing the curious and those considering investing in AI with the necessary qualitatively-vetted knowledge, which portrays AI as the programming of machines in general, and computers in particular, to mimic cognitive processes that are frequently, if not always, thought of as humanly exclusive namely, learning, reasoning, and self-correction. According to the website, for computers to learn, they need to be equipped with algorithms, which are basically a set of rules and procedural instructions that allow them to draw meaning and extract intelligence from large bulks of data, producing actionable information, which can be used to serve a desired purpose, or achieve a specific task. Sharpening machines' reasoning on the other hand, entails training them to select the most efficient and adequate algorithm that possesses the highest chances of generating the requested outcome. In order to ensure a perpetual betterment of the outputted results, the concept of self-correction is integrated into computers, a process that involves a continuous refinement of the algorithms in search of improved accuracy and efficiency. For the sake of exhaustiveness, the website also

elucidates the difference between a weak AI and a strong AI. An AI is referred to as weak or narrow, if it is trained to execute specific functions, but nothing beyond that. This means that when faced with an unfamiliar scenario, a weak AI will simply be befuddled, and will likely display a visual or auditory message expressing its incapability to handle the situation. Examples of narrow AI include, but are not limited to, personal assistants, like Apple's Siri, Google's personal assistant, Samsung's Bixby, and Amazon's Alexa. An AI is deemed strong when, once faced with a similar predicament, it uses fuzzy logic, which operates under the premise that there shades and degrees of truth, instead of the more traditional view that anything is either true or false, one or zero, to compile knowledge from various fields, and autonomously generates a solution. Additionally, to offer the reader a complete picture, the components necessary to build an AI are also covered. These constituents differ greatly in terms of cost, quantity, and quality depending on the intended application of AI, since an AI built for image recognition for example is going to necessitate a different processing power, among other variables, than one built for chatbots. Nevertheless, every AI needs expensive software and hardware, which envelop parallel processing tools such as Spark, powerful, yet sometimes unavailable due shortages of supply, graphics cards, and large amounts of storage, preferably in Solid State Drives (SSDs) for optimum speed. In addition, a programming language is a must, and nowadays most programmers seem to be drawn to use either Python or C to communicate with their machines. Once the aforementioned set and ready, a decision must be made by AI engineers regarding which type of models to follow while building the AI, be it a deep learning type, a machine learning type, or a neural networks type, which influences the way AI behaves and deals with data.

Allured by AI, Patrick Kiger, a veteran journalist at HowStuffWorks, an educational website that praises itself for providing reliable simplified information to nearly 30 million monthly visitors interested in the functioning of complex concepts and creations, wrote an article about AI's transformative impact on diverse fields like robotics and economics. He commenced by highlighting the interdisciplinary nature of AI, thus, referring to its frequent use of other disciplines such as

neuroscience, cognitive linguistics, and psychology, to name but a few, for the amelioration of its data processing. Then, the reporter moved on to an interview he had conducted with Vasant Honavar, who occupied throughout his career at the Pennsylvania state university many prestigious positions, including that of director of the Artificial Intelligence Research Laboratory at the Pennsylvania state university, and later on that of founding director of the Center for Big Data Analytics and Discovery Informatics, a position which he still holds to this day. When requested to provide a definition of his own regarding AI, the professor presented one that fell in line with the ones pondered above, which shed light on AI's quest to simulate human intelligence. He did, however, confirm that the arduousness that many come across while defining AI arises from the shared uncertainty about what intelligence really means.

Even though the former definitions were undeniably enlightening, one would be remiss to overlook the one bestowed by the rightfully nicknamed "*father of AI*", John McCarthy, the computer scientist who coined the phrase "*Artificial Intelligence*" back in 1956 at a summer workshop he organized at Dartmouth college, and who established, with the valuable contribution of more than 10 professors and mathematicians, the fundamentals of AI, ushering decades of innovativeness, creativeness, and boundary-pushing. Having received countless emails urging him for his ample knowledge and unmatched field expertise, the renowned professor decided to publish in 2007 an article of fifteen pages entitled "*What is Artificial Intelligence?*", via which, he addressed, once for all, the basic questions that relentlessly taunted his correspondents' minds, starting, obviously, with a definition of AI. Considerate of some of his followers' potential unfamiliarity with technical jargon, (McCarthy, 2007:2) proceeded with simplicity and straightforwardness in mind, merely describing his chef-d'oeuvre as "*the science and engineering of making intelligent machines, especially intelligent computer programs*". He further clarified to those still befuddled that AI, despite the popular belief, is not only about imitating human intelligence, but about understanding it as well, without being limited to the same biologically observable methods humans are bound by.

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Types of artificial intelligence:

In the midst of their heated debates surrounding AI's potential dangerousness, their passionate discussions about its futuristic tendencies, their fierce exchanges of arguments concerning regulating it, AI researchers reached a consensus that there are four major types of AI, or AI powered machines, namely, reactive machines, limited memory machines, machines that are influenced by the theory of mind, and self-aware machines. Arend Hintze, an assistant professor and AI researcher at the Michigan State University, wrote an article on the Govtech website for the sole purpose of elucidating the differences between these types. According to him, reactive machines are the most basic ones. Deprived of memory, they live in the moment via witnessing the environment around them, and interacting with it by making decisions that are based on what they perceive. Such machines are often built to perform one and only one task, and Deep Blue is by far the AI experts' go-to example to illustrate this type of machinery. This supercomputer was designed by the acclaimed International Business Machine (IBM) company, and gained international media attention in 1997 when it beat at chess Garry Kasparov, the until then undisputed world chess champion, which was a true testament to Deep Blue's computational power back then, since it could observe in real time the pieces on the chessboard, make solid predictions about its opponent's moves, and counter them by choosing the ones that will most likely lead to victory, all of which done with no memory, and no recollection of previous experiences and/or matches. Many AI specialists, such as Rodney Brooks, call for the sole built of this particular type of machines, a request they justify by AI programmers' still far from perfect ability to construct accurately simulated worlds to computers, a process known within the AI milieu as the representation of the world. In the case of Deep Blue, the aim of the programmers was to narrow down the potential moves to be made by continuously evaluating the endgame results, whether triumphs or defeats, instead of attempting to increase the number of plausible moves. One must bear in mind that reactive machines have a narrow vision of the world that is barely sufficient for them to properly function, since a broader vision requires more processing power, thus more resources. Even though the approach followed by the programmers of Deep Blue panned out, it remains situationally specific, because it cannot be applied to all scenarios, and

Deep Blue, despite its nostalgic glory, will surely fail at tasks outside the chess arena, its comfort zone. Other reasons why reactive machines are so popular among AI experts are their autonomy, reliableness, and trustworthiness, as they ensure a constant perfect, or near perfect, performance every time they run into the scenario for which they are designed, without needing human supervision, or posing the threat of transcendence, meaning they do not, will not, and cannot got beyond the established limitations.

Limited memory machines on the other hand, have a past, a memory that records bits of information that are crucial for taking sound decisions. Self-driving cars often serve as instances for this kind of machines. In their case, a continuous tracking via cameras, sensors, radars, and sometimes laser radars, otherwise referred to as lidars, of pre-set representations of the driving world, such as the surrounding vehicles' positions, their speeds, the pedestrians' positions, their walking directions, the road lanes, the weather, and the traffic signs as well as panels, is critically important, and it constantly generates data that are stored for a limited time in the car's memory, to be quickly accessed when making consequential decisions like changing lanes, accelerating or decelerating, maintaining or increasing the distance with the vehicle ahead, every one of which, has the risk of jeopardizing the driver's, the other drivers', and the pedestrians' safety.

The third sort of machines is futuristic and non-existent at the current time. They are based on the psychological theory referred to as the "*theory of mind*", which centres around one's socio-cognitive ability to grasp that others hold different beliefs, emotions, desires, and knowledge that influence their behaviours. Once mastered, this capability allows to infer others' personalities, and predict their actions as well as reactions, thus facilitating one's social manoeuvres. As a matter of fact, this capacity is deemed essential for the well-functioning of societies, and machines ought to first acquire this ability before integrating our societies, and really take part of our daily social interactions.

Purely imaginary at this stage of time as well, self-aware machines will, once real, have a consciousness, and will be able to build self-representations, meaning they will autonomously construct their own

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perceptions of themselves and the world around them. If this technological milestone is ever reached, the distinctive line between humans and machines will become blurry at best, and humans will merely have biological features to distinguish them from their steely counterparts, provided no major breakthroughs occur in the field of biology as well. While many directors attempted to portray such advanced models, albeit usually at unflattering threatening light, one must admit that no one came as close as Home Box Office's (HBO) critically acclaimed series "Westworld", which amassed a substantial fanbase throughout its three seasons by seriously contemplating the concept of artificial consciousness and its potential repercussions on human race.

Historical use of AI in translation:

Long before McCarthy coined AI, Alan Turing, the famous British mathematician who was accredited with the deciphering of Enigma, and the tilting of the world war's balance towards the allied, began pondering over a question, "can a machine think?", an inquiry that induced him to publish an article in mind paper in 1950. In fact, what Turing was really investigating was whether a machine can become so linguistically competent that it becomes challenging to differentiate it from a real human being. To probe the plausibility of such scenario, he designed the popular Turing Test (TT), which entails secluding a woman and a computer in two separate rooms, neither of which is visibly accessible to outsiders, and bringing a human who will solely have the email, called teletype by Turing, as a means of communication with the two rooms. If by the end of a set of interactions, the human judge cannot assert with a rate certainty that surpasses 50% which room accommodates the computer, then the computer is considered as having passed the test. Turing urged readers of his article to build such capable machines, going as far as offering clues as to how such build can be realized. From that point in time, many responded to Turing's call, making the build of such proof of concept their lifelong endeavour.

While certainly impressive, Turing was not the first to offer a shrewd test regarding intelligent machines. As a matter of fact, (Descartes 1637, 116), yet another visionary way ahead of his time, foresaw the arrival of such machines, and was extremely concerned that

humans will eventually lose their ability, or at least find it herculean, to distinguish themselves from the machines, which motivated him to conceive what he deemed an infallible test for this purpose. His test relied on two fundamental premises, first of which, was that machines could never match the smooth and adequate reactiveness of the human speech to the surrounding situation, since humans are able to alter and adjust their speech, in terms of structure and tone for instance, to express their mental as well as emotional state, often a reaction to their circumstances. The second premise upon which the reveal test was based claimed that while machines did enjoy a superiority over humans at certain tasks, their inability to exercise reason puts them in disadvantage, and critically hinders their adaptiveness to diverse situations. One must admit that Descartes' visionary prowess is beyond any questioning, however, his first premise suffers considerably in terms of reliability in this day and age, especially when one takes into consideration Google's most recent product for the translation world, "the *Translatotron*", an end-to-end speech to speech translation model that the company revealed in May 2019, which is capable of offering a more natural voice translation that takes the intonation and emotion of the speakers, called voice prints, into account, and reproduces them while interpreting, thus preserving tone fidelity. The second premise still holds, but one cannot help but wonder for how long, as AI researchers have been striving to make AI more versatile, and to bestow upon it the reasoning capability, rigorous efforts that gave rise to Watson, another IBM supercomputer, which, due to its question-answering AI, defeated in 2011 two Jeopardy champions by the names of Brad Rutter and Ken Jennings at their own game, a thought-provoking victory once one takes notice of the fact that the game compels players to combine their linguistic and factual repertoires with basic rationale to win. Like IBM, Google also had its fifteen minutes of fame and glory when a company it had recently acquired in 2014 by the name of DeepMind created and trained an Artificial Neural Network (ANN) called AlphaGo for the sole purpose of competing against professional players of the board game Go, a mission accomplished in March of 2016, when the network vanquished Lee Sedol, a world champion of the game. Later on, in 2017, a revised, more advanced, version of the network, named AlphaGo Master, achieved a

similar success by triumphing over the top ranked player back then, Ke Jie.

The efforts made to expand AI into diverse fields meant that it was only a matter of time before its introduction in the translation world. In March of 2018, an article published on freecodecamp, a website that proposes thousands of articles and tutorials regarding anything tech or coding-related, Ilya Pestov traced back the history of Machine Translation (MT). Contrary to the common misconception that Americans were the first to explore the use of machines for translation, it was in fact the soviets, more precisely, a soviet scientist name Peter Troyanskii, who were applaud for having made the first attempt at such endeavour. Back in 1993, Troyanskii demonstrated his "*machine for the selection and printing of words when translating from one language to another*" to the Academy of Sciences. What the soviet lacked in terms of cool naming, he compensated for in creative scientific imagination, since he merely relied on the use of cards in four different languages, a typewriter, and a camera that most would deem outdated by nowadays' standards to achieve his objective. To operate his machine, one would select a word in the source language, find the corresponding card with the translated word in the target language, type in the grammatical feature or category of that word using specific pre-supplied codes that Troyanskii referred to as "*signs for logical parsing*", then take a picture of the translated word along with its morphological code. This procedure is repeated for every word, and the resulting pictures are stuck one after the other on a tape, which, once the translation process is over, embodies the entirety of the translated text. The slow, time consuming, and rather complicated modus operandi of the machine, coupled with the high, if not sole interest, during that era in military scientific research and experiences, led to the swift dismissal of Trojanskii's invention. One does find solace in the fact that Trojanskii's efforts did not go in vein, as he was recognized later on, when his invention finally became public, by the international scientific community as the true pioneer of machine translation.

Convinced that any language is basically a code, armed with years of code breaking experience that they accumulated during the two world wars, aware of the imminent need for efficient automated translation, and

determined to emerge victorious out of the cold war, the Americans commenced their journey to create the perfect translation machine. This quest gave birth to a collaboration between the Georgetown University and IBM, what became commonly known as the Georgetown-IBM experiment, which birthed IBM 701, the computer that made history on January 7th,1954, when it successfully and automatically translated 60 Russian sentences to English. However, pressured by the tense political climate that reigned during that period of time, the Americans were reluctant to diminish or tarnish their media image as tech dominants by disclosing the minor, yet crucial, fact that the translated sentences were indeed cautiously and intentionally sampled to ensure high accuracy, and to exempt the computer from any sort of ambiguity, such as double meaning words. This false pretence caused the wide spread of the delusion that a fully efficient functioning machine, that can handle various languages, was just around the corner, which allured the United States (US) government, along with many others, to spend lavishly on research and development programs tasked with making such machine a reality. 40 years down the road, the absence of any tangible results left the US' Automatic Language Processing Advisory Committee (ALPAC) no other alternatives but to stop funding those researches, and recommend focusing more on computational linguistics. The ALPAC report really put a damper on the machine translation field, yet, hardcore believers still continued, despite the limited resources they had, to generate approaches and systems tackling the issue, most of which did not amount to anything of significance, however, there were three systems that stood out as the ones worth mentioning, namely, Example-Based Machine Translation (EBMT), Statistical Machine Translation (SMT), and Neural Machine Translation (NMT).

Having foreseen the imminence of globalization, and being conscious of the scarcity of English speakers among its citizens, Japan was incentivized to undertake some research of its own concerning machine translation. The abundant structural, grammatical, and linguistic differences between English and Japanese certainly did not render the task any easier, yet, in 1984, a computer scientist from the Kyoto University proposed a new approach to the conundrum that was as brilliant as it was simple, since it made use of ready-made phrases to

avoid repeatedly translating whole sentences. For instance, if one already knows the translation for the sentence "I work at the school", and is attempting to translate the sentence "I work at the university", then one only needs to find the translated equivalent for the word "university". In other words, this approach relies on a bilingual corpus that envelops sets of translated examples, hence the name EBMT, commonly called parallel texts, therefore, the bigger the corpus, the more accurate the translations will be.

Approximatively five years after the emergence of EBMT, IBM, which by then had made a reputation for itself as a forward-thinking company, revolutionized the field when it suggested an out of the box approach, SMT, that not only transcended the traditional dependence on linguistic rules, but also found a way to bypass one of the most complex hinderances with machine translation, multiple meaning words. The procedure entailed searching matching texts in two different languages for frequent repetitions of patterns. For example, if the machine notices after scanning millions of corresponding texts that the most frequent translation of "Das haus" is "house" instead of "building" or "construction", then the machine will make it a rule to favour the use of "house" as a translation for "Das haus", thus, this approach thrives on the utilization of statistics to automatically generate rules that dictate how translations, especially the tricky ones, are handled. It should be mentioned that in order to elaborate its approach, IBM collected numerous abstracts of the European Parliament and United Nations Security meetings, which were available in various languages to accommodate the members' diverse linguistic backgrounds. It is imperative that one grasps the dependency of SMT, very much like its predecessor, on huge data inputs, meaning that the quality of the outputted translation strongly correlates with amounts of matching texts fed to the machine. The marvellous success that SMT reached, motivated IBM to further work on refining its approach by offering upgraded models and sub-approaches under multiple names that, everyone of which improved the returned results at a word, phrase, or syntax level, by fixing a bug, introducing an original feature, expanding the translation scope, or enhancing the outcomes' coherence and cohesion.

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In 2014, a paper entitled "*Learning Phrase Representation using RNN Encoder-Decoder for Statistical Machine Translation*" by Cho et all established the basis for Neural Machine Translation (NMT), and caught the eye of Google, which saw in this approach the potential to take machine translation to the next level, and decided to pour manpower and heavy resources into adopting as well as enhancing it under the hope of putting its translation product, Google Translate, ahead of the competition's. One way of understanding NMT would be to contemplate the process that a police sketch artist undergoes while exercising his job. The victim or the witness provides based on his/her recollection descriptive physical features of the suspect, such as the colour of the eyes, the shape of the head, and the type of haircut, based on which, the sketch artist draws a sketch that resembles, often to a great extent, the suspect, having never even met the culprit. In addition, if the sketch artist is really talented, he can go as far as producing an oil painting, or a digital drawing of the person of interest. NMT operates in a similar fashion, as the specific features of the source language text or sentence, the equivalent of the suspects' physical traits, are encoded by a neural network, the equivalent of the witness or the victim, and decoded, meaning expressed, into the target language by another neural network, despite its obliviousness to the source language, hence, there is no need whatsoever for a bilingual dictionary, and if one craves translations in other languages, one merely has to choose the adequate decoding neural network, since the specific linguistic features are understand by all the decoding neural networks. This feature differentiated this approach from the previous ones, which had to use English to bridge the translation gap, thus, translating from Russian to Italian would entail first translation from Russian to English, then from English to Italian, a process that could compromise the translation fidelity. After having empowered Google, NMT asserted itself as the golden standard for machine translation, a position it holds to this day, which convinced many renowned corporates, including Amazon, Microsoft, and Facebook, to integrate it as part of their services in order remain technologically relevant as well as financially competitive.

Research methodology:

In order to get to the bottom of this inquiry, a case study was conducted at the Djillali Liabes University, where ten English teachers and a computer science teacher responded favourably to the researcher's request for participation by answering two open-ended questionnaires, which provided a peek into their mindsets regarding AI in general, and its use in the translation field in particular.

The sampling process:

With equality of participatory chances, total impartiality, and utter inclusiveness in mind, ten English teachers were randomly chosen from the Djillali Liabes university, a process which resulted in a diversified sample, that covered participants with different professional experiences, and various levels of technological familiarity. The computer science teacher on the other hand, was selected for his technological expertise, and for his exclusive position as the sole teacher responsible for instructing learners at the English department about the computer skills required to academically succeed.

The data collection tools:

The teachers' questionnaire:

An open-ended questionnaire, which comprised 8 questions that measured the participants' perception towards machine translation, probed their knowledge concerning the fresh developments of AI in the translation field, revealed their opinions regarding the severity of the professional treat that AI poses to human translations, and portrayed their initial reaction to the idea of contributing to the enhancement of AI.

The computer science teacher's questionnaire:

An open-ended questionnaire as well, which was designed in French in order to put the informant at a linguistic ease, and avoid any loss or miscommunication of data that may stem from linguistic barriers. The questionnaire was partitioned into two sections, with each section encompassing four questions. The first section, which was entitled "Understanding artificial intelligence", had as an aim to encourage the participant into providing his own overall comprehension of AI, and shedding light on its status within Algeria. The second section on the other hand, labelled "The use of artificial intelligence in translation", consisted of four questions that mirrored some of those asked in the

teachers' questionnaire, since they examined the computer expert's viewpoint regarding the efficiency of AI in translation, and investigated whether he believes human translators have a fighting chance at all against AI.

The interpretive analysis of the teachers' questionnaire results:
The first question urged the teachers to evaluate the efficiency of the translations performed by computers and web-services such as Google Translate. The participants unanimously agreed on the extreme usefulness of those services, especially for day-to-day uses, but mourned their lack of efficiency, before proceeding to provide what they believed to be the various causes behind this blemish. The most cited cause was the critical need for post reviews to remedy the noticeable structural flaws in the produced translations, which damage the sense of coherence and cohesion necessary for the smooth flow of the meaning. Another contributing factor that was identified as detrimental to the meaning was the low translation fidelity, which the informants accused of inducing the recurrent loss of key concepts' meanings in translation. Those less difficult to please made sure to reiterate their admiration of the technology, deemed borderline perfect by them, but felt compelled to point out its struggles to satisfactorily handle the translation of academic productions. The answers given to the initial question revealed an appreciation amongst the teachers for the assistance that machine translation brings, or at least try to, to their lives. Their complaints were well-founded, as even the developers of AI have acknowledged them on numerous occasions, and vowed to address them, a promise they are slowly but steadily fulfilling by enlarging the neural networks' sizes, and refining their algorithms. As an immediate solution, and in order not to lose any potential clients, translation companies relying on AI are proposing various offers with diverse rates, most expensive of which, entails a post-review of the produced translation by a professional certified translator.

When requested to compare computers' translation to that of humans via the second question, the totality of the informants came to the consensus that the latter one was of superior quality, characterized by a sense of naturality and authenticity that is simply unmatched by its competitor. This pre-eminence is attributed by some to the human

translators' natural and unequivocal skill at capturing as well as translating emotions, and by others to the detail-oriented process that translators undergo while practicing their craft, which involves many proofreads, and the devotion of strenuous efforts to finding the most appropriate substitute words, unlike computers that base their selection of alternative words not on their appropriateness, but merely on the likelihood and probability that certain words are the correct ones to use. The rest were simply convinced that some translation projects, given their complexity, are exclusively human, as they require a human touch and expertise. The professors did point out that human translation's biggest strength is also its biggest weakness against its counterpart, explaining that its process, which results in polished ready-to-use translations with high translation fidelity, is both time and financially consuming. These replies confirm a favouritism for the human translation, and an acknowledgment of its imperfection, which unveil an implicit desire for having the quality of human translation within the price range and accessibility of machine translation. This mirrors the commonly faced dilemma of price-quality ratio, since the quality of human translation, while beyond doubt, is not within everyone's financial or timely reach, especially when there is a free or cheap available alternative, which explains the rush of many to use machine translation. Nevertheless, Human translators still enjoy a near monopoly on the translation of academic works given the linguistic scrutiny that these go into, but major AI translation companies are eying this sizeable market share, and expressed many times their ambition to further expand theirs.

The third question incited the participants to describe what AI meant for them, and was met by divergent answers. The majority either opted for short, vague, and oversimplified descriptions of AI that were far from doing it justice, or refrained from providing any sort of definition, justifying this abstinence by confessing to having merely a broad idea about the technology. The minorities on the other hand, delivered intriguing answers to say the least, as few conveyed their firm belief that an AI is only the mathematical representation of its programmer's ideologies and experiences, whereas others portrayed it as a computer system capable of outperforming humans at certain tasks, and supplied translation as one example of these activities without going into

details, leaving bulk translation of substantial amounts of texts as the most plausible explanation of this example. Familiar with personal assistants like Alexa, some teachers explained AI as an intelligence that may assist humans in their everyday chores, but one we should be wary not to totally depend on. Moreover, one of the most accurate provided depictions of AI was an ominous one as well, as it stated that AI resembles human intelligence, but has more advanced competencies, and will eventually surpass it. The fact that the majority of the participants failed at giving a concise and precise definition of AI is an indication of a shared unfamiliarity, obliviousness, or feelings of intimidation towards it, its intricacies and complexities. Additionally, the call for caution regarding the over reliance on AI, and the bias accusations against it, shed light on a considerable distrust among the informants towards it, which must not go unnoticed. Perceiving AI as a daily assistant is far from wrong, but is also unfair to its potential, since, as previously discussed, acting as a personal assistant is merely a fraction of what AI is capable of. The claim that AI's ability to rapidly translate huge corpora of texts exceeds that of humans is a valid one, as it represents AI's biggest strength, and its greatest competitive advantage in the translation arena. Overall, it is safe to say that the participants revealed having at best a fuzzy understanding of AI.

The pedagogues were requested via the fourth question to share their insights regarding the recent technological leap made in the use of AI in translation. Few confirmed noticing a fresh increase in the usefulness of AI as a translation tool, made evident by the betterment of its translation of terminologies and scientific texts, while some disclosed having no idea whatsoever about the discussed technological development. Others praised the technological progress, going as far as describing it as a God-send to those who lack diverse linguistic skills. In the same vein, some participants, delighted, reported their amazement at the fact that there are machines out there nowadays that are not only capable of recognizing tone, but of reproducing it while translating as well. The teachers, regardless of their less than ideal grasp of AI, appear to be aware to a great extent of the breakthrough that recently stroke the machine translation field in general, and the AI domain in particular, the one that gave rise to companies such as Deepl, which due to its

outstanding neural networks, succeeded at elevating the quality of its translations to the point of receiving accolades from both technology reviewers and international press. This addresses the first research question which inquired as to whether the Algerian research teachers were aware of the advances made in the use of artificial intelligence in the field of translation, and confirms the first hypothesis, which suggested that the Algerian translation teachers are well-aware of these advances.

The fifth question encouraged the participants to assess the threat that the aforementioned technological advancement poses on the translators' bread and butter, which sparked a divergence of perspectives. One viewpoint was that human translators are safe due to the superior translation quality that they offer, and the forever existence of a niche for special types of texts, such as scientific texts, which can solely be translated by humans. Some, of close belief, alerted that the translators' professional safety is merely momentary, and that once AI's translation's quality matches humans', all while remaining freely or cheaply accessed, then translators will go professionally extinct. Others, less optimistic, suggested that human translators are severely and imminently threatened, as there already is a growing tendency among people to merely rely on the often-free web-services, and their limited mastery of the target language, to translate their documents. Despite their divergent assessments of the imminence of the AI's danger, those certain of it insisted that the human translators' sole chance towards professional salvation lies in their ability to adapt. The gathered responses presented evidence of a shared awareness amongst the majority of the participants regarding the AI's menace on translators' employability, and a predilection for adaptability and self-development as a resistance strategy.

For further exploration of this point, the sixth question prompted the teachers to explicitly reflect upon what translators can do to tip the scale to their advantage. Some participants were quick to dismiss the necessity of any action, manifesting once again their belief that translators will forever be deemed essential by the academic community. Others advised translators to lean on their cultural awareness, considered as their competition's Achille's heel, to increase the appropriateness of

their translations, and gain a unique edge. The majority of the informants on the other hand, recommended that translators immediately commence developing their technological skills as a coping and survival strategy, thus, use technology to their own advantage, with some teachers even suggesting integrating technology into their workflow, not only as a survival tool, but as a productivity tool as well. This last recommendation was noteworthy both due to its extreme popularity amongst the participants, and its recurrence throughout the course of this study, as the informants have alluded on repeated occasions, such as via their answers to the second question, to their desire for a compromise that combines their quality of translation and the machine translation's price tag, one that ensures the continuity of the technological evolution, along with its obvious conveniences, without devastating side effects like unemployment. Such ambition, coupled with the teachers' previous recognition of the assistance that AI brings to one's daily translation needs, which was in itself an admission on their part to the casual use of AI for translation, revealed that the participants, despite their valid concerns regarding their livelihood, are far from being opponents to the use of AI in the translation domain, which addresses the second research question that investigated whether the Algerian translation teachers are in favour of the use of AI in translation, and confirms the second hypothesis, which speculated that they are indeed proponents for such use of technology. Fortunately, in order to both make use of the needed translators' expertise to bypass AI's flaws, and avoid any backlash that may arise from depriving them from their metiers, many CEOs of renowned companies that use AI for translation have pivoted their interest from competing against human translators to working besides them, by using AI as an empowerment tool that not only accelerates, but manages the workflow of those translators. For example, AI would be responsible for billing, managing the accounts, assigning projects to translators based on their specialized skillset, and doing the bulk of translation, leaving human translators to post-review the results.

The seventh question was dedicated to the assessment of the participants' willingness to contribute with their professional expertise for the betterment of AI within the translation domain. To the researcher's utter surprise, merely the minority of the informants

expressed their readiness to take part in this endeavour, arguing that the development of AI will occur no matter what, therefore, it is better to jump on the evolution train and be of assistance. Few communicated their unsureness regarding how their expertise could be of use to the enhancement of AI, which reinforced the scepticism surrounding their understanding of the functioning of AI. The majority however, shared a reluctance to the idea of devoting their efforts and know-how for the sake of ameliorating AI, which can solely be perceived as an act of self-preservation, that involves slowing down their nemesis' steady and swift growth with all means possible. Nevertheless, these replies put an end to the mystery surrounding the third research question, which evaluated the degree to which the Algerian translation teachers are willing to contribute to the development of AI, and disproved the third hypothesis claiming they are extremely desirous to take an instrumental role in AI's history.

The participants were asked through the eighth, and last, question if there was anything they wished to add regarding the topic at hand. The majority of the teachers preferred to conclude with a piece of advice, a reminder that nothing can replace having a solid grasp of the target language, which allows for a first-hand understating of the original message, one that is totally untethered from, and unaltered by, translation, may it be that of humans or machines. Relentless, few informants took the opportunity to once again reiterate their conviction that a computer could never replace a human translator as it lacks the much needed "human warmth". Others went another route, and opted, instead of bashing AI one last time, to pay tribute to the positive impact it has had on smoothening people's communications and interactions.

The interpretive analysis of the computer science teacher's questionnaire:

In order to ease into the tackled subject, the expert was first asked to provide his own definition of AI, a request to which he responded by describing it as a scientific discipline and a technology, that aims at the execution by machines, via a combination of computers and software, of cognitive processes, which, till recently, were exclusive to the human mind, in various domains, such as comprehension, interactive communication between man and machine, and structuralization of

memory. Through his exhaustive and accurate explanation of AI, the participant demonstrated having ample knowledge concerning the technology.

Furthermore, the second question inquired about the prerequisites in terms of technological knowledge, hardware, time, and legal obligations needed to build an AI. To show emphasis, the informant devoted his whole answer to caution that in order for AI to remain within the fundamental human values while functioning autonomously, ethical considerations and doctrines must be integrated into its algorithms. The participant touched a nerve, and brought up an important issue, which is AI regulation, since the relative newness of AI exempted it for years from being heavily regulated, but many have recently voiced their concerns over the lack of control laws that guarantee the safe use of this technology, and urged legislators to act swiftly by generating meticulous laws as well as filling any legal voids.

The third question dug a bit deeper by focusing on how AI learns, and investigating the factors that influence its learning rate. The expert asserted that scientists use various techniques to build an AI, which can mainly be categorized into two major categories, namely, supervised learning, and reinforced learning, otherwise known as deep learning. In addition, he identified the size of the input data that is fed to AI as the key factor that primarily determines its learning speed. This explained the shortcomings of AI when translating minority languages, which are characterized by their small, if existent at all, digital corpora of texts, that are far from being sufficient for AI to master those languages. Moreover, this also clarified how certain human translators continue to not only survive, but also thrive professionally in this digital age, and shed light on their crucialness for the improvement of AI as well as the preservation of those minority languages.

In an attempt to review the status of AI within Algeria, the expert was urged through the fourth question to describe where his motherland stands vis-à-vis this technology. With a subtle hint of eagerness and pride, he reported that Algeria is among the leading African countries in the use of AI in diverse automation fields. Additionally, he declared that professor Aoureg Abdelhafid, the director-general of scientific research,

boasts 116 research laboratories devoted to AI, which house 568 research teams, and serve 67 research projects that focus on the utilization of AI in robotics. The shared facts paint a clear picture about the awareness of the government concerning the potential of AI, but also shine a light on a penchant for its use for industrial purposes, which is both understandable, given the country's financial ambitions, and regrettable, due to the resulting neglect of other prosperous fields, including, but definitely not limited to, translation.

The "understanding Artificial Intelligence" section successfully achieved its objective by bridging any knowledge gaps regarding the functioning of AI, by bringing attention to the regulation controversy surrounding it, but most important of all, by putting an end to the common delusion that Algeria is utterly disregarding AI, and falling way behind in the international AI race.

Ushering the second section entitled "the use of artificial intelligence in translation" was a question that solicited the expert for an audit of the AI use in the translation domain, its efficiency, its functioning, its accessibility, and its linguistic coverage. Intuitive about the implicit connection between the posed question and the AI-translators rivalry, the participant confirmed that nowadays, the development of AI is at its prime, but insisted that AI is still not yet ready to replace professional human translators. There was undeniably a great deal of logic in the informant's claim, since it had already been established that AI fails to compete head-to-head with human translators when it comes to translating minority languages. Besides, his words were on par with some teachers', who repeatedly echoed that translators shall forever persevere professionally.

The second question granted the informant the opportunity to cite the advantages that come from choosing the services of a human translator over those of AI. Unbiased, the expert maintained that professional translators possess a better knowledge as well as a mastery of the language, and are creatively superior over AI. He added that human translators can generate stylish translations in their mother tongue, and can also use their cultural consciousness to produce translations that are culturally sensitive as well as appropriate, a skill that

AI lacks. Indeed, the humans' unequalled ability to navigate the intricacies of languages, and adaptabt their translations to avoid cultural faux pas was, is, and will remain for the near future the principal reason why professional translators are still relevant in the translation industry, a point already made by the teachers via their replies to the second question of their questionnaire.

For a more extensive assessment of the AI threat over translators, the participant was encouraged through the third question to weigh in about the translators' survival odds against the digitalization of the translation field. He pointed out that during this era, symbolic and static systems which rely solely on linguistic rules as well as translated texts for their functioning are considered almost obsolete, and that the recent emergence of different tools, methods, and approaches for machine translation, which are based on AI and neural networks, marked a key step in its evolution. The expert went on using adaptive translation and automatic voice translation as examples of the methods that will most likely take prominent places in the translation domain during the upcoming years. How the informant envisions the future of AI translation ought to make the previously discussed idea of a collaboration with the machines all the more appealing for the translators, especially when one takes into consideration the fact that not all of them enjoy the professional advantage of mastering a dead, dying, or minority language, and the compromise appears to be the most plausible solution to ensure employability.

As final words, the expert stated that AI makes life easier and more comfortable, or at least should try to, however, there are certainly drawbacks to it as well, since AI entails numerous dangers, not imaginary ones such as the enslavement of the human kind by the machines, but genuine realistic ones, such as the loss of invaluable control over sensitive domains, unemployment, and humanization of machines. The participant's call for attention to the diverse hazards of AI, coupled with his previous emphasis on the imperativeness of AI regulation, further reinforced his status as a connoisseur of the technology, and revealed his awareness of AI's future potential to either become a source of empowerment, or that of problematic challenges

Conclusion:

This study endeavoured to investigate an international concern, which is the impact of AI on human translators' job security, on a local level, by revealing whether or not the Algerian translation teachers are au courant with the recent rise of AI as a major player in the translation industry, whether or not they are keen on its use in the translation field, and whether or not they are open to the idea of aiding its refinement. The collected evidence left no doubt that the teachers are informed tech-friendly individuals who keep abreast with the latest technological breakthroughs, and have no problem occasionally using technology to tend to minor translation needs, or integrating it into their daily routines to facilitate their every day's errands, but they still refuse to participate in its betterment nonetheless. Furthermore, if the information gathered from the computer science expert were to be believed, the teachers' implied readiness to incorporate the use of AI into their work methodology represents their best bet against the looming danger of unemployability.

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