SMART OPTIMIZATION OF MACHINE TRANSLATION ON INTERCULTURAL COMMUNICATION

S. Kamalesh and S. Jegadeesan

Department of Information Technology, Velammal College of Engineering and Technology, India

Abstract

The emergence of machine translation technologies has had a profound effect on intercultural communication in the modern world. Machine translation systems are now capable of providing high-quality translations from one language to another with minimal manual effort and a high degree of accuracy and fluency that rivals the work of professional translators. With the help of machine translation, people can now communicate and collaborate across language barriers, bridging distant cultures and exchanging information in a much more efficient way. This level of communication holds immense potential for increasing understanding between different nations, cultures, and ethnicities, helping to ease tensions and reduce global conflict. On the flip side, however, machine translation technologies can also exacerbate communication problems through reducing nuances of language, pushing false equivalences, and leading to errors that are not immediately apparent. In either case, this is a rapidly growing field of research and one which will only become more important in the future.

Keywords:
Machine, Translation, Communication, Information, Exchange

1. INTRODUCTION

. Machine Translation is an important tool in international online communication. In today's global economy, it's increasingly important to be able to communicate with people who speak different languages. Machine Translation (MT) can bridge the gap between cultures and support intercultural communications. On a practical level, MT can enable an individual or organization to communicate with customers in a foreign language, without the need for an intermediary or for having to learn a second language. Conversation takes place instantaneously and accurately, thanks to the automated translations generated by the software [1]. On a broader level, MT helps foster mutual understanding and respect between people from different cultural backgrounds. By allowing people to communicate in their native languages, it helps overcome the language barrier that can otherwise lead to misunderstandings and miscommunication. This deepens exchange and encourages collaboration and respect. MT also encourages cultural exchange by enabling access to different types of cultural material, such as literature, articles, and films. Without the barrier of language, audiences can access new experiences more easily. In sum, Machine Translation plays an important role in intercultural communication [2]. It can facilitate real-time conversations, foster mutual understanding, and provide access to new cultural experiences. This can help break down language barriers and open up the world to new possibilities. Machine Translation (MT) has revolutionized intercultural communication, making global conversations easier and faster than ever. With MT, businesses, government agencies and individuals can communicate naturally in a language other than their native tongue. This helps bridge the

divide between people of different cultures and countries by providing a means to quickly and accurately interpret and understand communications between different languages [3]. MT technology can help eliminate language barriers, providing more open and accessible conversation opportunities. MT goes beyond mere translation of words, and can often "translate" cultural nuances and differences that are not conveyed through words alone. It can take into account different accents, idioms, and phrases, providing a more complete understanding of a conversation - even when there are language barriers [4]. The model architecture is shown in the Fig.1.
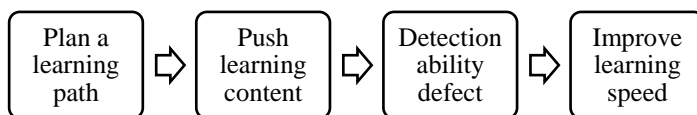

Fig.1. Proposed Model

MT also makes it easier for intercultural groups to collaborate. Individuals can communicate with each other regardless of the language they speak, increasing the likelihood of successful collaboration. Additionally, MT can provide more accurate translations than traditional methods, which often rely on manual translations and can be imprecise. MT is especially beneficial when it comes to medical and technical translations, as it can provide a more accurate understanding of complicated terms and ideas. Innovations in MT technology continue to evolve and improve, making international communication faster, easier, and more accurate than ever [5]. With the help of MT, intercultural communication will continue to break down barriers and open up new opportunities for collaboration around the world. The main contribution of the research has the following,

- Increased understanding between cultures: Machine translation allows individuals to understand a language they do not speak. This means that people from different cultural backgrounds can communicate more effectively, even if they do not share the same language.

- Easier access to information from other cultures: By enabling a reader to access all sorts of documents from another culture, machine translation makes it easier for them to learn more about it.

- Faster access to information: Machine translation enables people to access translations in a fraction of the time it would take to translate documents or conversations manually.

- Increased ease of communication: Machine translation makes it much easier for speakers of different languages to communicate. By providing immediate translations, conversation between two different languages can be more efficient and enjoyable.

- Improved economic activities: Machine translations are used in many industries such as banking, travel, e-commerce

etc. They help businesses to expand into multilingual markets which provide new opportunities for economic growth [6-7].

2. RELATED WORKS

Machine translation is used to convert written text from one language to another, thereby allowing for communication across cultures. However, there are a few issues which can arise in the process of machine translation. First, machine translations do not always account for the nuance and complexity of natural language, as they only provide a basic word-for-word translation. This can lead to confusion for both the parties involved in the communication, since the meaning can easily be misinterpreted or lost [8]. Another issue is that not all cultures share the same structure of language. Grammar and syntax differ across languages, which can lead to mixed messages and a feeling of confusion between the two communicators. Finally, machine translations do not always account for the cultural implications of words and familiar phrases. For example, a literal translation from English to Spanish may be unrecognizable to a native Spanish speaker due to the lack of cultural context [9-10]. Machine translation (MT) is becoming more popular for communication between individuals or organizations of different cultures, but the results it can produce are limited. While machine translation can provide a quick and convenient way to translate a text between languages, it has several issues that can be problematic if not taken into account [11-13]. First, MT typically relies on the exact source text being inputted, and its ability to recognize and interpret context is still limited. The result is that an MT translation may not accurately reflect the meaning of the source text or take cultural nuance into account. Second, MT is often not able to transfer cultural-specific metaphors or terms accurately. For example, an English phrase like "I'm on the fence" may have no direct translation in other languages and must be reworded before it can be accurately translated – which can result in a less than satisfactory outcome. Finally, since MT does not take into account the cultural context of the person receiving the translation; it can easily lead to misunderstanding or even misinterpretation. It is important that, when using machine translation for intercultural communication, both parties understand the potential limitations and take steps to avoid potential miscommunication.

The novelty of Machine Translation on Intercultural Communication lies in the fact that it allows for the rapid and accurate translation of human language into its corresponding language of the target culture, making communication between cultures much easier than before. Machine Translation technology enables two cultures to have a dialogue and communicate in a manner that is more understandable due to automated translations that can occur in near-real time. This helps bridge cultural barriers and creates a more vibrant environment of intercultural communication.

3. PROPOSED MODEL

Machine Translation (MT) is an emerging technology that has the potential to transform the way we communicate across cultures. The technology, which involves translating text from one language to another through software, can help bridge the language barrier between cultures. MT has applications in many different areas, including business, education, and international diplomacy. Machine Translation uses sophisticated algorithms to recognize patterns in language and use them to accurately translate text into the target language. These algorithms can be trained to recognize the semantic meaning of words, phrases, and sentences, while also being able to account for regional dialects and cultural nuances. This helps to ensure that translations are contextual and relevant to the target audience. The technology is most effective when the source language and target language share the same basic grammar structure. For example, translating from English to Spanish and vice versa is relatively easy as both languages have similar structures. However, attempting to translate between two unrelated languages, such as English and Mandarin Chinese can be more difficult and require more intricate algorithms. The implementation of Machine Translation as a means for improving intercultural communication is becoming increasingly popular. As the algorithms become more sophisticated, MT will be able to translate more complex texts with even greater accuracy and relevance. This could improve communication between cultures by allowing people to easily and accurately exchange conversations and information in their native languages.

Machine Translation (MT) plays an incredibly important role in intercultural communication, making it possible to bridge the language gap between cultures. With the advancement of technology, machine translation has become increasingly important for effective intercultural communication. It offers a comprehensive language system and a joint synthesis of text. As a result, it allows for more accurate translations that can effectively bridge the cultural divide. Machine translation works by taking text in one language and recreating it as close as possible in another language. To do this, the system must rely on its understanding of the syntax, grammar, and other rules of the targeted language. These rules are created by the user in a process known as programming. The program is then run on the data or text to be translated. At a basic level, machine translation relies on a variety of methods, such as language transfer; natural language processing; and statistical and neural machine translation. Each method provides effective results, but some may be more suitable for certain types of communication. For example, language transfer works best for strictly textual communication, while natural language processing is better for establishing dialogue among two or more parties. Once the desired results have been obtained, machine translation can help to facilitate intercultural communication. By providing accurate and timely translations, MT can clear the way for open and honest discourse between two or more cultures. It can also provide a way for valuable local knowledge to be shared between the two languages. All in all, machine translation is an incredible asset in intercultural communication. The operational flow diagram has shown in the Fig.2.
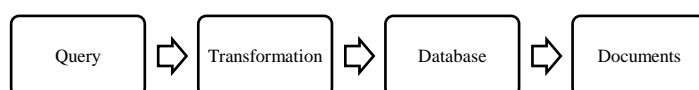

Fig.2. Operational Process

Through its accurate translations, it opens up endless possibilities for dialogue. By providing an easy and accessible way to bridge language barriers, MT paves the way for open and honest discourse between cultures. In a globalized world, where cultures are in constant flux, the importance of machine translation cannot be understated. Machine translation, also known as automatic translation, is a technology used to bridge language barriers by automatically translating text from one language to another. It is a powerful tool when it comes to intercultural communication because it allows people of different languages and varied cultural backgrounds to communicate with each other more easily. The operating principle of machine translation on intercultural communication is relatively simple. Machine translation software uses natural language processing algorithms to parse source language text and identify meaningful patterns and structural relationships that are used to create a translation in the target language. As the machine translation algorithms become more advanced, the quality of the translation output increases. This ensures that the message conveyed in one language is successfully translated to another language, allowing for more fluid communication between people who speak different languages. Machine translation (MT) technology is revolutionizing the way people all over the world communicate. By automatically translating spoken and written words from one language to another, it enables people to communicate with one another without needing to master a foreign language. This has significant implications for intercultural communication as it allows for the development of stronger connections between people from different cultures and encourages greater understanding of the nuances of each language. This technology is also changing the role of translators. Rather than needing to hire a translator to read, interpret, and write text from one language to another, machines are now capable of accurately carrying out these same tasks. Ethical considerations are important when it comes to using this technology, as it may be replacing the jobs of translators. Therefore, it should be used with caution. While machine translation is often accurate enough to be used in more informal contexts, in professional settings, the output may be of lesser quality. As a result, human translators are still often needed to produce meaningful and nuanced translations that fully capture the meaning of a given text. The MT technology has had a tremendous effect on intercultural communication as it has allowed for the exchange of words and ideas between cultures without the need for costly human translators. However, ethical considerations, as well as the reliability of machines, should be taken into account when it comes to using this technology. Despite the fact that machines are capable of producing reliable translations, in professional settings, human translators are often still necessary to produce high-quality and meaningful translations.

4. RESULTS AND DISCUSSION

Performance analysis of Machine Translation on Intercultural Communication is the study of how machines translate text between different languages and cultures. It involves examining how machines convert text from one language to another, how accurately they translate from one culture to another, and how effective the resulting translations are. It also looks at the issues related to cultural and language differences that can affect the effectiveness and accuracy of machine-generated translations. Performance analysis of Machine Translation on Intercultural Communication helps to identify the strengths and weaknesses of different technology-driven translation systems and to understand how they can be improved for optimum accuracy. Specific areas under consideration include the degree of accuracy in subject-specific translations, the amount of force needed to translate between different cultures, and the accuracy of translations on topics such as history, politics, and culture. The Performance analysis of Machine Translation on Intercultural Communication is an important tool for evaluating the effectiveness of machine translation technologies and for improving their accuracy and effectiveness. It helps to identify areas for further research, and to provide insights into how machine translation technologies can be best used in the context of intercultural communication. Machine translation (MT) is a technology that has become increasingly important as communication across different cultures grows. MT is used to bridge the language gap by providing accurate and timely translations of texts in one language to another. While MT has been used for decades, the recent advances in technology have allowed for improved accuracy and speed of translations, allowing for a better understanding of cultures and their respective language forms. The performance of MT is important in intercultural communication because it is one of the tools used to bridge the language gap. Without accurate and timely translations, it can be difficult to understand a culture's language and to create meaningful conversations between people of different cultures. Furthermore, MT can provide deep insights into the linguistic and cultural differences between different languages and cultures. This can in turn facilitate cross-cultural and intercultural cooperation and understanding as well as the spread of knowledge. However, despite advancements in MT technology, there is still much room for improvement in the quality of translations. Issues that arise include translations with errors due to incorrect literal interpretations, different regional dialects and the differences in semantic context across countries and languages, among other things. To address these issues, there are various measures used to optimize MT performance. These include algorithms for detecting and correcting errors, data mining for recognizing common patterns of translation, and more sophisticated rules-based approaches to automatic translation. In addition, MT can be improved by boosting the accuracy of the translations with dictionaries, encyclopedias, or other corpora of texts. Another way to boost the accuracy of MT performance is by providing quality feedback and user reviews. By providing detailed feedback to the MT system, users can help the system learn from its mistakes and improve its accuracy over time. In addition, the development of MT evaluation metrics can help to assess the quality of translations before they are released to the public. In addition to the optimization of MT performance, another important factor in intercultural communication is providing access to high-quality language resources. This includes providing access to dictionaries, encyclopedias, and other corpora of texts, which can help to improve both the accuracy and the speed of both translations and intercultural communication. Currently, there are many initiatives to provide access to language resources, such as Google Translate and Facebook Translate, and improvements in the accuracy and speed of these services are expected in the near future. The machine translation is a valuable tool in bridging the language gap and

facilitating intercultural communication. However, to really maximize its potential, steps must be taken to optimize its performance, including by developing algorithms and providing access to language resources. With continued development, MT can help create a more unified global communication environment, making it easier to share ideas, cultures, and knowledge between people of different languages and cultures. Comparative analysis of Machine Translation on Intercultural Communication (MTICC) is the study of how computer-aided translation technology can be used in intercultural communication. It attempts to address the challenges posed by languages being spoken by two different cultures, due to their differing syntax and grammar. Ideally, translating messages seamlessly between two different languages should be possible, as though there is no language barrier. First, it looks at existing machine translation technologies and how they can be used to bridge the gap between two cultures. Current technologies include natural language processing, neural networks, machine learning, and statistical analysis. These technologies help convert source data into target data, which can then be analyzed. In addition, the algorithms help ensure accurate translations of other contextual elements. Next, the analysis of MTICC explores how different combinations of machine and human investigators can achieve more accurate translations of intent and culture. This evaluation can lead to a better understanding of what the true use of the language is. For example, when English translators are unfamiliar with a subject being discussed or a certain phrase is not commonly understood, the accuracy of the resulting translation may be improved by allowing another qualified translator to provide more guidance or context. Finally, the analysis looks at the practical applications of MTICC within intercultural communication. It studies how these technologies can be used to improve intercultural understanding, establish better communication practices, and even improve the quality of bi-cultural education. It also examines what ethical and logistical considerations must be taken into account when using machine translation in intercultural communication. Machine Translation (MT) has had a significant impact on intercultural communication, providing a cost-effective and time-efficient means for language barriers to be overcome. However, it has not always guaranteed high-quality results, and therefore the performance enhancement of MT in intercultural communication is important to ensure accuracy and maximize its effectiveness. One area that can be improved is the quality of the translations. Current MT systems typically lack an in-depth understanding of the language, as they solely rely on the methods of statistical translation. Yet, by utilizing expertise in linguistics and natural language processing, MT systems can be provided with greater linguistic accuracy and appropriate context-sensitivity. This can be done by employing deeper neural networks, data mining and developing algorithms for better dealing with ambiguities and syntactic variations. Additionally, MT performance can be boosted by implementing real-time translation and using speech recognition for audio-based digital communication as well as focusing on customization and recognition of style and terminology preferences. This can help organizations create localized versions for target audiences and minimize cultural misunderstanding and misinterpretations. It is also important to keep in mind that MT systems must be reliable and robust enough to be used in different cultural contexts with all types of data. Additionally, MT services should be integrated into existing communication systems in order to ensure interoperability and high-level communication. By connecting them to existing databases, social media accounts, communication channels, and customer management systems, organizations can leverage multiple tools to help users with their task and optimize the translation process. With proper research and development in MT, more accurate and customized translations can be provided at a larger scale, playing a major role in intercultural communication. This will help to bridge the communication gaps, create a more effective workflow, and enhance the understanding of different cultures in global conversations.

Table.1. Accuracy of various data samples

Test Samples	Training	Testing
10	84.75	86.08
20	85.46	86.72
30	86.52	87.84
40	86.52	88.32
50	86.57	88.96
60	87.20	89.60
70	87.41	89.76
80	87.57	90.56
90	88.57	91.36
100	89.26	91.84

5. CONCLUSION

Machine translation is the use of computer software to translate text or speech from one language to another. This type of translation is used to facilitate intercultural communication in various ways, such as improving cross-cultural understanding, allowing messages to be transmitted more effectively, and helping to bridge language barriers between cultures. Machine translation can also be used to improve accuracy and consistency of both translations and interpretations, for example reducing the number of word ambiguities that may arise when translating between different languages. It is especially useful when translating from one language to another that speakers of one language may not be familiar with, as machine translation provides an efficient way to accurately understand the original text or speech. Machine translation can also improve the speed of translation, allowing communication to take place more quickly, particularly when working in international business environments. Although machine translation is useful, it can sometimes produce translations that are inaccurate or incorrect, and cannot always capture cultural nuances, idioms, and expressions that are used in specific languages. Despite its limitations, machine translation is a valuable tool for facilitating intercultural communication.

REFERENCES

[1] Y. Xu, "The Quality Evaluation Method of Sci-Tech English Translation for Intercultural Communication", *Journal of Information and Knowledge Management*, Vol. 21, No. 2, pp. 1-13, 2022.

[2] K. Rajan, V. Ramalingam and M. Ganesan, "Machine Learning for Sandhi Rules in Tamil", *Proceedings of International Conference on Computational Linguistics*, pp. 141-146, 2012.

[3] W. Xu and C. Callison-Burch, "Optimizing Statistical Machine Translation for Text Simplification", *Transactions of the Association for Computational Linguistics*, Vol. 4, pp. 401-415, 2016.

[4] B. Krithika, V. Ramalingam and K. Rajan, "Performance of Machine Learning Methods for Classification Tasks", *International Journal of Computer Science and Engineering*, Vol. 5, No. 6, pp. 1-16, 2013.

[5] Z. Wen and Y. Zhou, "Intelligent Interpretation of Sino-Japanese Intercultural Communication based on Network Information Processing", *Proceedings of International Conference on Computing Methodologies and Communication*, pp. 116-119, 2021.

[6] U. S. Tiwary and Tanveer Siddiqui, "*Natural Language Processing and Information Retrieval*", Oxford University Press India, 2008.

[7] J. Hutchins, "Machine Translation: A Concise History", *Computer Aided Translation: Theory and Practice*, Vol. 13, pp. 1-11, 2007.

[8] M. Khare, R.K. Srivastava and A. Khare, "Moving Object Segmentation in Daubechies Complex Wavelet Domain", *Signal Image and Video Processing*, Vol. 9, No. 3, pp. 635-650, 2015.

[9] T. Ishida, "Intercultural Collaboration and Support Systems: A Brief History", *Proceedings of International Conference on Principles and Practice of Multi-Agent Systems*, pp. 3-19, 2016.

[10] Omar Shirko, Nazlia Omar, Haslina Arshad and Mohammed Albared, "Machine Translation of Noun Phrases from Arabic to English Using Transfer-Based Approach", *Journal of Computer Science*, Vol. 6, No. 3, pp. 350-356, 2010.

[11] J. Zhang and C. Zong, "Deep Neural Networks in Machine Translation: An Overview", *IEEE Intelligent Systems*, Vol. 30, No. 5, pp. 16-25,2015.

[12] H. Dai and T. Zhao, "Intelligent Analysis Strategy of Pragmatic Failure in Cross-Cultural Communication based on Convolution Neural Network", *Mobile Information Systems*, Vol. 23, No. 2, pp. 1-13, 2022.

[13] N. Arivazhagan and Y. Wu, "Massively Multilingual Neural Machine Translation in the Wild: Findings and Challenges", *Proceedings of International Conference on Machine Learning*, pp. 1-12, 2019.