eISSN 2581-8996
ONLINE
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN MULTIDISCIPLINARY SCIENCES (IJARMS)
A BI-ANNUAL, OPEN ACCESS, PEER REVIEWED (REFEREED) JOURNAL
Vol. 08, Special Issue 01, April 2025

Machine Translation and Artificial Intelligence in Language Studies: Issues and Challenges

Dr. Rajeev Yadav[1]
[1]Assistant Professor-English, NSCB Government Girls PG College Aliganj, Lucknow, Uttar Pradesh

Received: 05 April 2025, Accepted: 20 April 2025, Published online: 30 April 2025

Abstract

Machine Translation (MT) has significantly evolved with the integration of Artificial Intelligence (AI), particularly in English language studies. AI-driven MT tools, such as Google Translate, DeepL, and Microsoft Translator, have revolutionized the way languages are learned, translated, and processed. These tools have enabled faster, more accurate, and accessible language translation, benefiting various domains such as education, business, and international communication. However, while advancements have propelled MT to new heights, significant challenges remain.

This paper explores the advancements and challenges associated with MT and AI in English language studies, emphasizing their impact on education, communication, and linguistic research at various levels of education.

Keywords: Machine Translation, Artificial Intelligence, Language Studies

Introduction

The National Education Policy (NEP) 2020, approved by the Government of India, is a comprehensive framework for the development of education in India. One of its significant focuses is on language and translation, emphasizing multilingualism, cultural inclusivity, and the promotion of Indian languages.

Much more concentration has been given to language studies and translation in the NEP-2020 to enhance accessibility of learning materials in regional languages, to preserve and promote the diverse linguistic heritage of India, to facilitate interdisciplinary and intercultural understanding, to bridge the language gap in higher education and research. Moreover, it encourages translation as a profession and academic discipline.

For wider understanding of these issues we need to discuss the NEP-2020 in respect of language studies and translation. The section 4 of the NEP-2020 discusses the promotion of Multilingualism (NEP-2020, Section 4). It also emphasizes on the Three-Language Formula to ensure that students learn at least three languages (two native Indian languages and one international, preferably English) apart from teaching in the mother tongue/regional language until at least Grade 5, preferably till Grade 8. The section 22.8 of the NEP-2020 discusses the necessity of the translation of Educational Content (NEP-2020, Section 22.8) The high-quality textbooks and materials need to be translated into all major Indian languages.

NEP-2020 proposes the establishment of a National Translation Mission (NTM) to coordinate these efforts. It highlights the creation of the Indian Institute of Translation and Interpretation (IITI). It talks for establishment a specialized institute to: promote professional translation to support interpreting and translation training programs, and fostering research in Indian and classical languages. NEP-2020 mentions the Digital Translation Efforts Support for the Bharatavani Project – a government initiative for multilingual knowledge and content along with the development of AI-based translation tools to enable real-time translation of learning resources. There are provisions in NEP-2020 to implement strategies collaborating

eISSN 2581-8996
ONLINE
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN MULTIDISCIPLINARY SCIENCES (IJARMS)
A BI-ANNUAL, OPEN ACCESS, PEER REVIEWED (REFEREED) JOURNAL
Vol. 08, Special Issue 01, April 2025

between universities, language departments, and technology institutions like IITs and IIITs; use of Open Educational Resources (OERs) in translated forms; incentivizing researchers and translators to develop content in native languages by including translation studies in undergraduate and postgraduate curricula.

To solve the shortage of skilled translators and interpreters in Indian languages, to standardize issues in terminologies across languages, technological limitations in automatic or machine translation, need for quality control in translated content, to democratize of knowledge by making it available in all languages, to promote of inclusive education for rural and vernacular-medium students, to reviving and safeguarding of endangered languages through educational use, and strengthen cultural identity and national integration through language NEP-2020 proposes various methods. One of these tools is increasing use of the Machine Translation and AI in language studies.

Historical Background of MT and AI in Language Studies:

Machine Translation has its roots in the 1950s, with early rule-based systems that relied on linguistic rules, dictionaries, and manually crafted grammars to translate text from one language to another (Hutchins, 2005). These early systems, while effective for structured and formal language, struggled with ambiguity and idiomatic expressions.

The advent of statistical machine translation (SMT) in the 1990s marked a significant improvement. Instead of relying on fixed rules, SMT utilized probabilistic models based on bilingual corpora, allowing translations to be generated based on statistical likelihood (Koehn, 2010). However, SMT still faced challenges with context and fluency, as translations were often fragmented and unnatural. More recently, neural machine translation (NMT), powered by deep learning and artificial neural networks, has demonstrated remarkable accuracy and fluency (Bahdanau et al., 2015). NMT considers entire sentences instead of word-for-word translations, enabling greater contextual awareness and improved coherence.

NMT has surpassed SMT in terms of fluency, coherence, and contextual understanding. It utilizes deep neural networks to process entire sentences rather than fragmented phrases, leading to more natural-sounding translations (Wu et al., 2016). Models such as Transformer-based architectures (Vaswani et al., 2017) have further enhanced translation quality by leveraging self-attention mechanisms, allowing MT systems to handle long-range dependencies and complex sentence structures more effectively.

Modern AI-driven MT systems employ contextual embeddings, such as those found in OpenAI's GPT models and Google's BERT, to improve translation accuracy (Devlin et al., 2018). These models learn from vast amounts of multilingual data, enabling them to understand syntax, semantics, and discourse-level structures. Moreover, adaptive MT systems can refine their translations based on user feedback, allowing continuous learning and improvement for domain-specific applications, such as legal and medical translations.

Advancements in the MT and AI for Language Studies:

Recent advancements incorporate multimodal inputs, including text, speech, and images, to improve translation accuracy. Speech-to-text and text-to-speech technologies allow users to communicate seamlessly across languages. Interactive translation tools, such as adaptive MT and post-editing interfaces, enable human translators to refine machine-generated translations dynamically, improving efficiency and accuracy (Turchi & Negri, 2019). Real-time translation capabilities have been integrated into chat applications, virtual assistants, and customer service platforms. AI-powered translation tools such as Google Assistant and Microsoft's Skype Translator enable cross-lingual communication in real-time, bridging language barriers in

eISSN 2581-8996
ONLINE
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN MULTIDISCIPLINARY SCIENCES (IJARMS)
A BI-ANNUAL, OPEN ACCESS, PEER REVIEWED (REFEREED) JOURNAL
Vol. 08, Special Issue 01, April 2025

global interactions. The integration of MT with conversational AI models enhances natural language understanding and context retention, improving translation effectiveness.

Challenges in the field of MT and AI for Language Studies:

Despite advancements, AI-driven MT struggles with linguistic nuances, idiomatic expressions, and cultural context. English, with its complex syntax, polysemy, and regional variations, presents significant challenges (Vinay & Darbelnet, 1995). Many expressions carry meanings that cannot be directly translated, requiring cultural awareness and contextual adaptation.

AI models are susceptible to biases inherent in training data. Studies have shown that MT systems may reinforce gender, racial, and cultural biases (Bolukbasi et al., 2016). For example, gender-neutral words in one language may be incorrectly translated into gendered equivalents, leading to misrepresentations. Addressing these biases remains a critical challenge in AI-driven translation, requiring improved data curation and algorithmic fairness.

High-quality MT systems require extensive bilingual corpora, which may not always be available for low-resource languages. Data scarcity impacts the quality and reliability of translations, particularly for less commonly spoken dialects (Koehn & Knowles, 2017). Researchers are exploring methods such as transfer learning and unsupervised learning to improve translation capabilities for underrepresented languages.

MT tools are increasingly used in educational settings to aid language acquisition. Automated translation assists students in understanding foreign texts, writing assignments, and communicating with speakers of other languages. However, concerns remain regarding students' overreliance on automated translation, potentially hindering language learning and critical thinking skills (Krashen, 1982). Educators emphasize the need for balanced usage, combining AI-driven tools with traditional language learning methodologies.

The widespread use of AI-powered MT raises legal and security concerns. Data privacy regulations, such as the General Data Protection Regulation (GDPR), necessitate secure handling of user data in cloud-based translation services. Additionally, inaccuracies in translation can lead to misinterpretations in legal and medical contexts, potentially resulting in serious consequences. Ongoing research aims to develop secure, reliable, and explainable AI models for critical applications.

The future of AI-driven MT in English language studies lies in improving contextual awareness, reducing biases, and enhancing multimodal capabilities. Emerging trends include zero-shot translation, where AI models translate between languages without direct parallel data, and self-improving systems that adapt to evolving linguistic trends. Hybrid approaches, combining AI and human expertise, will continue to play a crucial role in ensuring translation quality. While MT has made significant strides, continued research in AI ethics, linguistic diversity, and adaptive learning will shape the next generation of translation technologies. As AI advances, its integration into English language studies will further bridge linguistic gaps and foster global communication.

eISSN 2581-8996
ONLINE
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH IN MULTIDISCIPLINARY SCIENCES (IJARMS)
A BI-ANNUAL, OPEN ACCESS, PEER REVIEWED (REFEREED) JOURNAL
Vol. 08, Special Issue 01, April 2025

1- **References:**-

Bahdanau, D., Cho, K., & Bengio, Y. (2015). Neural machine translation by jointly learning to align and translate. arXiv preprint arXiv:1409.0473.

2- Bolukbasi, T., Chang, K. W., Zou, J. Y., Saligrama, V., & Kalai, A. T. (2016). Man is to computer programmer as woman is to homemaker? Debiasing word embeddings. Advances in Neural Information Processing Systems.

3- Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). BERT: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

4- Hutchins, W. J. (2005). Machine translation: A brief history. Concise history of the language sciences.

5- Koehn, P. (2010). Statistical machine translation. Cambridge University Press. Koehn, P., & Knowles, R. (2017). Six challenges for neural machine translation. arXiv preprint arXiv:1706.03872.

6- Krashen, S. D. (1982). Principles and practice in second language acquisition. Pergamon Press.

7- Turchi, M., & Negri, M. (2019). Adaptive neural machine translation. Springer.

8- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017).

9- Vinay, J. P., & Darbelnet, J. (1995). Comparative stylistics of French and English: A methodology for translation. John Benjamins.

10- National Education Policy 2020, Ministry of Education, Government of India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

11- Bharatavani Project, Ministry of Education: https://www.bharatavani.in National Translation Mission (NTM), Central Institute of Indian Languages: https://www.ntm.org.in

12- Rajaram, M. (2021). *Language and Multilingual Education in India under NEP 2020*, Economic and Political Weekly, Vol 56, Issue 48.

13- Agnihotri, R.K. (2007). *Multilinguality and Education in India: From Folk Wisdom to Policy Formulation*. Orient Blackswan.

14- Mohanty, A.K. (2009). *Multilingual Education for Social Justice: Globalising the Local*. Orient Blackswan.

15- Ministry of Education. (2020). *National Education Policy 2020*. Government of India.

16- National Translation Mission. (2022). *Annual Report*. Central Institute of Indian Languages.

17- King, R.D. (2001). *Nehru and the Language Politics of India*. Oxford University Press.