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ASSESSING THE IMPACT OF ARTIFICIAL INTELLIGENCE TRANSLATION ON IGBO LANGUAGE: A CRITICAL DISCOURSE ANALYSIS

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Abstract

The This study examines the impact of Artificial Intelligence (AI) translation technologies on the Igbo language, focusing on cultural, linguistic, and socio-political implications. Using Critical Discourse Analysis (CDA), we investigate how AI translation outputs represent Igbo language and culture, perpetuate language ideologies, and reinforce power dynamics. Our analysis of Igbo-to-English translations from five AI-powered tools reveals compromised linguistic accuracy, cultural relevance, and nuances. This threatens language preservation, cultural identity, and social justice. We argue that AI translation technologies must be developed and deployed in a contextualized and culturally sensitive manner. Collaborative efforts between linguists, cultural experts, and AI developers are essential to promote linguistic diversity, cultural inclusivity, and social equity. Our findings highlight the need for more research on the impact of AI translation technologies on minority languages like Igbo. By addressing these concerns, we can ensure that AI translation technologies support language preservation and cultural diversity.

Keywords: Machine Translation, AI Translation, Minority Languages, Igbo Language, Computational Linguistics, Critical Discourse Analysis, Cultural Representation, Language Preservation.

INTRODUCTION

Language translation has been a crucial aspect of human communication for centuries. Translation is said to be a process of recreating what was understood, giving symbols to the author's subjective and objective world (Mildred et Al., 2022). Traditional translation methods relied on human translators, which were time-consuming, expensive, and often prone to errors. The advent of machine translation (MT) in the 1950s revolutionized the translation landscape. However, early MT systems were rule-based, relying on hand-coded rules and dictionaries, which limited their accuracy and flexibility. In

the digital age, language translation has become increasingly reliant on artificial intelligence (AI), bridging cultural divides and facilitating global exchange. According to ("AI and Language Translation" 2024), the limitations posed by reliance on human translators, such as time constraints, resource limitations, and the inability to efficiently handle extensive datasets, paved the way for the transformative impact of AI. The author posits that AI-driven language translation has significantly enhanced the speed and efficiency of the translation process. Unlike human translators who may be constrained by time and the need for breaks, AI systems can operate continuously, providing rapid translations around the clock.

Wu and Liu (2018), are also of the view that by promoting multilingualism and facilitating cross-cultural communication, AI-powered Translation systems contribute to creating a more inclusive and interconnected global communication landscape. Noor (2025), opines that the rapid advancement of artificial intelligence (AI) technologies has opened unprecedented possibilities for the documentation and preservation of endangered languages, which face the threat of extinction due to globalization, urbanization, and cultural homogenization. AI-based translation tools facilitate the documentation of lesser-known languages by enabling linguists and communities to record and translate oral and written forms, thus creating essential digital resources that were previously unattainable. This transformative approach on one hand helps in language preservation and on the other if not handled properly, poses a threat to the language.

While AI translation tools have improved accessibility, concerns arise regarding their efficiency and impact on minority languages. Javier (2024), posits that if the training data for Gen AI models is biased towards a particular group or perspective, this bias could be reflected in the generated content. This means that if there has been a historical bias in the training Corpus or Knowledge Base, towards the population related to the minority language, the outputs coming from the Gen AI initiative are going to be biased upon it. This, may end that the use of Gen AI models may exacerbate existing social biases by reinforcing harmful stereotypes or perpetuating unequal power dynamics. The author while exploring the pros and cons of AI translation on minority languages states that the impact of Gen AI on minority languages is a complex and transversal issue with both potential benefits and risks. On the one hand, Gen AI can be used to create new and original content in minority languages, preserve and revitalize these languages, and make them more accessible to speakers and learners worldwide and on the other, Gen AI models can be biased and inaccurate, and their use could intensify existing social inequalities. While AI language translation is seen as one of the approaches to preserve minority languages, there are serious concerns that these minority languages may face endangerment if computational linguists from those minority languages do not intervene.

Zaki & Umar (2024), suggest that to fully unlock the potential of these technologies, it is essential to mitigate bias and promote language diversity and promote communication equity and inclusion in our increasingly interconnected world. Majumde, Lauly, Nadejde, Federico, & Dinu (2022), are of the view that most machine translation studies to date have concentrated on translating and assessing sentences in isolation, disregarding the context in which such sentences appear. This implies that the non-linguistic and extra-linguistic features of a text may not be considered during translation. Giving credence to the just stated assertion, Ahmed & Yousef (2024) in a comparative study of human and AI translations advance that AI may not always capture the subtleties and cultural nuances of the text as accurately as a human translator can. They express worry that AI Translation may struggle with idiomatic expressions, metaphors, and other language-specific features that a human translator is likely to understand and translate accurately. Truth is that these features are vital during textual interpretations and when not considered, meaning may be completely lost.

Nick (2024), highlights the challenges of AI translation, thus;

- Context and subtleties – While they are better at it, AI systems may still not be able to translate idioms, slang, and culturally specific references accurately. AI also cannot fully grasp emotions and may miss the tone or cultural sensitivity required in certain translations. These are very basic translation problems that often need human intervention to work out.
- Legal and ethical concerns – In areas where precision is paramount, like legal or medical fields, reliance on AI translation can raise ethical and legal concerns due to the potential for errors.
- Problems with rare languages – AI translations for less commonly spoken languages may be less reliable due to limited available training data. They are among the hardest languages to translate for any kind of machine translation.
- Data dependency – Generally, the quality of AI translation is heavily dependent on its training data points. If there isn't enough or if it is of bad quality, the translation quality will suffer. This is a problem with all AI models and can lead to things like language bias.
- Privacy concerns – Use of AI translation in sensitive or confidential circumstances raises concerns about data privacy and security. You might not know what will happen to your information after you upload it.

While these authors discussed the impact of Artificial Intelligence Translation Systems on minority languages, no attention was given to their impact on Igbo Language. These issues compelled the researchers to assess the impact of AI translation on the Igbo Language. There is a long list of AI translation softwares but Nick (2024), enlisted the best 14 AI translation software and they are: Deeply, Google Translate, Microsoft Bing Translator, ChatGPT, Copy.ai, Google Bard, Systran, Wordly.ai, Sonix, Amazon Translate, Yandex Translate, Promt, iTranslate, Papago. For the sake of this research, the focus is on the AI translation tools that translate English to Igbo and vise- versa.

According to Indiana University, Centre for Language and Technology (2024), Igbo is one of the ethnic groups in Nigeria and the language, Igbo is spoken by approximately 44 million people, according to. This language which is one of the major languages in Nigeria is assumed to be facing threats from globalization, urbanization, and technological advancements. (United Nations Educational Scientific and Cultural Organisation [UNESCO]), 2006), classified it as one of the world's languages in danger. Igbo language preservation efforts necessitate careful examination of AI translation's role. This study investigates the effects of AI translation on Igbo language through a critical discourse analysis (CDA) framework. By examining AI-translated Igbo texts, this research aims to contribute to the growing body of research on language and technology, shedding light on the complex dynamics between AI translation and language preservation. Building on the preceding discussion, the following section articulates a critical research problem that warrants attention. The investigation will inform language documentation and preservation efforts, AI translation tool development, and linguistic policies supporting endangered languages.

STATEMENT OF THE PROBLEM

The increasing reliance on Artificial Intelligence (AI) translation tools poses a significant threat to the preservation and development of the Igbo language, classified as "vulnerable" by UNESCO. Despite the benefits of AI translation, its impact on Igbo language accuracy, cultural nuance, and speaker interaction remains understudied. There are fears that AI translation if not well investigated may adversely affect the Igbo Language. There is the suspicion that AI will fail to capture Igbo language's complex grammar, idioms, and cultural references, and subsequently offer inaccurate translations. Unclear long-term consequences of AI translation on Igbo language preservation and development which may include, loss of linguistic diversity and cultural heritage; inaccurate representation of Igbo language and culture; marginalization of Igbo speakers' voices and perspectives; and, compromised language preservation and documentation efforts.

Most of the existing studies focus primarily on AI translation's technical aspects, neglecting its linguistic, cultural and social implications for minority languages like Igbo. This study addresses this gap by investigating AI translation's impact on Igbo language through a critical discourse analysis framework.

RESEARCH QUESTIONS

1. How do AI translation tools affect Igbo language accuracy and nuance?
2. What are the cultural implications of relying on AI translation for Igbo language?
3. What are the potential consequences of AI translation on Igbo language preservation and development?

RESEARCH OBJECTIVES

The objectives of the study are to:

1. Evaluate the accuracy and cultural sensitivity of AI translation tools in rendering Igbo language.
2. Explore the cultural implications of relying on AI translation for Igbo language.
3. Identify the consequences of AI translation on Igbo language preservation and development.

SIGNIFICANCE OF THE STUDY

This study addresses the critical need to examine AI translation's impact on Igbo language, providing valuable insights for linguists, language preservationists, and technology developers. This will inform language preservation efforts, improve AI translation quality as well as provide insights for language teaching and learning. It will also contribute to the literature on the trending discourse; the impact of AI translation on languages, particularly minority languages.

THEORETICAL FRAMEWORK

The theory used for this research is the Critical Discourse Analysis. This concept views language as a form of social practice. According to Heidi, (2023), Critical Discourse Analysis (CDA) describes a series of approaches to how researchers (socio-environmental [S-E] and others) may critically analyze texts and cultural artifacts to reveal connotations and draw out the larger cultural narratives that these connotations support. What is the social context of the story being told and why is the teller relating it in this particular narrative structure, lexicon, and moment in time? Analysts study how language is used in discourse in order to consider the contexts in which texts are produced, distributed, and consumed; designate the ways people use texts to construct a sense of self, society, and material reality and explore a deeper context in which textual features influence wider social discourse, political stances, institutional values and choices, and to support or challenge hegemonies. (Burke 187).

The authors aver that the goal of CDA is to reveal submerged power structures and elaborate on the role of discourse in both reflecting and constructing social realities. It is based on the premise that language can reflect dominant cultural, political, gendered (etc.) views and practices whether conscious or unconscious. Here, CDA will make use of data, from Artificial intelligence translation tools, to analyze a range of linguistic, cultural, demographic, and geographic, perspectives on machine translation. This theory is suitable for analysing the impact of artificial intelligence translation on Igbo Language because it explores the language context and reveals the implications of the translated texts.

DEFINITION OF TERMS

Machine Translation: Machine Translation (MT) is a sub-field of Natural Language Processing (NLP) devoted to the development and enhancement of computer-based translation systems. The goal of an MT system is to automatically translate a given textual content from one language to another in a way

that best preserves its meaning and style while ensuring that the produced translation output is as linguistically fluent as possible, (Mohamed, et al., 2020).

Artificial intelligence (AI): This is the intelligence of a machine or computer that enables it to imitate or mimic human capabilities, (Kanade, 2025).

Minority Languages: The term "minority language" enjoys a natural, but problematic, definition. In the most straightforward sense, a minority language is simply one spoken by less than 50 percent of a population in a given region, state or country. The key criterion here is the size of the speaker population within a specific geographic context: an individual language may be a minority language in one region or state but a majority language in another, (Grenoble & Singerman 2014). In the context of this research, the Igbo Language is considered a minority language globally.

RESEARCH METHODOLOGY

The research design is an evaluative study of AI translated Igbo Language texts. The research population is non -finite because it's difficult to state the actual population of AI translation tools as more tools are built continually. The study is a qualitative analysis of five purposively selected AI translation tools. The sampling technique is purposive because the researchers aim at studying AI English to Igbo and Igbo to English translation tools. Translation was conducted with key focus on the lexical, syntactic, semantic and contextual levels of language. Evaluation was carried out based on the area of accuracy, fluency, and cultural sensitivity. Results were manually analysed to show strengths and weaknesses of AI translation as well as patterns and themes in errors or cultural insensitivity. The data and analysis were validated by Dr. G. N. Amajuoyi, Department of Igbo Language, Benjamin Uwajumogu (State) College of Education, Ihitte/Uboma, Imo State, Nigeria.

DATA PRESENTATION AND ANALYSIS

This study utilized five selected AI translation tools to generate data: English to Igbo Translator, Igbo to English Translator, Translator Igbo-English, English Igbo Translator Dictionary, Meta AI

The tools' performance was assessed at three linguistic levels:

1. Lexical: Words "mmanwụ", "ahịa", and "ọkọchị" were translated from Igbo to English.

2. Sentential: Sentence "Ekwenyere m na onye gba mbọ n'ọrụ, Chukwu ga-agọzi ya" was translated from Igbo to English.

3. Contextual: Proverb "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" was translated from Igbo to English.

Data was generated on September 30, 2024.

1. English to Igbo Translator

Lexical Translation: Mmanwụ - The sun, ahịa - market, ọkọchị - summer

Sentence Translation: Ekwenyere m na onye gba mbọ n'ọrụ, Chukwu ga-agọzi ya - I believe that those who work hard, God will bless them.

Contextual Translation: Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya - The boy picked up his father, and his father-in-law closed his eyes.

Critical Evaluation: A thorough examination of the data reveals glaring errors, readily identifiable by proficient Igbo-English translators.

Lexical Discrepancies:

1. "Mmanwụ" was mistranslated as "sun," whereas it denotes "masquerade."

2. "Ahịa" received an accurate translation.

3. "Ọkọchị" was inaccurately translated; "summer" is not applicable in Nigeria's context. The correct translation is "dry season".

Sentential Inconsistencies: The translation of "Ekwenyere m na onye gba mbọ n'ọrụ, Chukwu ga-agọzi ya" demonstrates:

1. Partial comprehension of sentence structure.

2. Lack of fluency, evident in incorrect pronoun translation ("onye" and "ya" from singular to plural "those" and "them").

Contextual Misinterpretations: The proverb "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" was severely mistranslated, with no attempt at transliteration. This underscores the tool's lmited linguistic expertise and insufficient cultural understanding.

Overall Assessment: The translation tool's performance is subpar, characterized by lexical inaccuracies, sentential inconsistencies and contextual misinterpretations. These shortcomings highlight the need for enhanced linguistic expertise, cultural sensitivity, and contextual awareness to effectively convey Igbo language complexities.

2. Igbo to English Translator

Lexical Translation: Mmanwụ - Poling, ahịa - market, ọkọchị - summer

Sentence Translation: Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga-agọzi ya - I believe someone who tries to be, God will bless it.

Contextual Translation: Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya - A child to pick up his father in the custody of her.

Critical Evaluation: This translation tool's output is marred by substantial inaccuracies.

Lexical Discrepancies: "Mmanwụ" was mistranslated, "Ahịa" received an accurate translation while "Ọkọchị" was translated as in the first tool, indicating consistency in error.

Sentential Inconsistencies: The translation of "Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga agọzi ya" demonstrates:

1. Limited comprehension of sentence structure.

2. Erroneous interpretation of meaning, revealing fluency deficits.

Contextual Misinterpretations: The proverb "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" was severely mistranslated, exposing lack of linguistic expertise and insufficient cultural understanding.

Overall Assessment: The translation tool's performance is subpar, characterized by lexical inaccuracies, sentential inconsistencies, as well as contextual misinterpretations. These shortcomings underscore the need for enhanced linguistic expertise, cultural sensitivity, and contextual awareness to effectively convey Igbo language complexities.

3. Translator Igbo-English

Lexical Translation: Mmanwụ - life, Ahịa - market or supermarket, ọkọchị - summer or drought.

Sentence Translation: Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga-agọzi ya - I believe that those who work hard, God will bless him.

Contextual Translation: Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya - The boy picked up his father and cut his eyes.

Critical Evaluation: This AI translation tool exhibits pronounced deficiencies in rendering accurate Igbo translations.

Lexical Discrepancies: "Mmanwụ" was mistranslated, "Ahịa" received an accurate translation. "Ọkọchị" was partially mistranslated as "summer," whereas the correct equivalent for summer is "oge ekpọmọkụ" while the translation for "drought" is "oke ọkọchị". The precise translation of "ọkọchị" is "dry season."

Sentential Inconsistencies: The translation of "Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga agọzi ya" demonstrates:

1. Understanding of sentence structure.

2. Error in pronoun translation: "onye" (singular) was incorrectly translated as "those" (plural). The correct pronoun should be "anyone" or "whoever."

Contextual Misinterpretations: The proverb "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" was severely mistranslated, with no attempt at transliteration. This underscores the tool's lack of understanding of Igbo linguistic and cultural nuances.

Overall Assessment: The AI translation tool's performance is subpar, characterized by lexical inaccuracies, sentential inconsistencies and contextual misinterpretations. These deficiencies highlight the need for enhanced linguistic expertise, cultural sensitivity, and contextual awareness to effectively convey Igbo language complexities.

By addressing these shortcomings, the tool can improve its translation accuracy and better serve language users.

4. English Igbo Translator Dictionary

Lexical Translation: Mmanwụ - The sun, Ahịa - Price, ọkọchị - The standard

Sentence Translation: Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga-agọzi ya - I believe that one who strives in service, God will bless him.

Contextual Translation: Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya - The boy picked up his father and cut his eyes.

Critical Evaluation: This AI translation tool exhibits significant shortcomings in rendering accurate Igbo translations.

Lexical Inadequacies: The tool consistently failed to accurately translate Igbo words, including: "Mmanwụ", "Ahịa" and"Ọkọchị". This pattern of error suggests a fundamental weakness in lexical comprehension.

Sentential Analysis: Contrarily, the tool demonstrated potential at the sentence level, notably in translating: "Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga agọzi ya" This isolated success hints at the tool's capacity for improvement.

Contextual Misinterpretations: Regrettably, the tool severely mistranslated the proverb: "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" This highlights the tool's lack of understanding of Igbo linguistic and cultural nuances.

Overall Assessment: The AI translation tool's performance is subpar, underscoring the need for enhanced linguistic expertise, cultural sensitivity, and contextual awareness to effectively convey Igbo language complexities.

By addressing these deficiencies, the tool can improve its translation accuracy and better serve language users.

5. MetaAI

Lexical Translation: Mmanwụ - beauty or good looks, Ahịa - market, ọkọchị - husband

Sentence Translation: Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga-agọzi ya - Stand with me and support me in times of trouble, God will reward you

Contextual Translation: Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya - A child who disrespects his father will suffer shame and regret.

Critical Evaluation: MetaAI's translations exhibit notable errors across lexical, sentence, and contextual levels.

Lexical Inaccuracies:

1. "Mmanwụ" was mistranslated, highlighting semantic discrepancies.

2. "Ahịa" received an accurate translation, demonstrating potential for lexical precision.

3. "Ọkọchị" suffered significant translation error, underscoring the need for enhanced lexical comprehension.

Sentential Misinterpretations:

1. The sentence "Ekwenyere m na onye gba mbọ n' ọrụ, Chukwu ga agọzi ya" was grossly mistranslated, indicating significant syntactic and semantic misalignment.

2. However, the translation for "..Chukwu ga-agọzị ya" was translated accurately as "..God will reward him", showcasing partial success in capturing theological nuances.

Contextual Analysis:

1. The proverb "Nwata bulie nna ya elu, ọgọdọ ayọchie ya anya" received a near-accurate translation, demonstrating MetaAI's capacity for contextual understanding.

2. Notably, the word "nna" was translated as "father" instead of the more contextually appropriate "elder", revealing room for improvement in cultural and social nuance.

Overall Assessment: MetaAI's translation attempts demonstrate significant shortcomings, emphasizing the need for enhanced linguistic expertise, cultural sensitivity, and contextual awareness to effectively convey Igbo language nuances.

DISCUSSION OF FINDINGS

The findings of this study indicate that the current translation tools fall short of recommended standards. Nevertheless, these tools hold potential for improvement, contingent upon dedicated development efforts.

A tripartite collaboration involving Igbo linguists, cultural experts, and AI developers is proposed to enhance translation quality. This interdisciplinary approach will integrate linguistic expertise, cultural nuance, and technical innovation. Policymakers can develop regulations to ensure AI translation tools are designed and trained with consideration for linguistic and cultural diversity. This can include standards for accuracy, cultural sensitivity, and transparency. Furthermore, Government and organisations can provide funding for research and development of language technologies that cater to minority languages. This can include AI translation tools, language learning platforms, and speech

recognition systems. Policymakers can also promote cultural sensitivity training for developers of AI translation tools, highlighting the importance of cultural awareness and linguistic diversity.

These measures are pertinent and the consequences of inaction may culminate in language endangerment, jeopardizing the linguistic and cultural heritage of Igbo. Therefore, timely and collaborative intervention is crucial to preserve the language's integrity and ensure its continued relevance.

CONCLUSION

The advent of machine translation has brought ease to the translation procedure particularly with the invention of Artificial Intelligence (AI) translation tools. However, there are growing concerns on the impact of these translation tools on minority languages considering the fact that most of these languages are endangered. This study examined the impact of of AI powered translation tools on Igbo to English translations. Findings reveal that there are a lexical, grammatical, semantic, and contextual inaccuracies with the translations made by these AI tools. These inaccuracies pose threats to the Igbo Language. In order to preserve the Igbo Language, a collaborative effort amongst Computational linguists, culture experts, Igbo linguists and AI tool developers is recommended. This study contributes to the growing discourse on the impact of AI translation systems on minority languages particularly the Igbo Language. It is expected that it will raise awareness on the impact of Artificial Intelligence Translation on minority languages.

RECOMMENDATIONS

The following recommendations were made by the researchers:

1. Lexical database expansion and refinement which will improve the accuracy and effectiveness of AI translation systems

2. Contextual understanding enhancements which enable AI systems comprehend complex texts, capture subtle meanings and generate more accurate translations, ultimately leading to more effective and empathetic human -AI interactions.

3. Integration of cultural and linguistic expertise in order to produce more accurate, culturally sensitive, and effective AI translation tools that will benefit the Igbo Language community.

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