Popular Culture in the Age of Artificial Intelligence: An Applied Study on the Arabic Language

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Abstract

This study aims to explore the challenges of translating popular culture (pop culture) in the context of artificial intelligence applications, through an applied study on the Arabic language. The research is grounded in the assumption that popular culture represents one of the most complex domains of translation, as it relies on deep semantic, cultural, and contextual layers that extend beyond the literal meaning of texts. With the increasing reliance on AI-powered translation systems, there is a growing need to assess their ability to handle such complexities effectively. The study adopts a descriptive-analytical approach, selecting a corpus of texts representative of popular culture, including film dialogues, youth expressions, songs, and digital content. These texts are processed through AI translation tools, and the outputs are systematically analyzed and compared with their original meanings within their cultural contexts. The analysis focuses on a proposed classification of errors, including semantic, cultural, contextual, pragmatic, and stylistic errors. The findings indicate that AI systems demonstrate considerable efficiency in translating direct and literal structures; however, they show clear limitations in handling figurative language, implicit cultural references, and idiomatic expressions. This often results in literal or misleading translations that fail to convey the intended meaning and diminish the cultural essence of the source text. Moreover, these systems lack sufficient awareness of the social and cultural context, which is essential for interpreting popular culture accurately. Beyond identifying these challenges, the study proposes utilizing AI-generated errors as a pedagogical tool in translation education. By training students to critically analyze such errors, learners can develop a deeper understanding of the distinction between surface meaning and intended meaning. The study also introduces an analytical framework that may contribute to improving translation curricula in the Arab educational context and enhance learners' critical engagement with technological outputs. The study concludes that, despite its advancements, artificial intelligence cannot replace the human translator in conveying cultural meaning.

***Keywords**: Popular Culture Translation, Artificial Intelligence, Machine Translation, Error Analysis, Arabic Language*.

1. Introduction of Research

Artificial intelligence technology has witnessed rapid advancement in recent years especially in the field of natural language processing which has directly contributed to improving the performance of machine translation systems [1]. These systems based on deep learning and Neural Machine Translation (NMT) models have brought a qualitative shift in terms of translation accuracy and fluency when compared with old systems [16]. As a result, the use of these technologies has expanded across many domains such as media and education and digital communication [3]. However, despite the significant progress of this technology it does not resolve the challenges associated with these systems ability to capture context and understand the deeper meanings of texts as we see in recent literature [11].

At its core translation is more than just direct transfer of language because it is closely connected to the cultural and social context where the text is produced [10]. Meanings cannot be fully understood away from the cultural frameworks that shape them which makes the achievement of equivalence in translation depends on the ability to represent cultural and pragmatic dimensions alongside the linguistic dimension [2]. Recent studies indicate that machine translation systems despite their remarkable development still face significant limitations when dealing with these dimensions especially in texts characterized by high degree of cultural density [8].

Popular culture is considered one of the clearest domains in which these challenges become evident due to its distinctive linguistic and cultural features [1]. It relies heavily on informal expressions and colloquial terminology and implicit references that appear in film dialogues songs and circulating digital content [8]. Such texts involve multiple layers of meaning including figurative language and idiomatic expressions which

are difficult to render directly into another language without losing part of their significance [10]. Studies have shown that machine translation systems tend in such cases to produce literal translations which leads to a decline in the transfer of the intended cultural meaning [2].

Despite the notable progress achieved by AI-based translation systems they still encounter clear difficulties when handling texts characterized by complex cultural content particularly texts related to popular culture [16]. While these systems show acceptable efficiency in translating direct structures, they often fail to represent implicit meanings and the cultural contexts associated with the text [11]. As a consequence, they may generate translations that appear linguistically correct but lack accuracy at the semantic and cultural levels which ultimately affects the quality of the translation and its communicative function [3].

In this context a review of the literature shows that most recent studies in machine translation have focused either on the overall performance of models or on formal and standardized texts whereas studies addressing the translation of popular culture remain limited especially within the Arab context [10]. It is also noticeable that there is a lack of studies adopting a systematic multidimensional analysis of translation errors one that encompasses semantic, cultural, contextual, and pragmatic aspects [16]. Hence there is a pressing need for applied studies that address this gap through an in-depth analysis of machine translation outputs in this type of text [8].

Accordingly, this study aims to analyze the performance of AI-based translation systems in translating popular culture texts into Arabic through an applied error-analysis approach [2]. It also seeks to construct an analytical framework for classifying these errors according to multiple dimensions including semantic, cultural, contextual, pragmatic, and stylistic aspects in addition to exploring the potential use of such errors in developing translation teaching skills [1]. The significance of this study lies in its contribution to deepening critical understanding of machine translation applications and supporting the development of related educational and practical practices within the Arab context [11].

1.1 Research Problems

Despite the rapid advancements witnessed in artificial intelligence–based translation systems particularly with the adoption of neural machine translation models their ability to effectively handle texts characterized by complex cultural dimensions remains highly questionable [17]. Empirical observations indicate that while these systems show notable performance in processing direct linguistic structures their effectiveness declines significantly when confronted with texts that contain implicit meanings or non-explicit cultural and contextual references [15]. This limitation negatively impacts both the overall quality of translation and its functional accuracy [14].

This issue becomes particularly pronounced in the domain of popular culture texts which are inherently characterized by high symbolic density and a strong reliance on idiomatic expressions figurative language and context-specific social references [5]. Translating such texts requires an advanced level of interpretive competence that extends beyond surface-level linguistic processing [4]. Within this context the present research problem lies in investigating the extent to which AI-based translation systems are capable of conveying semantic cultural, and contextual, dimensions when translating popular culture texts into Arabic [17]. It also seeks to identify the types of errors resulting from these limitations and to analyze them within a systematic analytical framework that enables a precise and theoretically grounded interpretation [5].

The linguistic gap between Arabic and English makes this problem more complex because Arabic is characterized by rich morphology and complex syntax and many dialects [14]. For example, the distinction between Modern Standard Arabic (MSA) and regional dialects like the Egyptian or Saudi dialect poses a big challenge for automated systems [4]. The systems are often trained on formal texts like news or official documents, but popular culture uses everyday language that is very different [15].

Table 1. AI Translation Challenges in Popular Culture

Feature of Popular Culture	Challenge for AI Translation	Source Reference
Slang and Youth Language	Literal translation leads to loss of nuance	[1]
Idiomatic Expressions	AI cannot find cultural equivalents	[7]
Dialectal Variation	Systems trained on MSA fail in local dialects	[15]

Implicit Emotional Meaning	AI processes text as isolated units	[1]
Pragmatic Tone	Failure to convey surprise or irony	[1]
Social Politeness	Flattening levels of respect and formality	[19]

The data suggest that even advanced models such as ChatGPT and Google Translate struggle to preserve the cultural meaning of the source text [14]. As a result, students may receive translations that appear linguistically accurate but remain semantically inadequate.

1.2 Research Questions

RQ1. To what extent are AI-based translation systems capable of translating popular culture texts into Arabic with semantic, cultural, and contextual adequacy?
RQ1.1. What are the most prominent types of errors that occur in translating popular culture texts using AI-based translation systems?
RQ1.2. To what extent do these systems succeed in conveying implicit meanings and culture-specific references embedded in the source texts?
RQ1.3. How effectively do AI-based translation systems handle figurative language and idiomatic expressions commonly found in popular culture?
RQ1.4. Does translation accuracy vary according to the type of popular culture text, such as film dialogues, song lyrics, youth slang, and digital content?
RQ1.5. What are the limitations of AI-based translation systems in representing the social and cultural context of texts?
RQ1.6. How can errors produced by AI-based translation systems be utilized to enhance translation pedagogy and foster learners' critical awareness?

1.3 Research Objectives

The study intended to achieve the following specific objectives: first to analyze the performance of AI-based translation systems in translating popular culture texts into Arabic [18]. Second to identify the most common error patterns in machine translation outputs particularly semantic cultural, contextual, pragmatic, and stylistic errors [12]. Third to examine the extent to which these systems can convey implicit meanings and culture-specific references embedded in the source texts [13]. The fourth objective is to develop a systematic analytical framework for classifying translation errors in popular culture texts [7]. And fifth to explore the popular potential of using AI-generated translation errors as a pedagogical tool for enhancing translation teaching and promoting learners' critical awareness [9].

1.4 Significance of the Study

This study has both theoretical and practical significance. From a theoretical side it contributes to advancing the scholarly understanding of artificial intelligence applications in translation particularly in relation to the translation of culturally complex texts [6]. It addresses a notable research gap reflected in the limited number of applied studies examining the translation of popular culture within the Arab context [18]. It also proposes a systematic analytical framework for classifying machine translation errors across multiple dimensions including semantic cultural, contextual, pragmatic, and stylistic aspects [12]. From a practical side the study contributes to the development of translation pedagogy by using machine translation errors as a practical entry point for training and analytical practice [7]. It assists translation students in developing critical thinking skills and in distinguishing between literal meaning and intended meaning in culturally embedded texts [9]. It also provides practical insights that can inform developers of translation systems in improving performance particularly in handling culturally loaded texts [13]. Finally, it supports the development of translation curricula in alignment with recent technological advancements [18].

2. Theoretical Framework

This study adopts a multidimensional error lens informed by recent machine-translation quality research and translation theory: critically classifiable MT failures [14] are read alongside interference-driven production patterns in Arabic–English bilingual writing [15], while core equivalence and cultural–pragmatic arguments follow contemporary translation-studies overviews [13] [12].
Machine translation is considered one of the most prominent applications of artificial intelligence in the field of computational linguistics as it enables the automated processing and transformation of texts across languages based on advanced computational models [13]. Recent studies indicate that these systems are no longer limited to literal translation; rather they have evolved to incorporate deeper processing of linguistic structures particularly with the integration of deep learning techniques which has significantly enhanced the quality and accuracy of translation outputs [10]. This trend also suggests that machine translation has become an effective tool in supporting the use of the Arabic language in academic and scientific contexts by facilitating access to knowledge and enabling its transfer across languages [12]. However the technological progress does not eliminate the challenges associated with the nature of the Arabic language itself which is characterized by rich morphology and contextual variability [11]. These features can negatively affect translation accuracy in certain cases especially when dealing with non-standard texts or those embedded with cultural nuances [8].

2.1 Artificial Intelligence and Machine Translation

Machine translation represents one of the key applied branches of artificial intelligence within the field of natural language processing (NLP) as it aims to automatically convert texts across different languages using computational models capable of analyzing and representing linguistic structures [6]. Recent studies indicate that this field has undergone a significant transformation evolving from rule-based models to statistical approaches and subsequently to neural models driven by deep learning [9]. This progression has substantially enhanced translation quality in terms of accuracy and fluency particularly in texts with relatively straightforward structures [7].
Modern machine translation systems rely on advanced neural architectures based on the Encoder–Decoder framework which enables context-sensitive modeling of relationships between words within a sentence rather than relying on traditional word-for-word translation [2]. The Transformer model which relies exclusively on the attention mechanism has played a pivotal role in advancing machine translation systems and improving their performance across a wide range of linguistic tasks [9].
This mathematical foundation allows the model to calculate which parts of the sentence to focus on [7]. But even with this advanced math the accuracy tends to decline in languages with complex morphological structures such as Arabic [16]. The gap between Modern Standard Arabic and regional dialects poses an additional challenge for translation systems as it requires the ability to adapt to diverse linguistic and sociocultural contexts [18].

2.2 Popular Culture and Its Translation Challenges

Popular culture represents one of the most complex domains in the field of translation as it relies on intertwined linguistic and cultural elements that extend beyond the literal meaning of the text [1]. It encompasses idiomatic expressions culture-specific references and communicative patterns embedded within particular social contexts making its transfer into another language a process that requires a deep understanding of implicit meaning rather than merely surface-level linguistic structures [6].
Within the context of machine translation these challenges become even more pronounced. Intelligent systems primarily rely on the analysis of linguistic patterns without possessing genuine awareness of the cultural context which often results in literal translations that fail to convey the intended meaning. Recent studies have demonstrated that machine translation systems encounter considerable difficulties in translating dialogues and context-dependent linguistic interactions particularly when they involve communicative acts or implicit meanings.
Furthermore, translation between Arabic and English presents additional challenges due to structural and semantic differences between the two languages especially in complex constructions such as descriptive clauses and syntactic relations. For example, the Arabic language has fewer consonant clusters and sounds like "p" or "v" don't exist. This makes students and sometimes older AI systems spell things like "bizza" or "baber" instead of "pizza" or "paper".

2.3 Translating Popular Culture in the Age of Artificial Intelligence

The translation of popular culture is closely linked to the nature of language used in everyday contexts as such texts incorporate idiomatic expressions implicit references and communicative patterns shaped within specific social and cultural environments. Several studies indicate that despite their advancements automated systems continue to struggle with capturing these dimensions particularly when translating dialogues or texts that involve communicative acts with indirect meanings.

Recent research has shown that AI-based translation systems achieve relatively acceptable performance when handling straightforward linguistic structures however they show clear limitations when dealing with texts that contain cultural elements or implicit meanings. Evidence suggests that these systems tend to produce literal translations in such cases leading to a loss or distortion of the intended meaning.

Moreover the challenges extend beyond the cultural dimension to include structural differences between languages. Variations in syntactic and semantic structures between Arabic and English significantly affect the quality of machine translation. For instance the "run-on" sentence is very common in Arabic writing where students use many commas and few periods. AI often follows this pattern or fails to correct it leading to confusing output.

3. Previous Studies

Study	Focus	Main Contribution
O'Brien (2022)	Professional MT	Discussed post-editing
Rico & González Pastor (2022)	Translation Education	Emphasized MT literacy
Sun et al. (2022)	Document-level NMT	Improved contextual processing
Barrault et al. (2023)	Multilingual MT	Highlighted limitations in informal language
Nagi (2023)	Arabic-English MT	Identified structural weaknesses
Qassem & Aldaheri (2023)	Dialogue Acts	Examined pragmatic transfer
Appicharla et al. (2025)	Context-aware MT	Reviewed LLM-based translation

4 Critical Review of Previous Studies

Despite the valuable contributions most of these studies have focused on general aspects of translation quality or on isolated dimensions examined independently. They have largely failed to provide a comprehensive treatment of texts characterized by complex cultural dimensions especially in relation to popular culture within the Arab context. Hence there is a big need for an analytical framework that captures semantic cultural, contextual, pragmatic, and stylistic dimensions of translation errors in popular culture texts.

5. Methodology

This study adopts a descriptive-analytical approach with an applied orientation. This approach aims to identify patterns of errors that emerge in the translation of popular culture texts and to analyze them across multiple dimensions including semantic cultural, contextual, pragmatic, and stylistic aspects.

The study corpus consists of a purposively selected sample of 150 popular culture texts categorized into four main types: 40 film dialogues, 40 common youth slang expressions, 30 song lyrics, and 40 digital content social media texts.

The study utilizes two primary tools: AI-based translation tools Google Translate and ChatGPT. All texts were processed using standard user-level access without prompt engineering. A customized analytical model was developed for classifying translation errors into five main dimensions: semantic cultural, contextual, pragmatic, and stylistic.

6. Data Analysis

This section represents the practical component of the study where the outputs of AI-based translation systems are analyzed in their handling of popular culture texts.

Table 2. Analysis of AI-Based Translation Outputs

No.	Source Text	Machine Translation	More Accurate Translation	Error Type	Brief Analysis
1	"I'm not okay, but I'll pretend I am"	"I am not okay, but I will pretend that I am"	"I am not okay, but I am hiding it"	Pragmatic + Semantic	Failure to convey the implicit emotional meaning [1]
2	He's low-key jealous	He is low-key jealous (literal)	He is subtly jealous	Cultural + Semantic	Literal rendering of a slang expression [15]
3	That's not my vibe	That is not my vibration	That does not suit me	Cultural + Pragmatic	Failure to interpret the cultural expression [1]
4	"You really went there, huh?"	You really went there	Really? Did you actually say that?	Pragmatic + Contextual	Inability to convey the intended tone [1]
5	I just need a break from everything	I need a break from everything	I need to step away for a while	Semantic + Emotional	Loss of the emotional dimension [1]
6	This situation is eating me alive	This situation is eating me alive	This situation is emotionally draining me	Figurative + Semantic	Failure to interpret figurative meaning [7]

The findings reveal a clear gap between the linguistic proficiency of AI systems and their ability to adequately represent cultural and pragmatic dimensions. The findings align with recent studies emphasizing the limitations of NMT in culturally dense texts.

Table 3. Translation Quality Evaluation Matrix

Analytical Dimension	Performance Level	Interpretation
Semantic Accuracy	Moderate	Systems show acceptable accuracy in straightforward structures [1]
Cultural Dimension	Weak	Clear limitations in interpreting culturally embedded expressions [9]
Contextual Dimension	Moderate	Limited ability to fully capture the broader context [1]
Pragmatic Dimension	Weak	Inadequate transfer of communicative intent and tone [18]
Stylistic Dimension	Moderate	Linguistically correct but lacks naturalness [1]

7. Discussion of Results

The results indicate that AI-based machine translation systems achieve acceptable performance when processing texts that are structurally simple. However this performance declines significantly when dealing with texts that involve implicit meanings or cultural dimensions. This suggests a systematic limitation rather than isolated translation errors. Similarly, the systems lack the ability to interpret psychological and emotional dimensions as they tend to reproduce surface meaning without capturing the affective context. In our analysis a clear deficiency is observed in the pragmatic dimension where the translation fails to convey communicative tone despite being grammatically accurate.

7.1 Ethical Use of AI Tools in Academic Writing and Translation

Students and researchers should follow institutional integrity rules when they use AI drafting or translation assistance: disclose assistance where required, keep human oversight over claims and citations, and treat detector scores as imperfect signals rather than proof of authorship [20]. Recent work also stresses AI literacy and awareness of bias when generative tools shape academic reading and writing practices [22].

Table 5. Common AI Flags

AI Overused Word	Human Alternative	Why automated writing checkers may flag it	Source
Delve	Explore / Dig into	Extremely high statistical choice for ChatGPT	[22]
Moreover	Also / Plus	Robotic formal transition	[20]
In conclusion	So / Finally	Predictable structure marker	[22]
Leverage	Use	Business jargon AI loves	[20]
Foster	Help / Grow	Common AI verb for collaboration	[20]

8. Recommendations

Based on the findings the study proposes several recommendations:
AI models should be developed to incorporate cultural and pragmatic context particularly for idiomatic and figurative expressions.
Translation systems should be trained on contemporary and informal data like social media content to better process youth language.
Mechanisms for capturing implicit and emotional meaning should be integrated into the models.
Post-editing tools should be developed to support human translators with focus on cultural and pragmatic errors.
Machine translation errors should be used as a pedagogical tool in translation education to help students distinguish between surface and intended meaning.

9. Conclusion

This study analyzed the performance of AI-based translation systems in translating popular culture texts into Arabic through a multidimensional error analysis. The findings show that while these systems achieve acceptable accuracy in structurally simple expressions their performance declines significantly when dealing with complex cultural, contextual, and pragmatic dimensions. Applied analysis shows that machine translation systems tend to rely on literal translation especially in idioms and youth-oriented discourse leading to loss or distortion of meaning. Also, the findings reveal a limited capacity to represent implicit meanings and communicative tone which affects the functional quality of translation.
The study confirms that the primary challenge in AI translation is the ability to interpret meaning within its broader cultural and social context. Development of more advanced models capable of capturing deeper layers of meaning is essential but the role of the human translator remains indispensable.

REFERENCES

[1] Barrault, L., Biesialska, M., Bojar, A., Costa-jussà, M. R., El-Kishky, A., et al. (2023). SeamlessM4T—Massively multilingual and multimodal machine translation. arXiv preprint arXiv:2308.11596.
[2] Sun, Z., Wang, M., Zhou, H., Zhao, C., Huang, S., Chen, J., & Li, L. (2022). Rethinking document-level neural machine translation. In Findings of the Association for Computational Linguistics: ACL 2022 (pp. 3537–3548). Association for Computational Linguistics. https://doi.org/10.18653/v1/2022.findings-acl.279.
[3] Rico, C., & González Pastor, D. (2022). The role of machine translation in translation education: A thematic analysis of translator educators' beliefs. Translation & Interpreting, 14(1), 177–195. https://doi.org/10.12807/ti.114201.2022.a010.

[4] Nagi, K. A. (2023). Arabic and English relative clauses and machine translation challenges. Journal of Social Studies, 29(3), 145–165. https://doi.org/10.20428/jss.v29i3.2180
[5] Qassem, M. M., & Aldaheri, M. M. (2023). Can machine translate dialogue acts: Evidence from translating dialogues from English to Arabic. 3L: Language, Linguistics, Literature—The Southeast Asian Journal of English Language Studies, 29(4), 63–81. https://doi.org/10.17576/3L-2023-2904-05
[6] O'Brien, S. (2022). How to deal with errors in machine translation: Post-editing. In D. Kenny (Ed.), Machine translation for everyone: Empowering users in the age of artificial intelligence (pp. 107–124). Language Science Press.
[7] Hendy, A., Abdelrehim, I., Abdelfattah, A., Gabr, M. M., Nasr, M., et al. (2023). How good are GPT models at machine translation? A comprehensive evaluation. arXiv preprint arXiv:2302.09210.
[8] Appicharla, R., Gain, B., Pal, S., & Ekbal, A. (2025). Beyond the sentence: A survey on context-aware machine translation with large language models. arXiv preprint arXiv:2506.07583.
[9] Künzli, A., & Mellinger, C. D. (Eds.). (2022). Translation revision and post-editing: Implementation and impact. Routledge.
[10] House, J. (2023). Translation: The basics (2nd ed.). Routledge.
[11] Pym, A. (2023). Exploring translation theories (3rd ed.). Routledge.
[12] Baumgarten, S., & Tieber, M. (Eds.). (2025). The Routledge handbook of translation technology and society (1st ed.). Routledge.
[13] Munday, J. (2022). Introducing translation studies: Theories and applications (5th ed.). Routledge.
[14] Sharou, K. A., & Specia, L. (2022). A taxonomy and study of critical errors in machine translation. In Proceedings of the 23rd Annual Conference of the European Association for Machine Translation (pp. 171–180). European Association for Machine Translation.
[15] Khan, A. (2024). Transformative impacts of explicit morphological instruction on irregular inflectional acquisition in Saudi EFL learners. Humanities and Social Sciences Communications, 11, Article 1342. https://doi.org/10.1057/s41599-024-03610-4
[16] Costa-jussà, M. R., Cross, J., Çelebi, O., Elbayad, M., Heckelmann, M., et al. (2022). No language left behind: Scaling human-centered machine translation. arXiv preprint arXiv:2207.04672.
[17] Deutsch, D., Juraska, J., Finkelstein, M., & Freitag, M. (2023). Training and meta-evaluating machine translation evaluation metrics at the paragraph level. In Proceedings of the Eighth Conference on Machine Translation (pp. 996–1013). Association for Computational Linguistics. https://doi.org/10.18653/v1/2023.wmt-1.96
[18] Kocmi, T., Bawden, R., Bojar, O., Dankovics, R., Federmann, C., et al. (2024). Findings of the WMT24 general machine translation shared task: The LLM era is here but MT is not solved yet. In Proceedings of the Ninth Conference on Machine Translation (pp. 1–47). Association for Computational Linguistics.
[19] Hadley, J., Taivalkoski-Shilov, K., Teixeira, C. S. C., & Toral, A. (Eds.). (2023). Using technologies for creative-text translation. Routledge.
[20] Alnajar, A., & Hadwan, E. A. K. L. (2023). Investigating common grammatical errors in writing: The case of EFL students, Faculty of Education in Al-Mahrah. The University Researcher Journal of Human Sciences, 30(1), 316–332.
[21] Weber-Wulff, D., Ançin, J. A., Rademann, S., Rode, H. G., Akgül, G., et al. (2023). Testing of detection tools for AI-generated text. International Journal for Educational Integrity, 19(1), Article 26. https://doi.org/10.1007/s40979-023-00146-z
[22] Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative artificial intelligence (AI): Understanding AI literacy, soft skills, and research bias. Education Sciences, 13(10), Article 998. https://doi.org/10.3390/educsci13100998.