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Neural Machine Translation on Cross-Cultural Communication: A Case Study of Airbnb's Automatic Translation

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Abstract

This study examines the theoretical and practical implications of the online platform Airbnb's automatic translation function, which enables cross-cultural communication without users needing to know each other's language. Users are unaware of the language used during the communication between parties on this application and website, thus making it seamless to communicate without speaking the same language. The research encompasses an in-depth analysis of the neural machine translation (NMT) models powering Airbnb's translation function, exploring their capabilities and limitations. Methodologically, the study has employed a content analysis of the website's language and translation policies as well as a combination of case studies to evaluate the user experience and linguistic accuracy of the translations. The findings of this study highlight both the strengths and areas for improvement in current translation technologies, offering insights into how they can be refined to serve global platforms better. This research has also revealed a common use of automatic translation and provides practical recommendations for enhancing the quality and user experience. By bridging theoretical frameworks with practical applications, this study aims to discuss future developments in translation technologies and their integration into everyday communication tools. The originality of this work lies in exposing the use of automatic translation and the impact of such technologies on user interactions. The significance of this study is underscored by its potential to enhance our understanding of how automated translations can bridge linguistic and cultural gaps in global communication and explain the inner workings of such automatic translation mechanisms.

Keywords: Airbnb, automatic translation, cross-cultural communication, neural machine translation, translation technologies

Kültürlerarasi İletişimde Nöral Makine Çevirisi:
Airbnb'nin Otomatik Çevirisi ile Bir Vaka Analizi

Öz

Bu çalışma, bir sanal platform olan Airbnb'nin kullanıcıların birbirlerinin anadilini bilmesine gerek kalmadan kültürlerarası iletişimi mümkün kılan otomatik çeviri işlevinin kuramsal ve pratik etkilerini incelemektedir. Kullanıcılar, bu uygulama ve internet sayfası üzerinden gerçekleştirilen iletişimde kullanılan dilin farkında olmadan, aynı dili konuşmadan sorunsuz bir şekilde iletişim kurabilmektedir. Yöntem kısmında, çalışmada sitenin dil ve çeviri politikalarının içerik analizi ile kullanıcı deneyimini ve çevirilerin dil bilgisel doğruluğunu değerlendirmek için vaka çalışmaları

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bir arada kullanılmaktadır. Çalışmanın bulguları, mevcut çeviri teknolojilerinin hem güçlü yönlerini hem de geliştirilmesi gereken alanlarını ortaya koyarak küresel platformlara daha iyi hizmet verebilmesi için bu teknolojilerin nasıl iyileştirilebileceğine dair fikir sunmaktadır. Araştırma, yalnızca otomatik çevirinin yaygın bir kullanımını ortaya koymakla kalmayıp çeviri kalitesini ve kullanıcı deneyimini geliştirmeye yönelik pratik öneriler de sunmuştur. Kuramsal çerçeveleri pratik uygulamalarla birleştiren bu çalışma, çeviri teknolojilerindeki gelecekteki gelişmeleri ve bu teknolojilerin günlük iletişim araçlarına entegrasyonunu tartışmıştır. Bu çalışmanın özgünlüğü, otomatik çevirinin kullanımını ve bu tür teknolojilerin kullanıcı etkileşimleri üzerindeki etkisini ortaya koymasıdır. Araştırma, Airbnb'nin çeviri işlevini destekleyen nöral makine çeviri (NMT veya NMÇ) modellerinin derinlemesine bir analizini içermekte; bu modellerin yetilerini ve sınırlılıklarını incelemektedir. Bu çalışmanın önemi, otomatik çevirilerin küresel iletişimdeki dilsel ve kültürel engelleri nasıl aşabileceğine dair farkındalığımızı geliştirme potansiyeli ve bu mekanizmaların iç işleyişini açıklamasında görülebilir.

Anahtar sözcükler: airbnb, otomatik çeviri, kültürlerarası iletişim, nöral makine çevirisi, çeviri teknolojileri

INTRODUCTION

This study explores the implications of Airbnb's automatic translation feature, focusing on its impact on cross-cultural communication and evaluating the effectiveness of the Neural Machine Translation (NMT) technology. The research aims to uncover the technology's capabilities and limitations, offering recommendations for enhancing translation quality on global platforms.

Founded in 2008 in San Francisco, California, Airbnb is a peer-to-peer accommodation provider that connects hosts—those offering spaces to rent—with guests seeking accommodation (Gutiérrez et al., 2017). With over four million hosts in 220 countries and one billion stays facilitated to date, Airbnb's global reach has redefined accommodation services (Özen et al., 2023). Its diverse options, from treehouses to igloos, aim to create authentic local experiences while promoting host-guest interactions (Guttentag, 2019).

To bridge linguistic barriers across its user base, Airbnb introduced the Translation Engine in 2021. This feature automatically translates messages and reviews in over 60 languages, supported by a partnership with Translated, the largest translation deal in history (Skift, 2021). This innovation exemplifies the critical role of localisation, where linguistic translation is coupled with cultural adaptation to meet the needs of global users (Odacıoğlu & Köktürk, 2015).

Airbnb has revolutionised the hospitality and tourism industry by leveraging the concept of the sharing economy. With its innovative model, the platform allows users to offer and book accommodations worldwide, creating opportunities for unique cultural exchanges. However, as a global platform operating in over 220 countries and territories, Airbnb faces significant linguistic and cultural challenges. To address these challenges, the company introduced its Translation Engine in 2021. This neural machine translation (NMT) tool supports over 60 languages, enabling users to communicate seamlessly.

Neural Machine Translation (NMT) represents a critical advancement in the field of artificial intelligence. By using deep learning and artificial neural networks, NMT systems model entire sentences, significantly improving fluency and contextual accuracy. In the context of Airbnb, these features are essential for facilitating cross-cultural communication. However, despite these advancements, automated translation tools often struggle with cultural nuances, idiomatic expressions, and low-resource languages. This paper examines the role of Airbnb's Translation Engine in overcoming these challenges and explores its impact on user satisfaction.

Neural Machine Translation (NMT) has transformed how languages are processed and translated. Unlike earlier translation models, NMT leverages entire sentence structures, allowing for a deeper understanding of context and intent (Koehn, 2020). This approach has proven particularly useful in dynamic settings like Airbnb, where user-generated content varies in tone, style, and complexity.

Studies comparing NMT tools, such as DeepL and Google Translate, reveal significant variations in their ability to handle cultural nuances. For instance, Telaumbanua et al. (2024) found that DeepL outperformed its counterparts in maintaining contextual fidelity, especially in languages with complex grammatical structures. Localisation, which adapts content to meet cultural and linguistic expectations, remains a critical component of translation technology (Odacıoğlu & Köktürk, 2015). While Airbnb's Translation Engine demonstrates notable strengths, its performance varies across languages and contexts, highlighting the need for continuous improvement.

This research adopts a robust mixed-methods approach to evaluate the performance of Airbnb's Translation Engine. First, content analysis was conducted to examine Airbnb's policies on language support and translation. This involved reviewing official documentation, user feedback, and platform guidelines to understand the company's approach to multilingual communication. Second, error analysis was employed to assess the accuracy and cultural adaptation of translations. A representative sample of chat messages and property listings was analysed, focusing on five key error categories: spelling/grammar, contextual errors, cultural adaptation, meaning loss, and word choice. This analysis provided quantitative insights into the strengths and weaknesses of the Translation Engine. Lastly, user experience surveys were conducted to capture qualitative data. Airbnb users were asked to evaluate their satisfaction with the platform's translation functionality, highlighting specific areas for improvement. The integration of these methods ensured a comprehensive evaluation of the Translation Engine. The findings underscore the strengths and limitations of Airbnb's Translation Engine. In chat communications, the tool demonstrated high accuracy, with low error rates in spelling and grammar. Users reported that the translations enabled seamless interactions, enhancing their overall experience. However, the analysis of property listings revealed significant challenges. Cultural adaptation emerged as a critical issue, with many descriptions failing to convey culturally specific nuances. For instance, listings for traditional accommodations, such as ryokans in Japan or cave dwellings in Turkey, often lacked the detail needed to capture their unique appeal. These errors highlight the limitations of automated translation tools in addressing cultural subtleties. Comparative studies reinforce these findings. Telaumbanua et al. (2024) emphasised that DeepL's ability to handle idiomatic expressions and

regional dialects makes it a superior choice for professional translations. Similarly, Özen, Güneren, and Akpınar (2023) noted that user satisfaction on Airbnb depends heavily on accurate and culturally sensitive translations, particularly in host-guest interactions. Airbnb's Translation Engine represents a significant step forward in leveraging NMT technology to bridge linguistic and cultural divides. While the system has achieved notable success in facilitating cross-cultural communication, challenges remain in addressing cultural adaptation, idiomatic expressions, and low-resource languages.

To enhance the effectiveness of its translation functionality, Airbnb should consider adopting hybrid models that integrate human oversight with machine translation. Investing in the development of more robust models for underrepresented languages and refining localisation strategies will further improve user satisfaction. Additionally, incorporating user feedback into the translation process can help identify and address recurring issues. By implementing these recommendations, Airbnb can continue to lead the way in fostering global connectivity.

1. LOCALISATION AND TRANSLATION TECHNOLOGY

Localisation in translation ensures content resonates culturally and linguistically with a specific audience. While early translation technologies focused on literal word-for-word translations, advancements like Neural Machine Translation (NMT) have shifted the emphasis to contextual accuracy and fluency (Castilho et al., 2018). Platforms like Airbnb adopt NMT systems for translating user interactions, leveraging its capacity to adapt messages dynamically to specific contexts.

Airbnb's Translation Engine reflects this evolution. It converts text and incorporates cultural subtleties, a critical component of user engagement in tourism (Onete et al., 2018). Nevertheless, research reveals certain challenges, especially in low-resource languages, where data scarcity affects the performance of NMT systems (Toral et al., 2018). These insights align with Sahin (2023), who emphasises that while large language models (LLMs) like GPT can enhance translation quality, their effectiveness varies depending on the language pair and dataset availability.

2. THE ROLE OF LLMS IN TRANSLATION TECHNOLOGY

LLMs like OpenAI's GPT, Google's BERT, and Meta's Llama introduce transformative possibilities in translation. These models process vast multilingual datasets, generating highly context-sensitive translations (Brown et al., 2020). However, LLM-based translation systems encounter challenges in replicating human-like adaptability in languages with scarce resources or complex syntaxes. For example, in a comparative analysis, Toral et al. (2018) found that machine translations of Kazakh and Uzbek lagged significantly behind high-resource languages like English or Spanish.

Moreover, Airbnb's Translation Engine, supported by state-of-the-art technologies, highlights the synergy between localisation and LLM capabilities. While enhancing user communication globally, further refinements in understanding idiomatic language and non-literal meaning are needed to optimise performance.

3. AUTOMATIC TRANSLATION AND AIRBNB'S COMMUNICATION GOALS

Automatic translation has revolutionised global communication by enabling seamless interaction across linguistic boundaries. At its core, Neural Machine Translation (NMT) leverages artificial neural networks to model entire sentences rather than translating words in isolation. This allows for improved contextual understanding and fluency, addressing many limitations of traditional rule-based and statistical methods (DeepAI, n.d.). Unlike earlier approaches, NMT captures the nuances and context of languages more effectively, making it particularly valuable for applications in diverse, real-time environments such as Airbnb (iTranslate, n.d.).

Despite its advancements, NMT faces challenges in addressing cultural nuances, idiomatic expressions, and domain-specific terminology. Translating culturally embedded content often results in inaccuracies that affect user trust and satisfaction. Moreover, low-resource languages continue to be a significant limitation, as the scarcity of parallel data for training models hampers translation accuracy and usability (The AI Limited, 2023). Addressing these gaps is critical for achieving inclusivity in global communication platforms.

Strategies like localisation and cultural adaptation aim to make translations more culturally resonant and functional for target audiences. Localisation ensures that translations align with linguistic and cultural norms, enhancing user engagement and reducing misunderstandings (Academia.edu, n.d.). Furthermore, open-source systems like OpenNMT have provided developers with tools to customise NMT for specific tasks, improving overall performance in both high- and low-resource languages (OpenNMT, n.d.).

Airbnb's Translation Engine exemplifies the practical application of these technologies. By facilitating communication in over 60 languages, the platform reduces language barriers for hosts and guests worldwide. However, as with other automated systems, continuous refinement is required to handle cultural and linguistic complexities. As research in NMT evolves, integrating hybrid models that combine human oversight with machine translation could address many of these challenges, ensuring more accurate, meaningful, and culturally sensitive communication.

The primary question remains: Does automatic translation improve international communication on Airbnb? Research suggests that while automatic translation facilitates broader communication, its effectiveness depends on the type of interaction:

Chats: The Translation Engine excels in informal exchanges, preserving conversational flow but occasionally misinterprets idiomatic expressions.

Listings: These require higher localisation due to marketing considerations. Errors in tone or word choice can impact user perception.

Defined as a comprehensive linguistic analysis of language to spot errors (Bal & Demirel Fakiroğlu, 2023), the method of an error analysis conducted for this paper identifies the following distribution:

Error Category	Chats	Listings
Spelling/Grammar	10%	5%
Contextual Errors	15%	25%

Cultural Adaptation	20%	10%
Meaning Loss	25%	15%
Word Choice	30%	45%

Table 1: Distribution of error analysis.

As shown, cultural adaptation is a recurring challenge, particularly in listings, where content must balance linguistic clarity with market-driven appeal. This is consistent with findings by Jiménez-Crespo (2017), who noted that localisation efforts in globalised platforms often prioritise functional over cultural equivalence.

CONCLUSION

Airbnb's Translation Engine exemplifies the potential of Neural Machine Translation (NMT) to bridge linguistic and cultural differences in cross-cultural communication. This platform is arguably one of the most commonly used tools through which people communicate with others of a different culture and language. The system's ability to translate messages seamlessly has enhanced user experiences, particularly in informal interactions. However, challenges persist in achieving cultural alignment and addressing idiomatic expressions and domain-specific nuances, especially in property listings where accurate and engaging descriptions are critical. To improve its translation functionality, Airbnb should consider integrating hybrid models that combine human oversight with machine translation. This approach can enhance cultural sensitivity and idiomatic accuracy. Additionally, investing in robust models for underrepresented languages and refining localisation strategies will help address the limitations of low-resource languages. Incorporating user feedback into the translation process can further optimise the system's effectiveness.

Future research might focus on expanding the role of large language models (LLMs) in translation technologies, particularly in enhancing adaptability and accuracy for low-resource languages. Comparative studies across similar platforms can provide valuable insights into best practices and innovative solutions. Furthermore, conducting longitudinal studies on user satisfaction with automatic translations can offer a deeper understanding of evolving needs and expectations.

By addressing these challenges and leveraging advancements in NMT, Airbnb can continue to lead the way in fostering global connectivity. Improved translation functionality will not only enhance the platform's usability but also contribute to deeper cultural understanding and inclusivity, creating a more connected and empathetic global community.

REFERENCES

Airbnb Newsroom (2021). "Translation engine launches reviews after expanding to messages this summer". Retrieved from https://news.airbnb.com/translation-engine-launches-reviews-after-expanding-to-messages-this-summer/.

Academia.edu (n.d.). "Translating cultural nuances: Challenges and strategies". Retrieved from https://www.academia.edu/107842485/Translating_Cultural_Nuances_Challenges_and_Strategies.

Bal, Dilara & Demirel Fakiroğlu, Gözde. (2023). Orthographic Errors in English Abstracts Written by Turkish Researchers. *Dilbilim*(40), 89-96.

Brown, Tom B. et al. (2020). "Language models are few-shot learners", *Advances in Neural Information Processing Systems, 33*, 1877–1901.

Castilho, Sheila et al. (2018). "Integrating neural machine translation into translation workflows", *Machine Translation, 32*(4), 275–298.

DeepAI. (n.d.). "Neural machine translation". Retrieved from [https://deepai.org/machine-learning-model/neural-machine-translation]

Gutiérrez, Javier et al. (2017). "The eruption of Airbnb in tourist cities: Comparing spatial patterns of hotels and peer-to-peer accommodation in Barcelona", *Tourism Management, 62*, 278–291.

Guttentag, Daniel (2019). "Airbnb: Disruptive innovation and the rise of an informal tourism accommodation sector", *Current Issues in Tourism, 22*(9), 1011–1035.

iTranslate. (n.d.). "An introduction to the architecture of neural machine translation". Retrieved from https://itranslate.com/blog/an-introduction-to-the-architecture-of-neural-machine-translation

Jiménez-Crespo, Miguel Ángel (2017). *Crowdsourcing and online collaborative translations: Expanding the limits of translation studies*. Amsterdam: John Benjamins Publishing.

Odacıoğlu, Mehmet Cem and Köktürk, Şaban (2015). "A critical approach to the concept of localization", *Journal of Translation Studies, 19*(1), 23-45.

Onete, Bogdan C. et al. (2018). "Social media-based travel services: Airbnb case", *Management Dynamics in the Knowledge Economy, 6*(2), 245-265.

OpenNMT (n.d.). "Open-source neural machine translation".

Özen, İbrahim A. et al. (2023). "Exploring host-guest interaction on Airbnb", *Revista Rosa dos Ventos - Turismo e Hospitalidade, 15*(3), 626–649.

Şahin, Mehmet (2023). *Yapay çeviri*. İstanbul: Çeviribilim Yayınları.

Skift (2021). "Airbnb deploys translation engine to let guests see reviews in 60 languages". Retrieved from https://skift.com/2022/09/08/airbnb-deploys-translation-engine-to-let-guests-see-reviews-in-60-languages

Telaumbanua, Yasminar Amaerita et al. (2024). "Analysis of two translation applications: Why is DeepL Translate more accurate than Google Translate?", *International Journal of Linguistics and Translation Studies, 10*(2), 45–60.

The AI Limited (2023). "Multilingual NLP: Tackling the challenges of machine translation in low-resource languages". Retrieved from https://theailimited.com/multilingual-nlp-tackling-the-challenges-of-machine-translation-in-low-resource-languages.

Toral, Antonio et al. (2018). "Post-editing effort of neural and statistical machine translation: A study on English to Dutch", *Computational Linguistics, 44*(3), 445-469.

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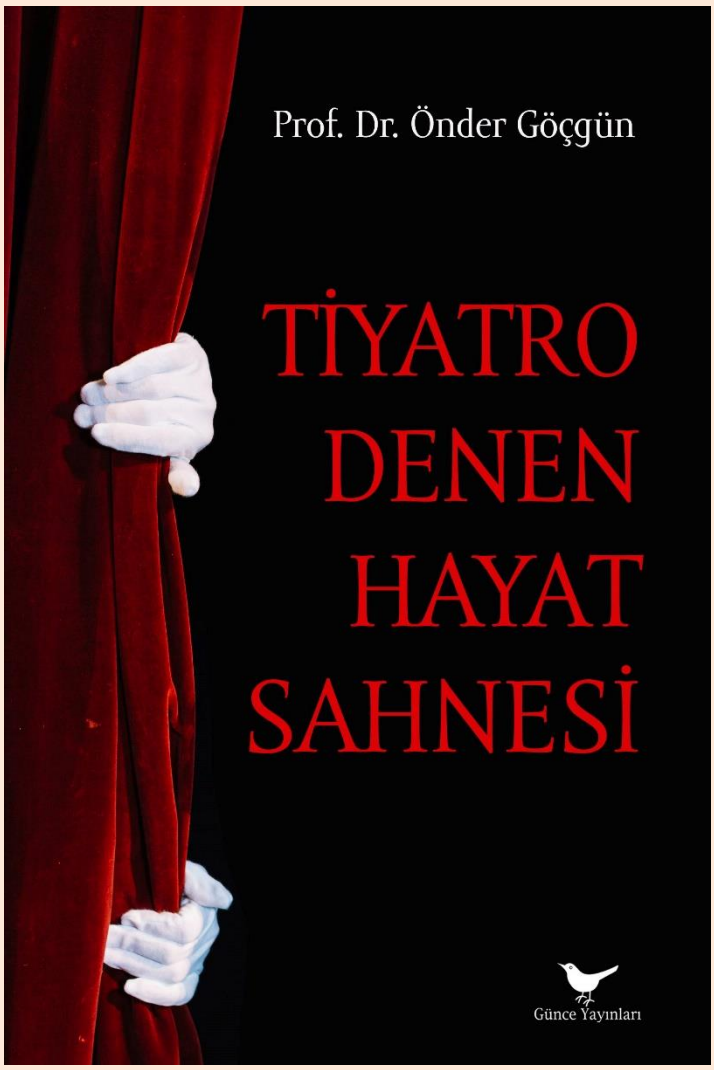

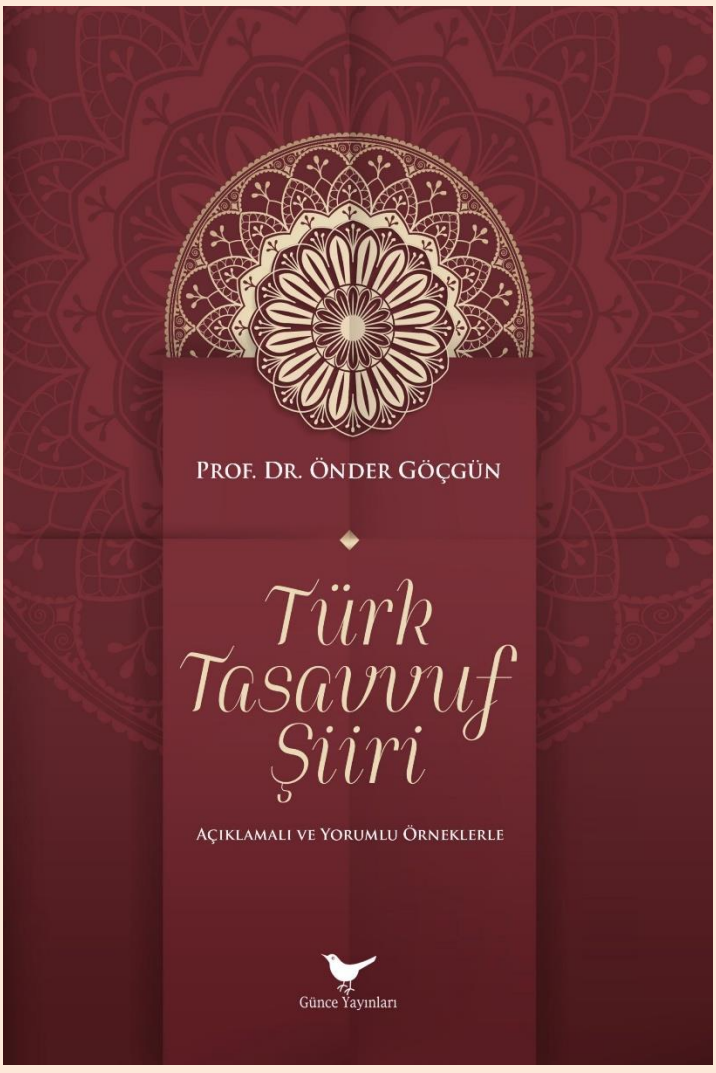

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