



Bridging The Gap Between Tradition and Innovation: A Survey on Study of Revitalization of Kailinese Language as One of the Precious Cultural Heritages of Central Sulawesi (Preliminary Research)

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Abstract. This research provides a thorough analysis of the significance of artificial intelligence (AI) in the preservation of endangered languages. This study reviews a selection of previous approaches that analyze the potential of AI technologies in documenting, analyzing, and revitalizing Kailinese as one of the cultural heritage of Central Sulawesi, Indonesia. The findings emphasize the varied applications of AI in linguistic research and discuss its implementation challenges and opportunities. This review also identifies essential gaps in the existing literature and suggests future research directions in this emerging field.

Keywords: Kailinese, Language, Preservation, Endangered, Artificial Intelligence.

1 Introduction

Mitigation refers to the actions or strategies implemented to reduce the negative impact of an unwanted event or condition, including the present state of local languages. Local languages are considered intangible heritage, referring to cultural elements lacking physical tangibility but holding significant value and significance within a society or community, making their preservation highly important.

1.1 Language Preservation

Local languages are integral to the cultural identity of specific regions or groups. They reflect the history, traditions, knowledge systems, cosmology, folklore, unique sayings, phrases not found in other languages, and the values passed down through generations.

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Hence, efforts to preserve local languages are crucial in ensuring continuity and cultural diversity in the future.

According to the UNESCO Atlas of the World's Languages in Danger, numerous languages are at risk of extinction due to the rapid pace of globalization, societal alterations, and the dominance of primary languages. In Wurm [1], more than 2,500 languages are threatened, with one language disappearing every two weeks. The disappearance of linguistic diversity threatens distinct cultural perspectives and the global tapestry of human expression. Indonesia has more than 640 local languages, of which approximately 154 require attention. Around 139 languages are endangered, while about fifteen have already become extinct.

According to Rahardini and Ainun [2], the local language vitality status can be categorized into six levels: safe, vulnerable, declining, endangered, critical, and extinct. These categories demonstrate that most local languages in Indonesia have been classified as minority languages. This opinion aligns with the findings of Moseley [3], which asserts that languages falling under the vulnerable and endangered categories can be considered minority languages.



Fig. 1. The distribution Map of Kailinese language speakers in Central Sulawesi.

Similarly, Arka [4] supports this perspective by stating that minority languages are frequently exposed to the danger of language demise, hold a marginalized status, and are confronted with the possibility of extinction.

1.2 Kailinese Language and Cultural Heritage

The Kailinese language belongs to the Austronesian language family and is primarily spoken by the Kaili tribe, an ethnic group residing in the central region of Sulawesi. The Kaili language encompasses ten unique dialects: Ledo, Rai, Tara, Taje, Da'a, Unde, Unde Kabonga, Kori, Njedu, and Pendau. It is predominantly used by a significant portion of the population in Central Sulawesi, including the cities of Palu, Donggala,

Sigi, the Parigi Mautong sections, certain parts of the Poso, Tojo Una-Una, and Toli-Toli as shown in Figure 1.

However, the current condition of the Kailinese language raises concerns about its endangerment. Like many indigenous languages worldwide, Kailinese faces numerous challenges, including language shift, reduced intergenerational transmission, and the influence of dominant languages. These factors contribute to the declining number of Kailinese speakers and the potential loss of valuable cultural knowledge embedded within the language.

Despite these challenges, efforts are being made to revitalize and preserve the Kailinese language. Language preservation initiatives involve documenting and archiving linguistic resources, developing language revitalization programs, and fostering language use within educational and community settings. These efforts aim to promote the continued use and vitality of Kailinese among current and future generations.

Considering the future of the Kailinese language, it is crucial to recognize the importance of ongoing language revitalization efforts and community involvement. Collaborative initiatives involving linguists, educators, community leaders, and policymakers can help mitigate the factors contributing to language endangerment and facilitate the sustainable use of the Kailinese language. By embracing innovative strategies and leveraging technology, there is hope for preserving, maintaining, and revitalizing the Kailinese language, ensuring its continued role in preserving the rich cultural heritage of the Kaili community in Central Sulawesi, Indonesia.

1.3 Artificial Intelligence and Language Preservation

In recent years, the emergence of artificial intelligence (AI) technologies has offered new opportunities for language revitalization efforts. With its advanced machine learning, natural language processing, and speech recognition capabilities, AI has shown promise in documenting, analyzing, and revitalizing endangered languages. By harnessing the power of AI, we can leverage cutting-edge tools and techniques to support language preservation and promote intergenerational language transmission.

One significant application of AI in language revitalization is the creation of digital archives and language documentation tools. AI algorithms can aid in transcribing, translating, and analyzing audio recordings, manuscripts, and historical documents in endangered languages. These digital archives serve as invaluable resources for linguistic research, cultural preservation, and educational purposes, ensuring that the knowledge embedded within endangered languages is preserved and accessible for future generations.

While AI presents immense potential for language revitalization, it is essential to approach its implementation carefully and closely with affected communities. Ethical considerations, community involvement, and the empowerment of local language

speakers should guide the development and deployment of AI technologies for language revitalization.

Given its vulnerable classification, efforts are being made to protect, preserve, and promote the Kailinese local language. Extensive research has been conducted on various aspects of the Kailinese language using conventional or AI-based approaches.

1.4 Conventional-Based Approaches

Research findings are typically disseminated through conference presentations, published in various scientific journals, and preserved in library archives. Extensive studies have been conducted on the Kailinese language, exploring its different aspects. For instance, Sofyan et al. [5] investigated Kailinese language morphology and syntax and further analyzed its repetition system [6]. Following Saro [7], oral literature in the Kailinese language was researched, and Rahim et al. [8] focused on its structural aspects.

Later, Asri [9] [10] explored Kailinese sentence patterns, investigated command sentence patterns, and constructed question sentences based on form and function in the Kailinese language. Alongside these studies, the collection includes the Ledo-Indonesian-English Kaili Dictionary by Evan [11], and numerous other supported research papers and reports have been conducted by Ponulele et al. [19], Pertiwi et al. [20], Safar and Gazali [21], and Himawan and Gazali [22].

In addition to its linguistic aspects, Gazali [12] [13] focused on the significant value held in the Kailinese local language. Their research findings highlight various values within the Balia rituals (medicine rituals) of the Kailinese community. These rituals encompass religious, philosophical, ethical, and social values, emphasizing the profound significance embedded within the Kailinese language beyond its mere linguistic characteristics.

1.5 Technology-Based Approaches

In recent years, the emergence of artificial intelligence (AI) technologies has opened up new possibilities for language recovery efforts. With its machine learning, natural language processing, and speech recognition capabilities, AI has demonstrated great potential in aiding the documentation, analysis, and recovery of endangered languages. By harnessing the power of AI, advanced tools and techniques can be utilized to support language preservation and facilitate language transmission across generations.

An important application of AI in language recovery is the creation of digital archives and language documentation tools. AI algorithms can assist in transcribing, translating, and analyzing audio recordings, manuscripts, and historical documents in endangered languages. These digital archives serve as invaluable resources for linguistic research, cultural preservation, and educational purposes, ensuring that the knowledge embedded in endangered languages is preserved and accessible for future

generations. Additionally, AI-powered language learning apps are crucial in language recovery efforts.

Through adaptive algorithms, interactive platforms, and virtual language immersion environments, these apps offer personalized language learning experiences. By integrating endangered languages into these platforms, communities can revive and promote their languages among the younger generation. AI can aid in developing interactive language lessons, speech recognition systems, and language proficiency assessments, facilitating engaging and accessible language acquisition and recovery.

The following research studies have been conducted on this subject, including Fitzgerald [14], presenting strategies and methods for restoring, preserving, and documenting endangered languages. The research framework covers various aspects of artificial intelligence techniques, language modeling, data processing, and collaborative approaches with language-speaking communities. Then, Kohlar and Alameen [15] discuss an AI-based language translation platform that combines AI technology with language translation capabilities, offering efficient and accurate solutions for interlanguage text translation. Then, Shuping [16] focuses on developing an AI-based English translation system connected via a network. Later on, Karthick and Meiraba [17] explore the development of a collaborative model for creating digital language archives in India, proposing a model that involves active participation from various stakeholders.

2 Method

This research method outlined the acquisition of data samples of the Kailinese language. Figure 2 provides an illustrative example highlighting the distinctive patterns inherent to the Kailinese language. These unique characteristics present additional challenges for successfully implementing future directions in the field.

2.1 Data Acquisition

Sampling was conducted to carefully select language data accurately representing the Kaili community's linguistic characteristics and cultural nuances. The collected data includes a variety of Kailinese dialects acquired from previous research, such as spoken language recordings, written texts, transcriptions, and language corpora. Sample Kailinese texts with various dialects are provided in Table 1. These resources are fundamental for analyzing the Kaili language's phonological, morphological, syntactic, and semantic aspects.

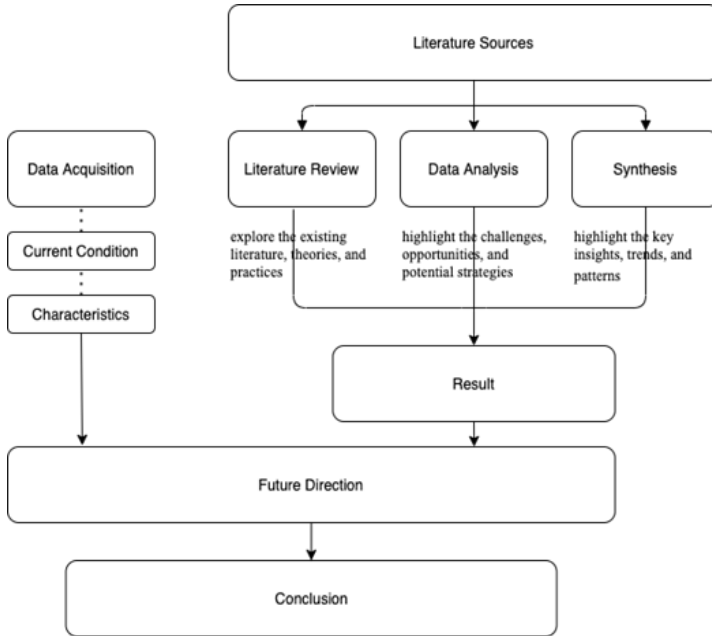


Fig. 2. Research outline.

Table 1. Sample (Uniqueness) Data Characteristics of the Kailinese Language

Dialect	Kailinese	Indonesian	English
Ledo	komiu	anda	you
Rai	kaqmiu	anda	you
Tara	komi	anda	you
Da'a	koromu	anda	you
Njedu	iko	anda	you

The Kailinese data exhibit distinctive features that reflect the Kaili community's linguistic attributes and cultural context. It unveils a phonological system by specific sound patterns, including consonants, vowels, pitches, and syllable structures. Morphologically, the Kailinese language demonstrates inflectional and derivational processes that facilitate the formation of words and convey grammatical information. Syntactically, the language displays word order patterns, sentence structures, and discourse organization strategies that reflect the communicative preferences of the Kaili community.

Additionally, the lexical resources and semantic domains of Kailinese encompass terms associated with traditional practices and indigenous knowledge systems, thereby reflecting the community's cultural heritage

2.2 Literature Review

The primary objective of this paper is to conduct an in-depth review of the utilization of artificial intelligence (AI) for language preservation. The study aims to explore the existing literature, theories, and practices surrounding the application of AI in language preservation efforts, with a specific focus on the endangered Kailinese language.

2.3 Data Analysis

The collected data was analyzed through a thematic analysis approach. Initially, the literature was coded and organized into themes related to traditional knowledge, language endangerment, and the application of artificial intelligence in language revitalization efforts. These themes were further refined through iterative analysis, allowing for the identification of key concepts, patterns, and trends in the literature. The study highlighted the challenges, opportunities, and potential strategies for bridging the gap between tradition and artificial intelligence in the context of the endangered Kailinese language.

2.4 Synthesis

The synthesized findings will be critically analyzed and discussed, highlighting the key insights, trends, and patterns emerging from the literature review. The discussion will explore the benefits and challenges of using AI for language preservation, ethical considerations, and potential future directions. The study will also examine the implications of AI-driven language preservation regarding linguistic diversity, cultural heritage, and community engagement.

3 Result and Discussion

The findings of this research highlight the potential opportunities for utilizing artificial intelligence (AI) in preserving Kailinese languages. Through a comprehensive analysis of existing literature and studies, it has been identified that AI technologies, such as machine learning, natural language processing, and speech recognition, offer promising avenues for language preservation efforts. These technologies can assist in documenting, analyzing, and revitalizing endangered languages, contributing to their preservation and information for future generations.

The results section of this paper presents the findings obtained through a comprehensive literature review, which delved into the intersection of tradition and technology in the realm of Kailinese language preservation. The review aimed to identify key themes, methodologies, and discoveries from previous studies investigating technology's utilization in protecting endangered languages. Drawing upon the condition and characteristics specific to the Kailinese language, the

subsequent findings summarize the significant insights gleaned from the literature review.

3.1 Digital Documentation and Archiving

The review revealed that digital documentation and archiving technologies play a significant role in preserving endangered languages. Researchers have utilized audio and video recording, corpus creation, and data management techniques to capture and preserve linguistic data, oral narratives, and cultural artifacts.

3.2 Language Learning and Technology

The literature review highlighted the potential of technology in language learning and revitalization efforts. Based on the current situation and characteristics of the Kailinese language today, the online language learning platforms, mobile applications, and interactive resources effectively engage language learners, promote intercultural exchange, and foster community-driven language revitalization initiatives.

3.3 Machine Learning and Natural Language Processing

Integrating machine learning and natural language processing techniques was identified as a promising approach to endangered Kailinese language preservation. Studies have explored automatic speech recognition, machine translation, and language analysis using computational methods, supporting the revitalization of the current situation of the Kailinese language.

The review identifies gaps in the current literature and proposes future research directions for integrating AI in endangered language preservation. It suggests exploring the potential of AI in language revitalization campaigns, fostering collaboration between AI researchers and linguists, and developing AI tools tailored to the specific needs of endangered language communities. The review also emphasizes the importance of interdisciplinary approaches and community involvement in shaping the future of AI-based language preservation efforts.

3.5 Automatic Speech Recognition and Transcription

Further advancements in automatic speech recognition (ASR) and transcription technologies can significantly benefit the preservation of the Kailinese language. Investing in research and development to improve the accuracy and efficiency of ASR systems specifically trained for Kailinese can facilitate the transcription and documentation of spoken Kailinese language data, making it more accessible for analysis and linguistic research.

3.6 Machine Translation and Language Revitalization.

Developing machine translation systems that can accurately translate Kailinese to and from other languages can facilitate cross-cultural communication and language revitalization efforts. Investing in research to train machine translation models specifically for Kailinese can enable effective communication between Kailinese

speakers and non-Kailinese speakers, fostering language revitalization and intercultural exchange.

3.7 Natural Language Processing for Language Analysis

Leveraging natural language processing (NLP), techniques can provide valuable insights into the grammatical structure, syntax, and semantic features of the Kailinese language. NLP algorithms can be used to analyze large Kailinese language datasets, aiding in the development of linguistics.

3.8 Interactive Language Learning Application

Creating interactive language learning applications and online platforms designed explicitly for learning Kailinese can enhance language acquisition and revitalization efforts. These applications can incorporate AI-driven techniques, such as adaptive learning algorithms, speech recognition, and interactive exercises, to provide tailored and engaging language learning experiences for learners of different proficiency levels.

3.9 Preservation of Oral Traditions and Cultural Knowledge

AI technologies can be harnessed to preserve and disseminate oral traditions and cultural knowledge associated with the Kailinese language. Developing AI-powered systems that can accurately transcribe and translate Kailinese oral narratives, songs, and stories can contribute to the preservation of Kailinese cultural heritage and facilitate intergenerational knowledge transfer.

4 Conclusion

In conclusion, this literature review examined the intersection between tradition and technology in the context of endangered Kailinese language preservation. The findings demonstrate the significant role that technology can play in bridging the gap between traditional and modern approaches, offering new opportunities and challenges for preserving endangered languages.

The review highlighted the importance of integrating traditional knowledge, cultural practices, and oral traditions with technology-driven approaches. It emphasized the value of combining indigenous knowledge systems and community engagement with modern digital tools and resources. By leveraging technology, language preservation efforts can be enhanced, allowing for the documentation, analysis, revitalization, and transmission of endangered languages.

Artificial Intelligence (AI), particularly natural language processing techniques, was identified as a promising avenue for endangered Kailinese language preservation. Automatic speech recognition, machine translation, and language analysis using computational methods contribute to the documentation, analysis, and revitalization of endangered languages. These technologies offer opportunities for transcribing and translating oral narratives, facilitating communication between speakers of endangered languages and other communities, and preserving linguistic diversity.

However, the review also identified challenges and ethical considerations associated with using technology in language preservation. Limited technological infrastructure, resource scarcity, digital divide, and ethical concerns regarding data privacy, intellectual property, and cultural sensitivity must be carefully addressed. Collaborative approaches, community engagement, and an inclusive and equitable design process ensure that technology-driven initiatives respect language communities' rights, needs, and cultural protocols.

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