Transformation of Indonesian Language in Social Media Using AI Expert Systems and Machine Learning

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ABSTRACT

This study explores the transformation of the Indonesian language on social media platforms by integrating advanced artificial intelligence techniques, including expert systems and machine learning algorithms. **The rapid** evolution of communication on platforms such as TikTok, Twitter, and Instagram has led to a dynamic shift in language use, characterized by increased creativity in slang, abbreviations, and code-mixing, alongside challenges in maintaining compliance with standard language norms. By applying intelligent systems capable of analyzing large volumes of social media data, **this research** aims to identify patterns of linguistic innovation and deviations from conventional language rules. The expert system framework supports automated detection and classification of language variations, while machine learning models enhance the accuracy and adaptability of language analysis over time. **Findings** indicate that AI-driven approaches can effectively balance the dual needs of fostering linguistic creativity and preserving language standards, providing valuable insights for language educators, policymakers, and digital content developers. **The study** underscores the potential of intelligent technologies to facilitate language monitoring and support efforts in maintaining the cultural identity of the Indonesian language amid the fast-paced digital communication landscape.

1. INTRODUCTION

The digital era has brought about significant changes in the way humans communicate. Social media, as one of the results of technological advancement, has become a dynamic space for people to express themselves, interact, and build communities. In this process, the use of the Indonesian language has undergone various transformations influenced by evolving communication habits on these platforms

The rapid growth of digital technology, especially social media, has profoundly altered communication patterns in Indonesian society. This shift is reflected in the language itself, marked by creativity and innovation

through the emergence of abbreviations, acronyms, slang, and code-mixing with foreign languages. However, such transformations also raise concerns about the preservation of standard language norms, such as compliance with the General Guidelines for Indonesian Spelling (PUEBI) and grammatical correctness. While social media enables more open and expressive communication, it also risks reducing language awareness and proficiency, particularly among younger generations [1, 2].

Addressing these challenges aligns directly with the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), which emphasizes the importance of inclusive and equitable education and lifelong learning. Promoting mastery of the Indonesian language especially in digital contexts supports language learning and literacy. At the same time, the use of AI-based expert systems and machine learning technologies, which can analyze, monitor, and classify linguistic patterns on social media, contributes to SDG 9 (Industry, Innovation, and Infrastructure) by leveraging innovation to strengthen digital literacy and language infrastructure [3, 4].

Furthermore, social media influence extends beyond communication it affects cultural identity and education. Maintaining Indonesian as a mother tongue while embracing technological developments is essential for preserving national identity amid globalization. However, the unregulated and fast-paced nature of digital platforms presents risks to language authenticity, accuracy, and ethics in communication [5, 6].

Therefore, it is crucial for social media users, educators, policymakers, and technology developers to work collaboratively in applying intelligent systems that balance linguistic innovation with the preservation of cultural and linguistic standards. In doing so, we not only support the goals of SDG 4 and SDG 9 but also promote sustainable language development in Indonesia's digital society [7, 8].

2. LITERATURE REVIEW

This literature review discusses various previous studies relevant to the transformation of the Indonesian language on social media, emphasizing the growing potential of AI and machine learning in linguistic analysis [9]. Several studies have examined morphological and syntactic changes resulting from social media use, as well as the impact of slang and informal language on users academic abilities [10]. Moreover, research by [11] highlights how language use on social media often deviates from formal rules, influencing communication patterns among the younger generation.

Identified frequent language errors in social media comments, reflecting users prioritization of communication efficiency over strict adherence to language norms. Explored how social media platforms shape social interaction patterns, with language serving as a primary communication tool. While these studies provide valuable insights into language transformation, they mainly rely on manual content analysis, which limits scalability given the vast volume of social media data [12, 13].

Recent advancements in AI and machine learning offer innovative approaches to address these limitations by enabling automated and scalable analysis of linguistic phenomena in digital communication. AI-based expert systems can be designed to detect deviations from standard language norms and classify creative language usage, while machine learning algorithms can adaptively recognize emerging slang, abbreviations, and code-mixing patterns [14, 15].

Building on these foundations, this research aims to extend the exploration of Indonesian language transformation by integrating AI expert systems and machine learning techniques for content analysis on TikTok, Twitter, and Instagram platforms. This approach promises to enhance the accuracy and depth of linguistic analysis while supporting language preservation efforts in the digital era [16, 17].

3. RESEARCH METHODS

This study employs a mixed-method approach combining literature review, content analysis, and the application of artificial intelligence technologies to investigate the transformation of the Indonesian language on social media platforms. Data are collected from user-generated content on TikTok, Twitter, and Instagram, focusing on linguistic elements such as morphology, syntax, semantics, and language variations including slang, abbreviations, and code-mixing [18, 19].

This methodological integration allows for a comprehensive understanding of how digital interactions shape linguistic trends among Indonesian users. The literature review establishes a theoretical foundation, while content analysis provides empirical insights by examining actual language use across platforms. The use

of artificial intelligence tools, such as Natural Language Processing (NLP) and machine learning algorithms, enables the efficient identification and classification of language patterns at scale [20].

Table 1. Platform, Data Types, and Data Collection Techniques

Platform	Data Types	Data Collection Techniques
Tiktok	Comments, captions, Language Trends	Analysis of popular posts using purposive sampling technique
Twitter	Tweets, Replies, Trending Topics	Sampling based on hashtags and topic popularity
Instagram	Caption, Komentar, Story	Content analysis of posts with high interaction

In Table 1 Each platform is analyzed based on the linguistic elements that emerge, including morphological, syntactic, and semantic variations that develop on social media. To manage and analyze the large volume of social media data, this research integrates AI-based expert systems designed to automatically detect and classify language patterns that either comply with or deviate from standard Indonesian language rules. These expert systems use rule-based decision-making algorithms reflecting linguistic norms and guidelines. The overall framework of the AI expert system combined with machine learning models used in this study is illustrated in the diagram below [21, 22].
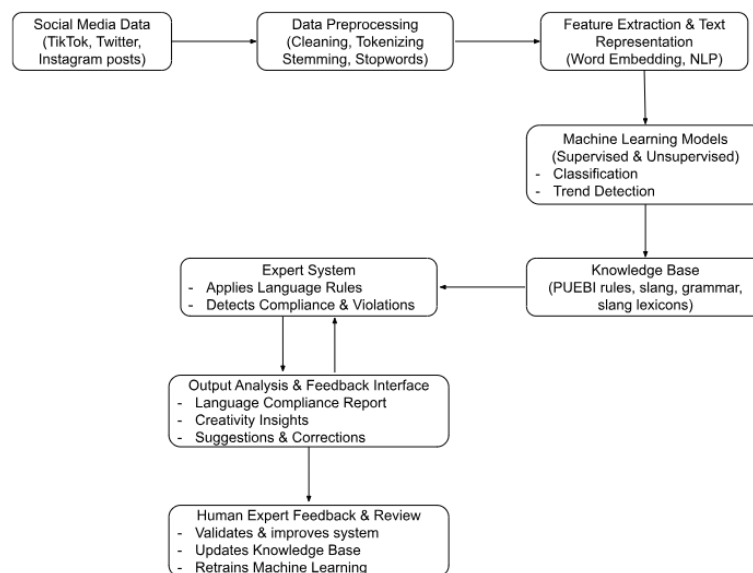

Figure 1. Diagram Framework AI Expert System dan Machine Learning

The diagram in Figure 1 illustrates the integrated framework combining AI expert systems and machine learning models designed to analyze Indonesian language transformation on social media. The process begins with collecting raw textual data from platforms such as TikTok, Twitter, and Instagram. This data undergoes preprocessing steps including cleaning, tokenization, and normalization to prepare it for computational analysis [23, 24].

Next, feature extraction techniques convert the preprocessed text into numerical representations suitable for machine learning, utilizing language-specific embeddings that capture semantic and syntactic nuances [25, 26]. Machine learning models then analyze these features to classify language patterns, detect slang, abbreviations, and code-mixing, as well as identify deviations from formal language norms.

Simultaneously, the expert system applies a knowledge base of linguistic rules and dictionaries, including standard spelling, grammar regulations, and known informal language forms. The inference engine assesses each input, flagging non-compliance or creative language use and offering suggestions or corrections [1, 27].

Outputs from both components are synthesized and presented through a user interface, enabling language researchers, educators, and policymakers to monitor evolving language trends on social media. Fur-

thermore, continuous feedback from human experts refines the knowledge base and retrains machine learning models, ensuring the framework adaptability and accuracy over time [28, 29].

Complementing the expert systems, machine learning models are employed to identify evolving trends and emerging language forms by learning from annotated datasets. Supervised learning algorithms are trained on labeled language samples to improve the system capability in recognizing creative linguistic expressions and non-standard usages dynamically [30, 31].

The combined use of expert systems and machine learning enables scalable and accurate content analysis, facilitating a deeper understanding of the balance between linguistic creativity and language compliance in social media communication. The study also includes qualitative validation through manual review of selected samples to ensure the reliability of AI-driven analyses [32, 33].

4.   RESULT AND DISCUSSION

The transformation of the Indonesian language in the digital era particularly through the use of social media demonstrates a complex interplay between linguistic creativity and standard language norms. As communication patterns evolve, especially among younger generations, various forms of informal language, slang, and digital expressions increasingly dominate daily interactions [34, 35]. This phenomenon reflects both the dynamic nature of language and the challenges it poses to language compliance, especially in formal or academic settings. Therefore, this section discusses the findings related to the influence of digital communication on language development, the creativity it fosters among users, and the resulting implications for maintaining language compliance in the context of Indonesian language use on social media [36].

4.1.   Changes in Structure and Vocabulary in Indonesian on Social Media

The influence of the development of the Indonesian language in the digital era like this has quite a significant role. Social media has become a massive and quite popular platform in the current digital era. Through social media, users can interact with other users from various backgrounds and different geographical locations. In this case, it creates diverse communication and opens up opportunities for the development of the Indonesian language. However, even so, the influence of social media on the language structure of users has become more or less standard or informal, because the influence of slang is increasingly widespread among young people in this era. Moreover, the difference in slang orslang word on each platform, this is a characteristic of the platform which for some reason creates a bad image in terms of language [37, 38].

The impact of developing digital communication is something interesting to discuss. Digital communication will continue to develop along with the progress of communication technology and the internet has brought about quite significant changes in the way people interact with the use of language, including Indonesian. However, not all users are affected by the changes in informal language which are a bad picture of language like this [39]. According to content analysis research on a platform such as Twitter (X), TikTok, Instagram, etc. Some users also often promote their written works where the use of standard language and diction is still often used by them to produce a poetic and meaningful story. However, young people prefer relaxed (informal) language in their everyday language use [40, 41].

One of the language findings that is often used in social media such as Tiktok, Twitter (X), Instagram. Language on social media often appears in the form of abbreviations, acronyms, and new terms that quickly spread widely. Uas. This change occurs because of increasingly rapid communication and the need to follow digital trends. New words often emerge from slang, foreign absorption, or abbreviations that facilitate communication [42]. Social media users also create terms that are relevant to certain social contexts, such as the use of the word "guys" which indicates the word (Friends) or (Friends), besides that they also use opposite terms such as "Mager" (Lazy to Move), "skuy" (from the word "yuk" which is reversed) or "mantul" (really cool), "bucin" (love slave), and "santuy" (a variation of the word "relax") are commonly used on social media [43, 44]. In addition, the use of abbreviations such as "OTW" (on the way) and "FYI" (for your information) is also increasingly popular. This transformation shows that the Indonesian language is undergoing adjustments to meet the needs of communication in the digital world. This kind of linguistic innovation is a form of expression of dynamic and ever-evolving digital culture.

However, this change also has negative impacts, such as the increasingly loose use of language according to the rules [45]. In informal conversations, sentence structures are often irregular, and spelling is often ignored. This sparks debate about the boundaries between linguistic creativity and the importance of maintaining existing norms. On the other hand, language compliance is also a major challenge on this topic.

The reason is, many social media users no longer maintain their standard and correct spelling system. For example, in everyday communication on platforms such as Twitter and Instagram, many writings are found without correct capitalization, the omission of vowels to save characters, and the use of foreign words without spelling adjustments. This shows a shift in perceptions of language compliance, especially among the younger generation who are more accustomed to informal communication patterns [46, 47].

This study also explores how Bahasa Indonesia is transformed on social media, highlighting the phenomenon of user creativity in language and the extent to which they adhere to standard language rules. The results show that users often modify language to express identity, humor, or personal uniqueness, leading to the emergence of new language forms or slang. However, there are also efforts to maintain compliance with formal language rules, especially in professional or educational contexts [48].

4.2. The Impact of Creativity in Language on Social Media Users

Language creativity on social media gives rise to various linguistic innovations that enrich expression and interaction between users. However, on the other hand, this change also raises concerns about the applicable language rules, especially in formal contexts such as the academic and professional worlds. Therefore, it is important to understand the impact of language creativity on social media users in the context of changes in the Indonesian language. Language creativity on social media also has various impacts on its users. One of the positive sides is the emergence of innovation in the way of communicating. Users can be freer and more dynamic in expressing themselves. Various forms of expression such as memes, abbreviations, and new words have also become part of the digital culture that enriches the way we interact [49].

Another positive impact of language creativity on social media is the emergence of innovation in the way of communicating. Users can express themselves more freely and dynamically, creating various forms of unique and contextual expressions. For example, the use of abbreviations, acronyms, and new words is often part of the ever-growing digital culture. This phenomenon can be seen in the use of words such as "OTW" (on the way) which replaces "sedang dijalan" or "bestie" which refers to a close friend. This innovation not only speeds up communication but also reflects the creativity of users in conveying messages in a more interesting and easy-to-understand way [50].

However, there are also negative impacts that need to be considered. The use of inappropriate language is increasingly widespread, especially among the younger generation. They use slang more often than formal language, which can have an impact on decreasing the ability to speak Indonesian properly and correctly, especially in formal situations such as in the academic or professional world. In addition, the phenomenon of rude or impolite language on social media is also increasingly common. The anonymity provided by the internet makes many people feel freer to express their opinions without considering social norms and communication ethics. For example, many students are accustomed to writing in an informal style on social media without paying attention to the correct structure and spelling, so that when they have to write in a formal context, they have difficulty constructing sentences that are in accordance with linguistic rules.

On the other hand, the use of language that is not in accordance with norms can also cause misunderstandings in communication. Sometimes, words that have double meanings or excessive use of abbreviations actually make the message less clear. For example, in online conversations, many people use abbreviations such as "gw" (me) or "city"(but). For those who are not used to this style of language, the message conveyed can be confusing. This kind of misunderstanding can hinder effective communication and even cause discomfort among social media users.

4.3. Language Compliance in Social Media

One of the main aspects of language compliance is the use of spelling that is in accordance with the PUEBI. On social media, the use of deviant spelling is often found, either in the form of abbreviations, puns, or phonetization that does not comply with standards. For example, the use of the word "gak" replaces "tidak" or "kamu" which is often shortened to "km". Although these abbreviations facilitate communication in the digital space, their continued use can affect language habits, especially for the younger generation who are still in the language learning stage. In addition to spelling, sentence structures that do not comply with the rules are also a challenge in language compliance on social media. In online conversations, users tend to use incomplete sentences, without paying attention to clear subjects, predicates, objects, and descriptions. Sentences that are truncated or consist of only one word are often found in comments or social media posts. This habit, if carried over into an academic or professional context, can hinder the ability to think critically and organize ideas systematically.

Word choice or diction also plays an important role in language compliance. In social media, informal language, slang, and mixed languages are often more dominant in everyday communication. One increasingly common phenomenon is the use of loan terms from foreign languages without adjusting to Indonesian language rules. For example, the termself lovemore frequently used than its Indonesian equivalent, namely "self-love". This reflects the influence of globalization in language development, but on the other hand, it can shift native vocabulary and reduce the use of standard language.

One of the factors that influences language compliance is the anonymity and freedom of expression offered by social media. Many users feel less bound by language norms because social media provides a more flexible communication space. As a result, language use becomes freer, sometimes without considering manners or politeness. This can be seen from the increasing use of harsh language, sarcasm, or even hate speech. This phenomenon shows that language compliance is not only related to linguistic rules, but also reflects ethics in communicating in the digital world.

In the academic world, adherence to correct language rules is very important. However, the habit of using non-standard language on social media often carries over into academic writing. Many students still have difficulty distinguishing between formal and informal language, so their academic assignments are often filled with vocabulary and language structures that are more suitable for everyday conversation. This challenge encourages educational institutions to further instill an understanding of the importance of using language that is appropriate to the context. The influence of social media in shaping language habits cannot be ignored. With the number of users continuing to increase, digital platforms have become the main space for linguistic interaction. Therefore, various efforts need to be made to improve language compliance on social media. One of them is broader education about the importance of maintaining language standards, both through educational institutions and digital campaigns organized by the government and language communities.

5.　MANAGERIAL IMPLICATIONS

This study highlights the value of leveraging AI expert systems and machine learning to monitor and analyze the transformation of the Indonesian language on social media. Educational institutions and language authorities can benefit from these technologies to detect informal language trends early, enabling the design of targeted digital literacy programs that balance creativity with proper language use. Policymakers can use automated language compliance tools to oversee online content more effectively, supporting language preservation efforts and maintaining cultural identity amid rapid digital communication.

For social media platforms and technology developers, integrating intelligent language analysis can enhance content moderation and improve user experience by recognizing both creative expressions and deviations from language norms. Adopting such AI-driven frameworks allows organizations to foster responsible communication, aligning with broader social goals of quality education and cultural sustainability in the digital era. Proactive implementation of these technologies positions organizations to lead in preserving language standards while embracing innovation in the evolving digital landscape.

6.　CONCLUSION

The transformation of Indonesian language on social media reflects the dynamics of communication in the digital era. Changes in vocabulary, syntax, and language style reflect innovation in communication, but also present challenges in maintaining compliance with standard language rules. Linguistic creativity allows for more flexible and interesting expressions, but on the other hand can reduce the quality of language in formal situations. The emergence of many new terms and the prevalence of language errors on social media show the need for a balance between innovation and compliance with language norms. In addition, anonymity in the digital world often encourages the use of language that is rude or inconsistent with social norms.

Various efforts have been made to maintain language compliance, both by the government and language institutions, through campaigns and regulations. Social media platforms have also begun to implement policies to filter hate speech and inappropriate language. However, regulations that are too strict can limit creativity, while policies that are too loose can accelerate language degradation. Therefore, the balance between creativity and language compliance needs to be maintained with a flexible approach. The role of individuals, communities, and education is very important in building good language habits. Collaboration between academics, language practitioners, government, and the community is key to ensuring that Indonesian on social media continues to develop without losing its identity and existing language norms.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: NP; Methodology: BR; Software: SR; Validation: RS and DD; Formal Analysis: RS and EN; Investigation: NP; Resources: BR; Data Curation: SR; Writing Original Draft Preparation: DD and DF; Writing Review and Editing: RS and EN; Visualization: BR; All authors, NP, BR, SR, DD, DF, RS, and EN have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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