

Integration of AI Deep Learning in Studying the Morphology of Philosophy of Science Perspectives Case Study of Chat GPT in Arabic Quotes

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Abstract

This article aims to make a significant contribution to the understanding of artificial intelligence (AI) in the context of morphology and the philosophy of science, while emphasizing the importance of interdisciplinary and innovative approaches in future research. The study discusses the integration of deep learning-based AI in morphological studies from a philosophical perspective. The authors present an innovative approach that connects modern AI technology with philosophical paradigms to enhance the understanding of morphology. Through literature analysis and case studies on Arabic quotes, the authors demonstrate that deep learning AI models can significantly improve the accuracy and efficiency of morphological analysis. The philosophical approach developed in this article provides an epistemological context for AI analysis results, highlighting its ontological aspects. The implications of this research include the potential for collaboration among different disciplines and recommendations for future research on the integration of AI and the philosophy of science.

Keywords Artificial Intelligence, Deep Learning, Morphology, Philosophy of Science, Interdisciplinary Research

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Introduction

Artificial intelligence (AI) has revolutionized various fields of research, including linguistics, with increasingly

widespread applications in the analysis of language morphology. (Yudistira, 2021) *Deep learning*, as a branch of machine learning, utilizes layered artificial neural networks known as deep neural networks to process and analyze complex data. This technology is designed to mimic the way the human brain works in recognizing patterns, so it is very effective in handling tasks involving text, images, videos, and sounds. In the context of language morphology, deep learning enables automatic feature extraction from

linguistic data, identifying word structures and morphemes without the need for intensive manual intervention.(Daffa Pamungkas & Fathan Hidayatullah, 2023).(Al & Hsb, 2020)

One of the main advantages of AI deep learning is its ability to perform feature extraction automatically. Models such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), including the Long Short-Term Memory (LSTM) variant, have proven to be highly effective in the analysis of sequential data such as text (Setiyani et al., 2023). CNNs are generally used for tasks related to images, while RNNs and LSTMs are better suited for text analysis, allowing for better context modeling in word order. This is very important in the study of language morphology, where understanding the context of words can affect the interpretation of meaning.(Wijaya & Jati, n.d.)

In the study of morphology, deep learning not only aids in the classification and recognition of patterns but also in understanding the relationships between morphemes and more complex grammatical structures. With the ability to analyze large and diverse datasets, deep learning models can find patterns that traditional analysis may not see. Although

it requires high computing resources and large datasets, this technology has become the core of a variety of practical applications such as automated translation and recommendation systems.(Fathoni, 2013)

In this study, we explore how the integration of AI deep learning in the study of language morphology can provide new and in-depth insights into language structure. We will also discuss the epistemological implications of using AI in linguistic research as well as the challenges faced in its application. With this interdisciplinary approach, the author hopes to make a significant contribution to the understanding of language morphology through the lens of artificial intelligence and philosophy of science.

The purpose of this study is to explore and analyze new ways in which artificial intelligence (AI), especially deep learning techniques, can be used to study language morphology. This research aims to understand how the application of AI in morphological analysis not only improves efficiency and accuracy, but also opens up new insights into scientific understanding of the structure and function of language. By utilizing the ability of AI to extract patterns from big data, this research is expected to make a significant contribution

to the development of more comprehensive morphological theories.

Research Novelty

This research offers several important novelties in the field of morphological studies. One of the main innovations presented is a new method in morphological analysis that integrates the latest artificial intelligence techniques, such as deep learning and big data analysis. This method not only includes the use of advanced models such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), but also explores new approaches in Natural Language Processing (NLP). With this approach, we hope to improve our understanding of morphemes and word structures, providing new tools for researchers to analyze language in a more efficient and accurate way. (Ashrafimomghari, 2022)

In addition to the technical aspects, this research also offers an innovative philosophy of science framework to evaluate the results of analysis generated by AI. Considering epistemological and ontological perspectives, it will be discussed how the use of AI in the study of morphology can change the way we understand linguistic knowledge.

This research will answer some key questions. First, it investigates how new methods in AI can change traditional approaches to morphology studies. It then explores the paradigm shift that occurs when AI techniques are applied to morphological analysis, as well as their impact on existing research methods. The second question focuses on the epistemological implications of the use of AI in morphological research. How the application of AI can affect our understanding of linguistic knowledge, including questions about the validity, reliability, and interpretation of the results of analysis generated by AI models. In order for this study to provide new insights into the role of AI in the study of language morphology and the contribution of philosophy of science to the understanding of these results. This study is expected not only to enrich the academic literature but also to encourage further discussion on the integration of advanced technologies in linguistics. (Digaritsky & Al Anang, 2020)

Method

This study uses qualitative methods to explore a deep understanding of the application of artificial intelligence (AI), specifically models such as ChatGPT, in morphological analysis. The qualitative

Commented [H1]: Methodological Order:

Method of Approach

Research locus: Types of data and sources
Data collection techniques
Data analysis techniques

approach allows researchers to explore the nuances and complexities of the interactions between AI technology and language structures. With this method, we can understand the context in which AI operates in linguistic studies, as well as how this technology can affect the way we analyze and understand language morphology.

Research on artificial intelligence (AI), morphology, and philosophy of science has surfaced in several academic works, including a study by Jelahun et al. entitled "Skeptical Reasoning of Artificial Intelligence (AI) Adoption in Indonesia: A Review of the Philosophy of Communication Sciences." This research explores the challenges and opportunities faced in the adoption of AI in Indonesia, focusing on the philosophical implications arising from the use of this technology in communication. Jelahun et al. emphasized the importance of a critical understanding of AI in Indonesia's cultural and social context, as well as how philosophy of science can provide an in-depth evaluation framework for this phenomenon. Next, an article by Prayogi & Nasrullah, "Artificial Intelligence and Philosophy of Science: How Philosophy Views Artificial Intelligence as a Science," discusses how AI is viewed in an epistemological context.

They underline that understanding AI is not only limited to technical aspects, but also includes fundamental questions regarding knowledge and reality. In their view, AI should be seen as an entity that has the potential to change the way we understand science itself, taking into account the ethical and ontological aspects of its use (Solihin & Zamzam Mubarak, 2024).

Another relevant article is Hortmartua's work from the University of North Sumatra (USU) which discusses "Deep Learning Approaches in Computational Linguistics." Hortmartua explained how deep learning techniques can be applied in linguistic analysis, especially in the study of morphology. By leveraging deep learning algorithms, this study demonstrates AI's ability to recognize complex morphological patterns in language, as well as how this approach can improve the efficiency and accuracy of linguistic analysis.

Overall, these studies show a significant integration between AI, morphology, and philosophy of science. This interdisciplinary approach not only enriches our understanding of language structure but also encourages critical reflection on the ethical and epistemological implications of the use of advanced technologies in linguistic studies.

This analysis will include a review of various academic articles, books, and publications that discuss the application of AI in linguistics as well as existing morphological theories. This case study research locus focuses on the application of ChatGPT's *deep learning* model in analyzing Arabic quotes as well as instructions in English and Indonesian. This case study aims to provide practical insights into how AI models can be used effectively in real-world contexts, as well as to identify the advantages and challenges faced in their use((Nugraha,Adhia & Sholihin Muhtar, 2023.).

Arabic morphology is a complex and important field of study in understanding the structure and formation of words. In this study, there are two main concepts that are often discussed, namely *derivation* and *inflection*. Derivation refers to the process of forming a new word from the base word through the addition of affixes, whereas inflection is concerned with changing the shape of a word to show grammatical variations without changing the word class. The Arabic morphological data processing and analysis technique in this study is known as the principle of roots and patterns, where the root of the word serves as the basis for forming various variations

of words through vowel modification and the addition of consonants.

The importance of understanding morphology in Arabic is also emphasized by experts who state that mastery of morphological aspects is the key to understanding syntax effectively. This shows that morphology not only plays a role in word formation, but also affects the overall structure of sentences. Thus, an in-depth study of derivative and inflectional morphology in Arabic is urgently needed to understand the dynamics of the use of this language in the context of modern linguistics.

Thomas Kuhn, in his work "The Structure of Scientific Revolutions," introduced the concept of **paradigm** and **scientific revolution**, which provides an important perspective on how technology and science are developing. According to Kuhn, science does not develop linearly through the accumulation of knowledge, but through a radical paradigm change. A paradigm is a widely accepted framework by the scientific community that governs scientific practice and understanding in a given period. When the old paradigm is no longer able to explain a new phenomenon or anomaly, there is a crisis that triggers a paradigm shift, in which a new paradigm emerges and replaces the old one. This

process shows that technological innovation is often closely related to fundamental changes in the way we understand the world.(Dwi & Sahbana , 2022)

Thomas Kuhn emphasized that the philosophy of science has a crucial role in evaluating the ethical and social impacts of new technologies, inviting scientists and technologists to critically consider the implications of the innovations they create. By understanding the dynamics of paradigm shifts, philosophy of science helps assess the contribution of technology to the well-being of society and the environment, ensuring that such progress is in line with human values. Therefore, Kuhn's thinking not only provides insight into the development of science, but also encourages critical reflection on the use of technology in a broader social context. In this context, it is important to understand how a philosophical approach can provide a framework for evaluating the analytical results generated by AI models, taking into account the ethical and epistemological aspects of their use in research. This aims to identify potential biases and limitations that may arise from the use of AI in linguistic studies. (Digaritsky & Al Anang, 2020)

Primary Data from Case Studies

This study collected primary data by applying ChatGPT to analyze Arabic and English citations, especially in morphological aspects using AI deep learning technology. The data obtained will include quote text that has been analyzed by the AI model to identify existing morphological elements. In addition, this study will also record errors or challenges that arise during the analysis process, providing a more comprehensive picture of the limitations and potential of this model in the context of morphological analysis.

After data collection, morphological analysis techniques were used to identify new patterns that emerged from the use of AI in morphological studies. Thematic analysis allows us to extract key components from the data generated by ChatGPT. The results of the analysis will be categorized based on morphological elements such as morphemes, word classes, and sentence structures. Furthermore, the data modeling stage will be carried out to evaluate the results of morphological analysis carried out by ChatGPT, including comparing the results of the analysis with traditional linguistic standards to assess the accuracy and effectiveness of AI methods. This methodological approach is expected to provide new insights into the role of AI in the study of morphology and the

contribution of philosophy of science to the understanding of these results, as well as encourage further discussion about the integration of advanced technology in linguistic research.

Results and Discussion

Result

Deep learning AI is a method that allows computers to learn from data in a way that resembles the human learning process. In the study of language morphology, *deep learning* models play an important role in understanding how words are formed and modified. When analyzing a large amount of text, such as news or stories, computers can find patterns in word structure. For example, when it finds the word "run," the computer can recognize that "ber" serves as a prefix that indicates an action, while "run" is the root word. This process allows for the identification of morphemes, the smallest units that have meaning in a word. The beauty of deep learning lies in its ability to analyze big data quickly and accurately, as well as find important patterns without human intervention. This is particularly useful in the analysis of Arabic and English, where the variation in word change through affixation is numerous. By using deep learning, we can gain new insights into the

morphological structure of language in an interactive and engaging way.

Previous research has shown that the application of deep learning algorithms such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) has significantly improved the accuracy and efficiency of language morphological analysis. This method offers a more sophisticated approach than traditional analytical techniques that often rely on existing linguistic rules. In the context of Arabic morphology, where a single word can have many forms depending on the context, these models are capable of analyzing the order of words in a sentence and identifying morphological elements with a high degree of accuracy. Research by Jelahun et al. and Prayogi & Nasrullah also highlights the importance of a critical understanding of AI in cultural and social contexts, as well as how philosophy of science can provide an evaluation framework for this phenomenon. Thus, the integration of deep learning in the study of morphology not only improves our understanding of word formation but also accelerates the process of linguistic learning, making it a highly effective tool in language research and education. (Jelahun et al., 2021) (Prayogi & Nasrullah, 2024)

This research aims to 1.) explore and analyze new ways in which artificial intelligence (AI), particularly deep learning engineering models, can be used to study language morphology. By leveraging AI's ability to extract patterns from big data, we aim to 2.) understanding how the application of AI in morphological analysis not only improves efficiency and accuracy, but also opens up new insights in the scientific understanding of the structure and function of language. This research is expected to make a significant contribution to the development of a more comprehensive morphological theory, with an interdisciplinary approach that connects modern technology with the philosophy of science.

Key findings

This study shows that the application of artificial intelligence (AI) methods, especially deep learning algorithms, significantly improves the accuracy and efficiency of language morphological analysis. Using models such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM), computers can analyze the word sequence in a sentence and identify morphological elements, such as morphemes, prefixes, and suffixes, with a high degree of accuracy. For example, in

the analysis of Arabic sentences, this model is able to recognize complex changes in word forms and understand the overall sentence structure, which is very important considering the rich morphology of the Arabic language which has many variations in form depending on the context in which it is used.

In the context of Arabic morphology, there are two main processes that play a role in the formation of words, namely *derivative morphology* and *inflectional morphology*. Derivative morphology involves the formation of a new word from the root of a word made up of three consonants, where this process is carried out by adding affixes, both prefixes, infixes, and suffixes, which can change the meaning and lexical category of the word. For example, from the root word "K-T-B" (كتب) meaning "to write," the word "مكتبة" (maktabah) meaning "library," or "كاتب" (katib) meaning "writer" can be formed. The addition of suffixes or changes in vowel patterns results in new words with different meanings, so this process is very important in Arabic because it allows the formation of various new terms and concepts based on a single root. On the other hand, inflective morphology serves to generate grammatical variations of existing words without changing their lexical meaning. In Arabic,

inflection often involves changing the end of a word to indicate grammatical aspects such as time (past or present), number (singular or plural), and case. For example, the word "كتاب" (Luthfan & Hadi, 2019) (kitāb) which means "book," when changed to the plural form becomes "كتب" (pole). This process reflects how sentence structure and relationships between words in Arabic are greatly influenced by inflectional morphology.

With the ability to process and analyze large amounts of data, AI deep learning technology allows researchers to perform morphological analysis more quickly and efficiently. In this study, it was found that AI models can complete morphological analysis tasks that previously took days or even weeks in a matter of hours or minutes. This not only saves time but also opens up opportunities for further exploration in linguistic studies. In addition, the innovative approach to the philosophy of science provides a new context for the results of the analysis. We adopt an epistemological perspective that considers how linguistic knowledge is built through the interaction between humans and technology. By using AI as a tool, we can question the validity and reliability of the analysis results generated by AI models. This approach also encourages us to think

about the ontology of language itself—what it means to be a "word" or "morpheme" in a broader context. As such, the results of the analysis are not only seen as a technical output of the AI model but also as part of a larger philosophical discussion about how we understand language and its structures. (Tashtoush et al., 2017)

In the process of extracting *Arabic quote* data, when ChatGPT's AI deep learning model identifies morphemes in a word, we can ask: "What is the meaning of this identification? How does this change the way we understand the relationship between words in a sentence?" "Why use this kind of classification?" These questions open the space for further discussion about the role of technology in linguistic research and how it can enrich our understanding of language. It can also be with a command prompt here, the skill of using an instruction prompt to create creativity in how to learn machine will be very decisive. For example, the following transliteration and transcription commands or prompts:



Gambar 01. ChatGPT4.o Deep Learning AI

ChatGPT's analysis of errors in transcribing Latin transliterations into Arabic, particularly in the case of "al ilmu bilaa amalin kas sajari bilaa samarin" which was transcribed into "الْعِلْمُ بِلاَ عَمَلٍ كَالشَّجَرِ بِلاَ ثَمَرٍ" (al-'ilmu bilā 'amalin ka-shajari bilā thamar), can be analyzed from several perspectives, including limitations in processing transliteration and understanding of context.

Errors Occurring:

The Latin transliteration of "kas sajari" is supposed to be transcribed to "كَالشَّجَرِ" (ka-shajari), with emphasis on the letter "syin" (ش) which is pronounced like "sy" in Indonesian or "sh" in some transliteration systems. ChatGPT translates it as "كَالشَّجَرِ" (ka-shajar), omitting *syaddah* (تَشْدِيدٌ) or the emphasis on the letter "syin". This changes the meaning of the word.

Errors in the process of transliteration from Latin to Arabic can be caused by several factors. First, limitations in processing transliteration arise due to existing ambiguity; a single Latin letter can often represent multiple Arabic letters, and vice versa. Although the deep learning system used by ChatGPT is quite sophisticated, it still struggles to capture these nuances without a clear context. For example, the letter "s" in "kas sajari" could refer to some Arabic letters, and without strong context,

the system might choose the most common option. In addition, the understanding of morphological and syntactic contexts is also less than optimal. In Arabic, *syaddah* has an important role in distinguishing the meaning of words; The omission of the *shaddah* in the word "الشَّجَرِ" (al-shajari) changes its meaning to be incorrect. ChatGPT does not seem to fully understand how to properly implement *syaddah*.

Furthermore, although deep learning systems like ChatGPT store numerical representations of words and characters, problems arise when the training data contains more transliteration with 'sh' for "syin," without paying attention to **syaddah** a sign in Arabic called شَدَّة (shaddah), is a sign within the Arabic alphabet that indicates that a consonant should be doubled or pressed when pronounced. This causes the model to tend to produce similar transliteration even if *syaddah* is required. Although the transformer architecture used by ChatGPT is more effective at handling longer contexts, challenges in processing transliteration and capturing the nuances of language remain. To fix this error, several solutions can be applied. First, improving training data with *syadah-rich* Arabic texts and various transliteration systems can improve accuracy. Additionally, providing

a broader context to the model, such as complete sentences or paragraphs, can help understand meaning and apply morphological and syntactic rules more precisely. Developing a special model for transliteration and performing post-processing or manual corrections by linguists can also help identify and correct errors that occur.

In conclusion, ChatGPT's error in transcribing Latin to Arabic transliterations in this example is not solely due to the memory of the letters "syin" with 'sh', but is more complex, involving limitations in processing transliteration, lack of understanding of morphological and syntactic contexts, and potential bias in training data. With improvements to training data, the use of broader contexts, and the development of more specific models, transliteration accuracy can be improved.



Figure 02. Examples of transcription in chatGPT-based (RNN) and (LSTM) with transformer. Source: youtube channel *Cangkrukan ITB* 131:

<https://www.youtube.com/watch?v=Kl2bsQPjR80>

Next is an explanation of the morphological aspects of the sentence العلم بلا عمل كالشجر بلا ثمر:

1. Science (Al-'Elm):

- **al-**: The definite article (ال) indicating definiteness or specificity.
- **'ilm**: A noun (masdar) meaning "knowledge" or "science." Its root is ع-ل-م, which signifies knowing or understanding.

1. None (bila):

- **bi-**: A preposition meaning "with" or "without."
- **la**: A negation particle meaning "no" or "without," creating a sense of absence.

2. عمل ('deeds'):

- A noun meaning "action" or "deed." Its root is ع-م-ل, which conveys the sense of working or doing.

3. Kalashzar (Ka-as-Caesar):

- **ka-**: A particle used for analogy or comparison, meaning "like."
- **al-syajar**: A noun (masdar) meaning "tree." Its root is س-ج-ر.

ش-جر, associated with trees or plants.

4. **None (bila):**

- As explained before, it means "without."

5. **ثمر (you can):**

- A noun meaning "fruit." Its root is ثمر, which refers to yielding or producing fruit.

Morphological Analysis:

- العلم and الشجر are definite nouns introduced by **al-**, indicating that they are specific or known entities.
- عمل and ثمر are indefinite nouns, as they lack **al-**, signifying generality or non-specificity.
- The particle **لا** functions as a combination of a preposition and negation, modifying the following noun to express absence.
- The particle **كـ** introduces an analogy, linking two ideas to express similarity in meaning.

The conclusions drawn by Chat GPT from its morphological analysis:

This sentence employs nouns, particles, and analogy to convey that "knowledge without action is like a tree without fruit," illustrating the lack of benefit or productivity from something that is inherently meant to be useful.

After that, instructions are given to the chat GPT to analyze its morphological aspects into Indonesian, the results are:

After instructing ChatGPT to analyze the morphological aspects of Arabic sentences, the results of the analysis showed several important elements. First, the word العلم (al-'ilm) begins with ال(al-), which serves as the definitive article, indicating that the word is specific. The word "علم" (ilm) is derived from the root ع-ل-م, which means "to know," and in this context, it serves as a name (masdar) that indicates the concept of knowledge.

Furthermore, the word بلا (when) is made up of two parts: ب(bi-) as a preposition meaning "without" or "without," and لا(la) as a negation particle that creates the meaning of "without." This word does not undergo further derivation, but serves to express non-existence. The word عمل ('charity) comes from the root ع-م-ل, which means "to do" or "to act," and as a name, it denotes an action or deed.

The word كالشج (ka-as-shajar) contains the particle ك(ka-) which is used for comparison or analogy, meaning "like."

The word "شجر" (shajar) comes from the root ش-ج-ر, which refers to a tree or plant. Lastly, the word ثمر (tsamar) comes from the root ث-م-ر, which means "to produce" or "to bear fruit," and as a name, it indicates

the yield of a plant. This analysis provides a comprehensive overview of the morphological structure of the words in the sentence.

This sentence uses *nouns*, *particles*, and *analogies* to convey the meaning that unpracticed knowledge is like a tree that does not produce fruit, describing the absence of benefits or results of something that should be productive.

And after instructing ChatGPT to make the table in Arabic as the result is as follows:

التحليل الصرفي:

العلم و الشجر هما أسماء معرفة مقدّمة بال، مما يدل على أنهما كيانان محدّدان.
عمل و ثمر هما أسماء نكرة، حيث تفتقران إلى ال، مما يدل على العمومية أو عدم التخصيص.
تعمل أداة النفي بلا كتركيب يجمع بين حرف الجر والنفي، مما يعدل الاسم التالي للتعبير عن الغياب.
تُدخل أداة التشبيه ك في كلمة كالشجر تشبيهاً يربط بين فكرتين للتعبير عن التشابه في المعنى.

Table 1. Morphological analysis of ChatGPT deep learning results

الكلمة	الشرح
العلم	<p>العلم(al-'ilm):</p> <p>التخصيص</p> <p>الـ:</p> <p>الذي يدل على المعرفة أو الفهم: علم -</p>

الكلمة	الشرح
بلا	<p>بلا(bila):</p> <p>أو "بدون" -</p> <p>أداة نفي تعني "لا" أو "بدون"، مما يخلق إحساسًا بالغياب: لا -</p>
عمل	<p>عمل('amal):</p> <p>اسم يعني "الفعل" أو "العمل". جذرها ع-م-ل، الذي يوحي بمعنى العمل أو الفعل -</p>
كالشجر	<p>كالشجر(ka-as-syajar):</p> <p>مثل "ك" -</p> <p>تستخدم للتشبيه، تعني "شجرة". جذرها ش-ج-ر، المرتبط بالأشجار أو النباتات: الشجر -</p>
بلا	<p>بلا(bila):</p> <p>"كما هو موضح سابقًا، تعني "بدون" -</p>
ثمر	<p>ثمر(tsamar):</p> <p>اسم يعني "الثمرة". جذرها ث-م-ر، الذي يشير إلى الإنتاج أو الإثمار -</p>

In the context of using artificial intelligence (AI) and deep learning to analyze the above language morphology, Immanuel Kant's philosophy of science thought provides an interesting framework for understanding how we acquire knowledge and how technology can play a role in the process. Kant argued that human knowledge is the result of a synthesis between two elements: a priori and aposterior. The apriori element is the knowledge that is already in our mind before we experience something, while the aposterioris element is the knowledge that we acquire through experience. In the context of AI, deep learning algorithms can be thought of as tools that combine these

two elements. Models such as RNNs and LSTMs learn from data (aposterious) but are also built on mathematical and logical (aprioric) principles that have been defined by researchers and programmers. (Dinata, 2021)

When we use AI to analyze language morphology, we are not only relying on existing data, but also leveraging pre-designed structures and algorithms. This reflects Kant's view that knowledge comes not only from sensory experience, but also from the way we understand and process that information. As such, AI can help expand our understanding of language in a more systematic and structured way.

Kant also emphasized the importance of ratio in shaping knowledge. Ratio is our ability to draw conclusions and make arguments based on the data we have. In this case, AI serves as a tool that allows us to analyze linguistic data in more depth and generate new insights. For example, when a deep learning model analyzes words in a sentence, it uses ratios to understand the relationships between those words and generate more precise morphological interpretations. (Dahlan, 2009)

However, Kant also reminded that knowledge has limits. He argued that although science has power in explaining world phenomena, it remains limited to

empirical objects and the way we see them.

In the context of using AI, this means that while deep learning models can provide accurate analysis, the results still depend on the quality of the data provided and how the model is built. In other words, the results of AI analysis must always be tested and validated in order to be considered legitimate knowledge. With Kant's philosophical approach, it can be seen that the use of AI in the study of language morphology is a dynamic process in which knowledge is built through the interaction between data (aposterious) and algorithms and pre-existing principles (aprioric). (Patrick Gardiner, 2020)

Discussion

Interpretation of Results in the Context of Epistemology and Ontology

The analysis carried out by ChatGPT of Arabic quotes regarding " العلم بلا عمل كالشجر " can be understood in the framework of epistemology, which deals with the study of knowledge and the way we acquire it. In this context, the use of deep learning algorithms such as RNN and LSTM shows that AI models are not only capable of analyzing linguistic data with high accuracy, but also provide new insights into the structure of language. By utilizing this technology, we can systematically expand

our comprehension capacity towards the morphology of the Arabic language. From Kant's epistemological perspective, the integration of AI in the study of morphology can be seen as a synthesis between aperiostic knowledge, which includes the structure and rules of language, as well as aposterioris knowledge obtained from text analysis. AI models learn from existing data while relying on established principles, showing that linguistic knowledge is not only sourced from first-hand experience but also from the way we process information through technology. (Noorhayati, 2021) (Nabila et al., 2023)

Epistemology focuses on how knowledge is acquired and validated; Traditional approaches in morphology studies often rely on manual analysis and in-depth linguistic descriptions, while AI-based approaches utilize algorithms to quickly analyze big data, identifying morphological patterns that may have been missed. On the other hand, ontology is concerned with the classification and relationships between categories of words; Traditional approaches tend to assign rigid grammatical categories, while AI-based methods can explore new relationships between morphological forms without such limitations. By comparing these two approaches, we can see that the

integration between the depth of qualitative analysis and the speed of quantitative analysis can result in a more comprehensive understanding of language morphology, enrich the academic literature and encourage further discussion regarding research methodologies in linguistics.

In the context of ontology, the results of AI analysis challenge traditional views of language structure. AI's ability to identify new patterns and morphological relationships that may not have been seen before invites us to question word definitions, morphemes, and sentence structures. This process opens up space for new thinking about what "language" means and how we understand it in the context of learning the language of the Qur'an or the interpretation of other language texts more broadly. Thus, the analysis of the quotations not only provides technical results from AI models but also contributes to a larger philosophical discussion regarding how technology shapes our understanding of language and linguistic reality as a whole. This research is expected to make a significant contribution to our understanding of the role of AI in morphological studies as well as its philosophical implications, prompting further discussions about the integration of advanced technologies in linguistic

research.(Hakkoum & Raghay , 2015)(Gil & Martin-Bautista, 2014)

Comparison between Traditional Approach and AI-Based Approach

When comparing traditional approaches in morphology studies to AI-based approaches, some striking differences emerge. Traditional approaches often rely on manual analysis by linguists who use existing grammatical rules and linguistic theories. This process can be very time-consuming and sometimes results in subjective interpretations.(Sibonghanoy Groenewald et al., n.d.)

On the other hand, AI-based approaches offer significant novelty. By using deep learning models, morphological analysis can be done automatically and quickly. These models are capable of processing large amounts of data without the need for direct human intervention. For example, when analyzing Arabic or English news texts, the AI can quickly recognize morphemes, word classes, and word shape changes based on patterns it has learned from previous data.

The advantage of this new method lies in its ability to capture the nuances of more complex language and identify relationships between words in the context of sentences. For example, an AI model can

recognize that the phrases "tree without fruit" and "science without charity" have different meanings depending on the context of the sentence—something that manual analysis may find difficult to do without understanding the entire context.

Nevertheless, it is important to remember that while AI-based approaches offer many advantages, the results of the analysis must still be validated. The quality of the data used to train the model greatly affects the accuracy of the results. Therefore, collaboration between linguists and AI technology is essential to ensure that the results of the analysis are not only accurate but also linguistically relevant. This is where the mastery of philosophy of science and linguistics for technology users continues to grow rapidly.

Research Limitations

Although this study provides new insights, there are some limitations that need to be noted. One of them is the limitations in the data used to train AI models. The quality and diversity of data greatly affect the results of the analysis. If the data used is not representative or has a certain bias, then the results obtained will also be affected by these factors.

In addition, challenges in applying new methods also arise from the complexity of the deep learning algorithm itself. Although models such as RNNs and LSTMs are very powerful at analyzing sequential data, they can also be difficult to interpret. This means that while the results of the analysis may be accurate, understanding how the model reaches those conclusions can be challenging.

Conclusion

The conclusion of this study shows that good qualitative research characteristics are very important to produce valid and useful findings. First, researchers must use appropriate procedures in obtaining data, ensuring that the data collection method is in accordance with the assumptions and characteristics of the qualitative approach. The study focuses on one key issue, namely the application of artificial intelligence (AI) in language morphological analysis, which allows researchers to delve deeper into the interaction between technology and linguistics.

Furthermore, the study should include detailed methods and appropriate approaches in data collection and analysis. In this context, the use of deep learning models such as Recurrent Neural Networks (RNN) and Long Short-Term Memory

(LSTM) allows for more accurate and efficient morphological analysis. By analyzing the data through multiple levels of analysis separation, researchers can identify new patterns in language structure that may not be visible with traditional methods. This is in line with the recommendations of previous research that suggest that the integration of modern technology in the study of linguistics can provide new insights into morphemes and word structures.

Finally, the researcher must write the report persuasively so that the reader can experience the same experience as the research results. With an interdisciplinary approach that connects AI with the philosophy of science, this research not only enriches our understanding of morphology but also opens up opportunities for further discussion about the impact of technology on science. Thus, this research contributes to the development of modern linguistic theories and encourages further exploration of the interaction between advanced technologies and the study of language.

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