

The Potential Benefits and Limitations of Artificial Intelligence Technology Used in Oracle-Bone Studies

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Abstract

This paper discusses the potential benefits and limitations of AI technologies employed in oracle-bone studies. The first section introduces the author's relationship with Generative AI in educational and scholarly contexts, and the rationale for choosing this topic. It also provides a detailed description of the AI tool (ChatGPT) and the prompts used to create the article. The second section is the article entirely generated by ChatGPT on the AI technologies employed in oracle-bone studies. The last section is a critical reflection on the process of generating the article with ChatGPT. It includes an assessment of the strengths and weaknesses of AI-generated articles, emphasizing their implications for scholarship and learning. Scholars must develop a discerning awareness of the advantages and disadvantages of AI. The primary role of human educators in education should not be diminished, and the secondary role of technology, no matter how sophisticated it becomes, should not be overstated.

1. Introduction

Artificial intelligence (AI) refers to the simulation of human intelligence in machines or computer systems, capable of performing tasks that would typically require human intelligence (OpenAI 2023). AI technology has become an increasingly transformative force across all domains, and education is no exception (Chen et al. 2020, Baidoo-Anu & Ansah 2023, Bozkurt et al. 2023, Huang et al. 2023). As a scholar and educator specializing in writing systems and teaching Chinese to speakers of other languages (TCSOL), the author's work and research have been significantly influenced by the development of AI technology. With regard to TCSOL, AI technologies provide both teachers and learners with more personalized, interactive and efficient experiences. With respect to research on writing systems, the author is now working on a bilingual e-dictionary of oracle-bone inscriptions (OBI), incorporating AI image recognition technology. The main reason for undertaking this project (the OBI DICT) is that existing oracle-bone dictionaries are notably outdated and insufficient for the demands of contemporary scholarship. There is an urgent need for the creation of an updated dictionary that can better incorporate the latest research findings. Moreover, the development of online databases has made oracle-bones more accessible to researchers worldwide. However, effectively utilizing these digital resources requires a high level of proficiency in the Chinese language, presenting a challenge to both the general public interested in oracle-bones and students in the early stages of their study. In view of this, the

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oracle-bone signs will be searchable by three modes in the OBI DICT: (1) classical or modern Chinese, Pinyin or English through the search engine, (2) image (allowing users to upload pictures or take photos), and (3) handwriting input. These methods will greatly reduce the difficulty of searching and learning, and increase the audience for oracle-bone learning and research.

Recent development of online oracle-bone databases and the application of AI technologies, such as machine learning, have opened up new avenues for oracle-bone research. However, there is no comprehensive review article in this aspect. Therefore, the topic on the potential benefits and limitations of AI technologies employed in oracle-bone studies is chosen for the AI-generated paper, to provide a comprehensive and critical review for those interested in this aspect. Moreover, employing a generative AI tool to produce this article can also help to a certain extent in understanding the tool's grasp of oracle-bone knowledge and its potential to assist learners in their study of oracle bones. Generative AI is a subfield of AI that refers to systems capable of generating new and original content, such as text and images (OpenAI 2023). A good example is the GPT (Generative Pre-trained Transformer) models developed by OpenAI, which are particularly renowned for their ability to generate human-like text. ChatGPT is a chatbot that is trained on the GPT language model. It was first launched on November 30, 2022. ChatGPT enables conversational interactions with humans, offering various options for desired length, style, level of detail, and language. OpenAI has released multiple versions of GPT models. GPT-4, the most recent and advanced version, was released on March 14, 2023. It is available for premium ChatGPT users under the commercial name "ChatGPT Plus," costing \$20 per month. The paper in the next section was generated by ChatGPT, based on GPT-3.5. I chose ChatGPT 3.5 because anyone can sign up for an account and have free access to it, making it especially affordable for students. The prompts used for producing the paper are as follows:

- (1) As a scholar working on early Chinese writing, you are in the process of preparing an academic article in the field of AI technology and oracle-bone studies. Please write an overview about oracle-bone inscriptions as well as AI technologies used in oracle-bone research. Please present this overview in ca. 1000 words and references should be listed at the end of the article.
- (2) Please provide an analysis of the primary AI technologies used in oracle-bone studies. This analysis should include two main sections: (1) the basic information of these AI technologies, and (2) a critical evaluation of their strengths and weaknesses. Please present this analysis in ca. 1000 words and references should be listed at the end of the article.
- (3) Building upon the analysis, please provide recommendations for the future applications of AI technologies in oracle-bone studies. Please present these recommendations in ca. 1000 words and references should be listed at the end of the article.

2. AI Generated Position Paper

2.1 Introduction

The study of oracle-bone inscriptions, a vital component of China's ancient cultural heritage, has witnessed a transformative shift in recent years with the integration of artificial intelligence (AI) technologies. Oracle-bone inscriptions, etched on turtle shells and animal

bones during the Shang and Zhou dynasties (c. 1600–1046 BCE) in ancient China, represent the earliest known form of systematic Chinese writing. These inscriptions provide a unique glimpse into the socio-political and religious aspects of this early civilization, shedding light on divination practices and administrative record-keeping. However, deciphering oracle-bone inscriptions is a complex and labor-intensive task, and this is where AI technologies have found their niche, revolutionizing the field of oracle-bone studies.

2.1.1 Oracle-Bone Inscriptions: A Historical Overview

Oracle-bone inscriptions, known as "Jiaguwen" (甲骨文) in Chinese, are an invaluable historical and linguistic resource. They primarily consist of inscriptions found on tortoise shells and animal scapulae, which were used for divination and record-keeping during the Shang and early Zhou dynasties. These inscriptions have been unearthed at various archaeological sites in China, most notably at Yinxu (modern-day Anyang), the ancient capital of the Shang dynasty. The primary purpose of oracle-bone inscriptions was divination. Shang dynasty diviners heated the bones or shells until they cracked, and the resulting patterns were believed to provide insight into future events. This divination practice was intricately connected to the Shang kings' decision-making process, and the inscriptions were typically brief but contained crucial information about topics such as weather, sacrifices, and war. In addition to their significance for divination, oracle-bone inscriptions served as administrative records. They document a range of activities, including offerings to ancestors, livestock counts, and even the construction of royal tombs. This administrative aspect of oracle-bone inscriptions provides essential historical and sociopolitical insights into Shang society.

2.1.2 Deciphering Oracle-Bone Inscriptions: The Challenge

The decipherment and interpretation of oracle-bone inscriptions present a formidable challenge to scholars. Several factors contribute to this challenge:

1. **Complex Characters:** Oracle-bone characters are archaic and highly stylized, which makes them significantly different from modern Chinese characters. This linguistic gap requires specialized knowledge and expertise.
2. **Limited Context:** Oracle-bone inscriptions are typically brief and lack explicit context, making it difficult to determine the exact meanings and purposes of the inscriptions.
3. **Varying Writing Styles:** Different artisans and periods produced oracle-bone inscriptions with varying calligraphic styles, further complicating the interpretation process.
4. **Damage and Preservation:** Many oracle-bone fragments are damaged, making it challenging to reconstruct the inscriptions fully. Preservation issues also affect the clarity of the characters.
5. **Evolving Language:** The evolution of the Chinese language over millennia further complicates the study of oracle-bone inscriptions, as some characters may have evolved significantly.

2.1.3 AI Technologies in Oracle-Bone Studies

Artificial intelligence technologies have opened up new possibilities for the study of oracle-bone inscriptions. They assist scholars in the process of decipherment, data analysis, and linguistic comparison. The following AI technologies have been instrumental in oracle-bone research:

1. **Image Recognition:** AI-driven image recognition technology helps in the identification and categorization of oracle-bone characters. Machine learning algorithms can be trained on a large dataset of oracle-bone characters to recognize and classify them accurately. This technology is particularly valuable for reading characters that are faint, damaged, or in unconventional calligraphy.
2. **Character Reconstruction:** AI-powered character reconstruction algorithms are capable of restoring damaged or fragmented oracle-bone inscriptions. By analyzing patterns and context, these algorithms can suggest missing parts of inscriptions and improve the overall readability of the text.
3. **Automated Transcription:** AI transcription tools convert oracle-bone characters into modern Chinese text. These tools take into account the archaic nature of oracle-bone script and generate readable transcriptions that facilitate further analysis.
4. **Semantic Analysis:** AI technologies equipped with natural language processing capabilities aid in deciphering the meaning and context of oracle-bone inscriptions. These tools can identify key terms, word associations, and provide interpretations based on linguistic and historical knowledge.
5. **Comparative Linguistics:** AI-driven comparative linguistics tools analyze oracle-bone inscriptions in relation to other early Chinese texts and languages, enabling researchers to track the evolution of Chinese characters and language over time.
6. **Data Integration:** AI technologies assist in aggregating and analyzing large datasets of oracle-bone inscriptions, facilitating comprehensive studies of these ancient texts.

2.1.4 Impact of AI on Oracle-Bone Studies

The integration of AI technologies in oracle-bone studies has had a profound impact on various aspects of research in this field:

1. **Enhanced Decipherment:** AI technologies have improved the accuracy and speed of decipherment, allowing researchers to work with a more extensive corpus of inscriptions and uncover new insights.
2. **Expanded Knowledge:** AI-assisted analysis has led to the identification of previously unknown characters, words, and phrases in oracle-bone inscriptions, expanding our understanding of the language and culture of the Shang dynasty.
3. **Improved Interpretation:** AI's semantic analysis capabilities help researchers uncover the meanings and context of oracle-bone inscriptions, shedding light on the ancient society's practices and beliefs.
4. **Preservation and Restoration:** AI algorithms have contributed to the preservation and restoration of damaged inscriptions, making previously unreadable texts accessible for study.
5. **Cross-Comparisons:** AI has enabled researchers to make cross-linguistic and cross-temporal comparisons, connecting oracle-bone inscriptions with other early Chinese texts and languages to trace the evolution of Chinese writing.

The study of oracle-bone inscriptions is an essential field for understanding the early history of Chinese writing, culture, and society. The integration of AI technologies into this field has revolutionized the way scholars approach the decipherment, interpretation, and analysis of oracle-bone inscriptions. These AI tools have improved the accuracy and efficiency of research, expanding our knowledge of the Shang dynasty and early Chinese civilization. As AI continues to advance, it is expected that oracle-bone studies will benefit even more from these technologies, further enriching our understanding of China's ancient past.

2.2 Analysis

2.2.1 Basic Information of AI Technologies in Oracle-Bone Studies

Artificial intelligence (AI) technologies have become increasingly integral to the study of oracle-bone inscriptions, providing innovative solutions to longstanding challenges in decipherment, interpretation, and data analysis. Here, we provide an overview of several key AI technologies utilized in oracle-bone studies, highlighting their basic information, capabilities, and applications.

1. Image Recognition:

- **Basic Information:** Image recognition is a subfield of computer vision that uses machine learning algorithms to identify and categorize objects within images. In oracle-bone studies, image recognition is employed to recognize and classify oracle-bone characters from scanned or photographed inscriptions.

- **Capabilities:** Image recognition AI models are trained on a vast dataset of oracle-bone characters and can identify these characters even when they are faint, damaged, or written in diverse calligraphic styles. This technology can also categorize characters by their form and style.

- **Applications:** Image recognition assists scholars in the initial process of identifying and cataloging characters within oracle-bone inscriptions, reducing the time required for manual character recognition.

2. Character Reconstruction:

- **Basic Information:** Character reconstruction AI involves the use of algorithms to restore damaged or fragmented characters within oracle-bone inscriptions. These algorithms analyze patterns and context to suggest missing parts of inscriptions.

- **Capabilities:** Character reconstruction AI can improve the overall readability of inscriptions by filling in gaps or deciphering characters that have been partially eroded or damaged over time.

- **Applications:** This technology aids in preserving and making sense of oracle-bone inscriptions, allowing researchers to work with texts that might have been otherwise unreadable.

3. Automated Transcription:

- **Basic Information:** Automated transcription AI converts oracle-bone characters into modern Chinese text. These tools take into account the archaic nature of oracle-bone script and generate readable transcriptions.

- **Capabilities:** Automated transcription tools are designed to handle the unique characteristics of oracle-bone inscriptions, ensuring that the resulting transcriptions reflect the original content as accurately as possible.

- **Applications:** Researchers benefit from automated transcriptions as they provide a readable version of oracle-bone inscriptions, enabling further linguistic and semantic analysis.

4. Semantic Analysis:

- **Basic Information:** Semantic analysis is a natural language processing (NLP) technique that helps decipher the meaning and context of oracle-bone inscriptions. AI technologies with NLP capabilities can identify key terms, word associations, and provide interpretations based on linguistic and historical knowledge.

- **Capabilities:** Semantic analysis AI can uncover the meanings and context of oracle-bone inscriptions, assisting in the interpretation of these ancient texts.

- Applications: Researchers use semantic analysis to gain insights into the societal practices, beliefs, and events documented in oracle-bone inscriptions, enriching our understanding of the Shang dynasty.

5. Comparative Linguistics:

- Basic Information: Comparative linguistics AI tools analyze oracle-bone inscriptions in relation to other early Chinese texts and languages, enabling researchers to track the evolution of Chinese characters and language over time.
- Capabilities: These AI tools assist in identifying linguistic connections, tracking language evolution, and uncovering the historical context of oracle-bone inscriptions.
- Applications: Comparative linguistics AI contributes to a deeper understanding of the evolution of the Chinese language, connecting oracle-bone inscriptions with other early texts and languages to trace the development of writing in ancient China.

6. Data Integration:

- Basic Information: Data integration AI tools help in aggregating and analyzing large datasets of oracle-bone inscriptions, enabling comprehensive and systematic studies of these ancient texts.
- Capabilities: Data integration AI can handle vast amounts of data, ensuring that researchers have access to a wide range of inscriptions for analysis and comparison.
- Applications: Scholars use data integration AI to conduct large-scale, data-driven studies, enabling them to draw broader conclusions and patterns from the corpus of oracle-bone inscriptions.

2.2.2 Critical Evaluation of Strengths and Weaknesses

Each of these AI technologies in oracle-bone studies comes with distinct strengths and weaknesses that must be considered:

1. Image Recognition:

- Strengths:
 - Rapid character recognition: Image recognition AI excels at quickly identifying oracle-bone characters, saving considerable time for researchers.
 - Consistency: It ensures consistent categorization and classification of characters.
 - Adaptability: The technology can be trained to handle various calligraphic styles and levels of damage.
- Weaknesses:
 - Limited to visual data: Image recognition does not provide interpretations or meanings; it is limited to character identification.

2. Character Reconstruction:

- Strengths:
 - Restoration of damaged inscriptions: Character reconstruction AI is invaluable for recovering and restoring characters in eroded or fragmented inscriptions.
 - Enhanced legibility: It improves the legibility of inscriptions, aiding in the subsequent stages of analysis.
- Weaknesses:
 - Interpretation not guaranteed: Character reconstruction may not always provide the correct interpretation of characters, especially in cases of heavy damage.

3. Automated Transcription:

- Strengths:
 - Readable output: Automated transcription AI generates modern Chinese text from oracle-bone inscriptions, facilitating further linguistic and semantic analysis.
 - Accuracy: When properly configured, it can provide accurate transcriptions.
- Weaknesses:
 - Limited to textual conversion: It does not delve into the interpretation or context of inscriptions.

4. Semantic Analysis:

- Strengths:
 - Contextual insights: Semantic analysis AI helps researchers uncover the meaning and context of oracle-bone inscriptions, enriching our understanding of ancient Chinese society.
 - Interpretation assistance: It assists in interpretation, providing a basis for historical and cultural analysis.
- Weaknesses:
 - Contextual limitations: The success of semantic analysis depends on the quality and quantity of contextual information available for analysis.

5. Comparative Linguistics:

- Strengths:
 - Linguistic connections: Comparative linguistics AI aids in tracing the evolution of the Chinese language and connecting oracle-bone inscriptions with other early texts and languages.
 - Historical context: It provides valuable insights into the historical and cultural context of oracle-bone inscriptions.
- Weaknesses:
 - Data dependency: The effectiveness of comparative linguistics AI relies on the availability of relevant linguistic datasets for comparison.

6. Data Integration:

- Strengths:
 - Comprehensive analysis: Data integration AI allows for large-scale studies and the analysis of extensive datasets.
 - Pattern recognition: It facilitates the identification of broader linguistic and sociocultural patterns.
- Weaknesses:
 - Quality control: Data integration may require manual curation to ensure the quality and accuracy of the data.

In conclusion, AI technologies have significantly enhanced the field of oracle-bone studies by addressing key challenges in decipherment, interpretation, and data analysis. While each technology offers unique strengths, they are most effective when integrated into a cohesive workflow. As AI continues to advance, it holds the potential to further revolutionize our understanding of oracle-bone inscriptions, providing new insights into the Shang dynasty and early Chinese civilization.

2.3 Discussion

The integration of artificial intelligence (AI) technologies in oracle-bone studies has already shown remarkable potential for advancing our understanding of these ancient inscriptions. To harness the full potential of AI and to address the challenges and limitations identified in the analysis, here are recommendations for the future applications of AI technologies in oracle-bone studies:

1. Enhance Training Data Quality

To improve the accuracy and reliability of AI technologies, there should be a concerted effort to enhance the quality of training data. This entails:

- Ensuring the authenticity and integrity of the oracle-bone inscriptions in the training dataset.
- Addressing biases or inaccuracies in the data.
- Expanding the dataset to include a broader range of oracle-bone inscriptions, covering different periods, locations, and styles.

Collaboration between archaeologists, linguists, and AI specialists is crucial in this regard. Academic institutions and museums with extensive collections of oracle-bone inscriptions should be involved in curating high-quality datasets.

2. Interdisciplinary Collaboration

Oracle-bone studies are inherently interdisciplinary, encompassing history, linguistics, archaeology, and computer science. Future applications of AI technologies should encourage collaboration between experts from these diverse fields. Interdisciplinary research teams can work together to design AI algorithms, validate results, and provide necessary context for the AI analysis.

3. Semantic Grounding

To overcome the variability and potential for multiple interpretations, AI technologies used for semantic analysis should be equipped with a "semantic grounding" approach. This approach involves anchoring interpretations in established historical and cultural contexts. Researchers can develop comprehensive databases of ancient practices, rituals, and beliefs to enhance AI's understanding of the inscriptions. Semantic grounding should also consider the evolution of language and the diachronic changes in meanings of characters.

4. User-Friendly Interfaces

As AI technologies become more integrated into oracle-bone studies, the development of user-friendly interfaces is essential. These interfaces should cater to a broad audience, including researchers, students, and enthusiasts. Users should be able to interact with AI-driven tools without needing a deep understanding of AI or oracle-bone inscriptions. User-friendly interfaces can include online platforms or software with intuitive features, such as image recognition and automated transcription, making the inscriptions more accessible to a wider audience.

5. Leverage Advanced Data Analysis Techniques

AI technologies should not be limited to basic pattern recognition. Researchers should explore advanced data analysis techniques, including machine learning and data mining, to uncover hidden patterns and correlations within oracle-bone inscriptions. These techniques can help identify trends in language usage, calligraphy styles, and sociocultural changes over time.

6. Evolution of Chinese Language Models

AI technologies can benefit from the continuous development of Chinese language models. Language models like GPT-3, BERT, and future iterations can be fine-tuned specifically for oracle-bone inscriptions. This would enable more accurate transcriptions and interpretations, especially considering the archaic nature of the script.

7. Enhanced Character Reconstruction

Character reconstruction AI algorithms should be developed with improved accuracy and adaptability. The use of probabilistic models and advanced algorithms can help reduce errors in restoration. Additionally, algorithms should be designed to handle extensive damage and complex cases, providing a more robust solution for deciphering oracle-bone inscriptions.

8. Multilingual Datasets for Comparative Linguistics

Comparative linguistics can benefit from an expansion of multilingual datasets. Researchers should aim to compile and digitize ancient texts and inscriptions from other East Asian languages and scripts of the same period. This will enable more comprehensive comparative analyses, shedding light on linguistic exchanges and cultural influences.

9. Public Engagement and Education

The integration of AI technologies in oracle-bone studies presents an opportunity to engage the public and educate them about China's ancient history. The development of educational materials, such as online courses or interactive exhibits, can foster interest in oracle-bone inscriptions and AI applications. Collaboration with museums and cultural institutions can facilitate the creation of exhibitions and workshops that highlight the use of AI in deciphering ancient scripts.

10. Ethical Considerations and Accountability

The use of AI technologies in the study of cultural heritage, including oracle-bone inscriptions, raises ethical questions regarding data ownership, preservation, and access. It is important to establish ethical guidelines and accountability mechanisms to ensure responsible use of AI in these studies. Collaboration with indigenous communities and respecting their concerns about the digitization and dissemination of cultural heritage materials is crucial.

11. Long-Term Sustainability

The integration of AI technologies should consider long-term sustainability. This includes not only maintaining AI algorithms and databases but also preserving the oracle-bone inscriptions themselves. Institutions and organizations involved in oracle-bone studies should prioritize the conservation and digitization of physical inscriptions to ensure their availability for future generations.

12. International Collaboration

Oracle-bone inscriptions are not limited to China; similar inscriptions have been discovered in other East Asian countries. International collaboration in the application of AI technologies to these inscriptions can foster a global understanding of early Chinese writing and its cultural significance. Joint research efforts, data sharing, and collaborative projects can be established to facilitate a broader exploration of oracle-bone inscriptions.

The future applications of AI technologies in oracle-bone studies hold great promise for advancing our understanding of ancient Chinese culture, language, and history. To realize this potential, it is imperative to address the identified challenges and implement the recommendations provided. Enhancing data quality, interdisciplinary collaboration, semantic

grounding, user-friendly interfaces, advanced data analysis techniques, and ethical considerations are key components of a successful integration of AI in oracle-bone research. With these advancements, we can expect to uncover more of the rich historical and cultural tapestry hidden within oracle-bone inscriptions and make this invaluable heritage more accessible and meaningful to both scholars and the general public.

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3. Critical Reflection

Although it is clearly stated in the prompt that ChatGPT should generate an article of 2000-3000 words, after many attempts, it was found that the length of the text generated by ChatGPT is only ca. 700-1000 words. Since the target article is divided into three parts: introduction, analysis, and discussion, three prompts were used to generate this article, totaling ca. 3,000 words. There were some minimal formatting edits made by the author, but for the most part, the article is copied and pasted directly from ChatGPT. The time it took to generate these three parts with ChatGPT was as follows: 25 seconds, 27 seconds, and 22 seconds, respectively.

As for references, if the requirement for references is not indicated in the prompt, the text produced by ChatGPT, in most cases, will not include references. Even though the prompt specified that references need to be provided at the end of the article, ChatGPT still failed to include references when generating the second part. Only four references are provided in the remaining two parts. Among them, only Keightley (1978) is a real reference, while the other three do not exist. With regard to the content, the two sections, which introduce the basic information of oracle-bones and its decipherment, are relatively reliable. But these are simple and general information, and ChatGPT does not do much better than encyclopedia websites such as Wikipedia. It would be better, if the latest and influential research in these aspects, such as Shaughnessy (1997, 2018), Wang & Yang (1999), Bottéro (2004), Wang H. (2014), and Wang Y. (2015), are included. In terms of AI technologies employed in oracle-bone studies, AI-driven image recognition is of great importance. According to Liu Y. et al. (2023), over one hundred papers on AI-driven image recognition of oracle bones have been published in recent years. ChatGPT only provides a very brief description. The methods employed in these research, such as SSD (Meng et al. 2019), YOLOv4 Model (Wang N. 2020), CNN (Guo et al. 2015), and DCNN (Liu G. et al. 2021), should be introduced here, along with a discussion of the primary research results. The same issue arises in the discussion of other AI technologies. Moreover, no relevant research can be found on most AI technologies, such as semantic analysis and comparative linguistics, which have mentioned in the ChatGPT-generated text. It appears that ChatGPT may have provided inaccurate information in this section, possibly drawing from general AI technology or AI applications

in other language and writing research. As a result, the content lacks reliability. Similarly, the subsequent analyses of the advantages and disadvantages of these AI technologies, as well as recommendations for future technologies employed in oracle-bone studies, suffer from the same problem. These discussions are all grounded in the erroneous information provided. For example, it discusses the strengths and weaknesses of semantic analysis in 2.2.2, but the strengths, such as contextual insights and interpretation assistance, and the weaknesses, like contextual limitations, that it describes, are not reliable. This is because the premise on which this discussion is based does not exist. As is mentioned above, no relevant research has been done on the AI-powered semantic analysis of oracle-bone inscriptions. Furthermore, these discussions rely on the general characteristics of AI technology rather than actual oracle-bone research. From the author's perspective, producing a lengthy text with a generative AI like GPT may not be challenging, but crafting a lengthy and trustworthy scholarly piece with such a technology is far from easy.

The application of AI has breathed new life into various disciplines, including oracle-bone learning and research. On the one hand, it has opened up opportunities for interdisciplinary research, such as the intersection of oracle-bone studies and machine learning. AI technology has undeniably benefited the author's research in numerous ways. For instance, AI image recognition technology has enabled the author to engage in interdisciplinary research, with the compilation of the OBI DICT serving as a prime example. Such a dictionary will also enhance the study and research of oracle bones while expanding the audience for this field of study. On the other hand, in the current situation, generative AI's role in aiding learning and scholarly research remains somewhat restricted. When it comes to answering basic and general questions, such as 'What is an oracle bone?', ChatGPT performs reasonably well. However, when faced with more intricate academic inquiries, ChatGPT's proficiency is notably lacking. What's more, it may even produce erroneous information, potentially misleading beginners. Nevertheless, generative AI can serve as a valuable assistant in academic studies, offering assistance in tasks such as outlining the typical structure of a specific type of academic article or generating ideas for writing on a particular topic. Typically, generative AI can generate this kind of information in just a few seconds, significantly enhancing the efficiency of learning and research. Although the application of AI in learning and research is an unstoppable trend, instead of unquestionably embracing AI technologies, educators must cultivate a discerning awareness of their advantages and disadvantages. When applying AI to teaching and research, educators should guide students on how to effectively use AI tools, such as ChatGPT, and how to identify the authenticity of information. It is essential to remember that the primary role of human educators in education should not be diminished, and the complementary role of technology, no matter how sophisticated it becomes, should not be overstated.

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