


Development and Effect Evaluation of Ancient Chinese Reading Comprehension System Assisted by Artificial Intelligence

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Received: February 10th, 2025 | **Accepted:** December 17th, 2025

ABSTRACT

Reading comprehension of ancient Chinese faces many challenges, including the inefficiency of traditional learning methods. Therefore, this study developed an artificial intelligence-based ancient Chinese reading comprehension assistant system that combines natural language processing technology and deep learning models to improve the automation level of ancient Chinese processing. The system adopts a hierarchical architecture: the data preprocessing layer cleans the text and realizes word segmentation, and word segmentation accuracy is improved using a bidirectional long short-term memory + conditional random field model combined with knowledge enhancement technology. With the help of the Stanza library, dependency syntax analysis is carried out, and semantic understanding is enhanced through bidirectional encoder representations from transformers fine-tuning and the incorporation of a knowledge map. Experiments show that the system has obvious advantages in the accuracy and practicality of ancient Chinese prose processing. Future work may further improve the automatic analysis of cultural metaphors through small sample learning and multi-modal fusion.

KEYWORDS

Artificial Intelligence Technology, Reading Comprehension, Ancient Chinese, System Development, Effect Evaluation

INTRODUCTION

With the inheritance and development of Chinese culture, ancient prose, an important carrier of Chinese civilization, has irreplaceable value in history, literature, and philosophy (Huang, 2021; Li, 2025). The linguistic form of ancient Chinese is quite different from modern Chinese. Its sentence structure is complex, lexical meanings are changeable, and the texts contain rich cultural background knowledge. These characteristics make the reading and understanding of ancient Chinese require high language skills and cultural literacy (Pan et al., 2021; Purcell-Gates, 2020). The traditional learning methods for ancient languages in China mainly rely on manual annotation and teacher explanation, but the traditional methods are inefficient and limited by the annotator's level and the learner's understanding ability (Li et al., 2023). Therefore, how to use modern technology to assist the reading comprehension of ancient prose has become a research topic of great significance.

In recent years, artificial intelligence (AI) technology has made remarkable progress in the field of natural language processing (NLP), the computational handling of human language, especially in

DOI: 10.4018/IJISMD.397634

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machine translation, text generation, semantic understanding, and question-answering systems (Li & Rohayati, 2025). AI technology represented by deep learning can automatically extract linguistic rules and semantic information from massive text data, realizing efficient text processing and understanding (Al-Aswadi et al., 2020; Kumari et al., 2021). In the field of ancient Chinese prose processing, the application of AI has begun to emerge. AI assistant systems can provide instant translation, semantic interpretation, and background linking, thereby lowering the learning threshold, improving the learning efficiency, and realizing the popularization of ancient Chinese language education (Chen & Macleod, 2021).

At the level of academic research, due to ancient language barriers, many precious literary works have not been fully explored and utilized. An intelligent ancient prose processing system can not only help scholars obtain textual information quickly but also support the construction of a cross-document knowledge map, providing a new methodological perspective for humanities research. Some studies have used traditional NLP techniques (e.g., word segmentation, part-of-speech tagging, and syntactic analysis) to preliminarily process ancient Chinese prose (Fan et al., 2023). Other studies have tried to apply the deep learning model to the automatic translation and semantic analysis of ancient Chinese texts (Zhang et al., 2021). However, there are still many shortcomings in existing ancient-prose processing tools.

First, the linguistic characteristics of ancient Chinese are quite different from those of modern Chinese, and the existing NLP models often perform poorly when dealing with ancient language (Sommerschild et al., 2023). Second, understanding ancient Chinese prose needs to be combined with rich cultural background knowledge, but the existing system still has much room for improvement in this regard (Zhang, 2022). Therefore, it is of great theoretical significance and application value to develop a system that can comprehensively assist the reading and understanding of ancient Chinese.

The purpose of this study is to develop an AI-based reading comprehension assistant system for ancient prose. By integrating deep learning models and structural knowledge, the system can significantly improve the accuracy and practicality of three key tasks: word segmentation, syntactic analysis, and semantic understanding. This research is devoted to providing efficient and accurate auxiliary tools for ancient Chinese reading, promoting the intelligent development of scholarship in ancient Chinese academic research.

The innovation of this study is that it goes beyond the simple application of a single technology. It creatively constructs a fusion framework in which deep learning is the core driver of language analysis, while a knowledge map provides semantic support. This framework systematically solves core problems such as inaccurate word segmentation, syntactic parsing errors, and superficial semantic understanding. Thus, it directly supports the research goal of significantly improving the automation and accuracy of ancient Chinese reading comprehension. This study provides a new attempt of AI in traditional humanities research.

This article consists of six sections. The first section explains the importance of the problem, identifies the shortcomings of the existing scheme, and establishes the necessity and goals of this study. The second section provides the theoretical and technical basis for the methodology, summarizes the gaps in existing research, and leads to the innovative methods of this study. The third section describes the overall structure of the system, datasets, and evaluation indicators. The fourth section proves whether the system has achieved the research goal by using experimental data. The fifth section analyzes the advantages and disadvantages of the system, discusses the practical significance, and points out directions for future work. Finally, the conclusion summarizes the results and evaluates the extent to which the research goals have been accomplished.

LITERATURE REVIEW

Although many digital humanities platforms provide support for research, most still lack a friendly reading environment to support in-depth interpretation of texts. Chen et al. (2019) developed an

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