Design of Error Correction System Based on Deep Learning Algorithm

You Chen
College of Foreign Studies, Guangdong University of Science and Technology, Dongguan City, Guangdong Province, 523083, China

Keywords: Artificial Neural Network Theory, Deep Learning Algorithms, Error Correction System Design, English, Syntax.

Abstract: The design of error correction system plays an important role in intelligent English grammar, but there is the problem of inaccurate error correction and positioning. The traditional neural network algorithm cannot solve the error correction system design problem in intelligent English grammar, and the effect is not satisfactory. Therefore, this paper proposes the design of English grammar error correction system based on deep learning algorithm and analyzes the design of English grammar error correction system. The purpose of this paper is to explore the common problems in English grammar learning, analyze the root causes of these problems, and put forward corresponding solutions. Through this study, we hope to provide English learners with a clearer and more systematic approach to grammar learning.

1 INTRODUCTION

In the process of English learning and application, grammatical errors are common problems. These problems not only affect the accuracy of learners' language expression, but also have a negative impact on communication effect (Tian and Jia, 2022). The purpose of this study is to explore the common English grammar problems and their analysis process, and to seek effective countermeasures to improve the quality of English teaching and learning (Hui, 2019). English grammar is an indispensable part of English learning, which regulates the organization and expression of language. However, in practical application, many English learners often encounter grammar problems, which not only affect their language fluency, but also may cause misunderstanding (Zhou, 2020). Therefore, it is of great significance to study English grammar deeply and put forward effective countermeasures for improving English learners' language level.

2 RELATED CONCEPTS

2.1 Mathematical Description of the Deep Learning Algorithm

As an important language for international communication, the correct use of English is very important for non-native speakers (Hui, 2019). The purpose of this paper is to explore the corrective strategies for common grammatical errors made by English learners, with a view to improving their grammatical accuracy and language application ability (Yang and Guo, et al. 2021). Incorrect use of tenses, such as the confusion between the present perfect tense and the simple past tense is shown in Equation (1).

$$\lim_{x\to\infty}(y_i \cdot t_{ij}) = \lim_{x\to\infty} y_{ij} \geq max(t_{ij} \div 2) \quad (1)$$

Grammatical errors are a common phenomenon in learning English as a second language or a foreign language. How to effectively identify and correct these mistakes is the key to improve the quality of English teaching and learning. This article will first analyze the common types of English grammatical errors, then explore effective corrective strategies and discuss the best practices for implementing these

Chen, Y.
Design of Error Correction System Based on Deep Learning Algorithm.
DOI: 10.5220/0013543400004664

In *Proceedings of the 3rd International Conference on Futuristic Technology (INCOFT 2025) - Volume 1*, pages 346-351
ISBN: 978-989-758-763-4

strategies. Misuse of voice leads to unclear expression of sentence meaning is shown in Equation (2).

$$max(t_{ij}) = \partial({t_{ij}}^2 + 2 \cdot t_{ij}) \succ mean(\sum t_{ij} + 4)\mathfrak{M} \quad (2)$$

Subject and predicate do not match in number or person, which leads to confusion of sentence structure.

Suppose I Misuse of tense and voice: Involving inconsistent use of tense and confusion between active and passive voice is as shown in Equation (3).

$$F(d_i) = \cap \quad \sum t_i \cap \xi \cdot \sqrt{2} \to \oint y_i \cdot 7 \quad (3)$$

2.2 Selection of Error Correction System Design Scheme

Hypothesis II Subject-predicate inconsistency: refers to the mismatch between subject and verb in person and number is shown in Equation (4).

$$g(t_i) = \ddot{x} \cdot z_i \prod F(d_i) \frac{dy}{dx} - w_i \quad (4)$$

Misuse of articles and pronouns: including the wrong choice of definite articles and indefinite articles, and the misuse of pronouns in gender, number and case as shown in Equation (5).

$$\lim_{x \to \infty} g(t_i) + F(d_i) \leq \frac{1}{2} max(t_{ij}) \quad (5)$$

Word order and sentence structure: For example, improper position of modifiers leads to ambiguity or ambiguity of sentence meaning is shown in Equation (6).

$$\sqrt{a^2 + b^2}\widetilde{g(t_\iota)} + F(d_\iota) \leftrightarrow mean(\sum t_{ij} + 4) \quad (6)$$

2.3 Analysis of the Design Scheme of the Error Correction System

Lack of adequate standard language input will lead learners to internalize wrong grammatical rules is shown in Equation (7).

$$No(t_i) = \frac{g(t_\iota)\widetilde{+F}(d_\iota)}{mean(\sum t_{ij}+4)} \frac{n!}{r!(n-r)!} \quad (7)$$

The grammatical structure of the first language (L1) may influence the learning of English (L2), and the result is shown in Equation (8).

$$Zh(t_i) = \lim_{x \to \infty} [\sum g(t_\iota)\widetilde{+F}(d_\iota)] \quad (8)$$

Inappropriate teaching methods and imprecise textbooks may lead learners to form wrong grammar knowledge is shown in Equation (9).

$$accur(t_i) = \frac{min[\sum g(t_\iota)\widetilde{+F}(d_\iota)]}{\sum g(t_\iota)\widetilde{+F}(d_\iota)} \times 100\% \quad (9)$$

Identify the types of common mistakes made by learners through tests and assignments, then the calculation of Equation (9) can be expressed as Equation (10).

$$accur(t_i) = \frac{min[\sum g(t_\iota)\widetilde{+F}(d_\iota)]}{\sqrt{b^2 - 4ac}\sum g(t_\iota)\widetilde{+F}(d_\iota) + randon(t_i)} \quad (10)$$

Learners' errors are compared with the target language standard rules, and the deviations are found out. This includes morphological errors, such as singular and plural forms of nouns, tense and voice of verbs, irregular changes and so on

2.4 Optimization strategy for error correction system design

English grammar is the foundation of English learning, and mastering grammar is very important for improving listening, speaking, reading and writing abilities (Xie, 2021). However, in the actual learning process, many learners encounter grammar problems, which not only affect their learning efficiency, but also hinder the improvement of their language application ability (Chen, 2020). Therefore, it is necessary to make an in-depth study of English grammar and divide it into (Li, 2020). English grammar is the foundation of English learning, and mastering grammar is very important for improving listening, speaking, reading and writing abilities (Gu, 2021). However, in the actual learning process, many learners encounter grammar problems, which not only affect their learning efficiency, but also hinder the improvement of their language application ability (Overseas English, 2020). Therefore, in-depth study and analysis of English grammar is of great significance for improving the overall level of English learners.

3 PRACTICAL EXAMPLES OF ERROR CORRECTION SYSTEM DESIGN

3.1 Introduction to the Design of the Error Correction System

Errors related to sentence structure, such as subject-predicate inconsistency, wrong use of passive voice, tense collocation errors and so on (Zhang and Yin, 2018). Make sure you master the basic grammar rules of English, such as the usage of nouns, verbs, adjectives, adverbs, prepositions and sentence structure. This will lay a solid foundation for learning more advanced syntax concepts is shown in Table I.

Table 1: Error correction system design requirements

Scope of application	Grade	Accuracy	Error correction system design
Error detection	I	85.00	78.86
	II	81.97	78.45
UI	I	83.81	81.31
	II	83.34	78.19
Contextual understanding	I	79.56	81.99
	II	79.10	80.11

The error correction system design process in Table 1 is shown in Figure 1.

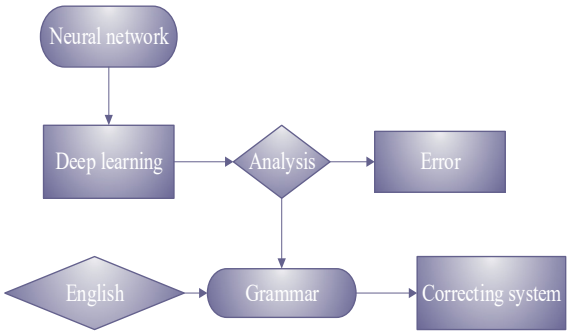

Figure 1: The analysis process of error correction system design

Reading English books, articles, newspapers and magazines can help you understand the application of English grammar in practical contexts. Observe how the authors use different sentence patterns and grammatical structures to express their views.

3.2 Error Correction System Design

Improve your English grammar ability by writing practice. Try to write some short articles or diaries, and pay attention to your grammar errors. As time goes by, you will gradually find that you make fewer mistakes in your writing is shown in Table 2.

Table 2: The overall picture of the error correction system design scheme

Category	Random data	Reliability	Analysis rate
Error detection	85.32	85.90	83.95
UI	86.36	82.51	84.29
Contextual understanding	84.16	84.92	83.68
Mean	86.84	84.85	84.40
X6	83.04	86.03	84.32
		P=1.249	

3.3 Error Correction System Design and Stability

Unclear meaning or improper use of words, including misuse of prepositions, omission or misuse of articles, etc.. Sign up for English courses or training courses can help you learn English grammar systematically. Professional teachers can provide you with personalized guidance and feedback to help you better understand complex concepts is shown in Figure 2.

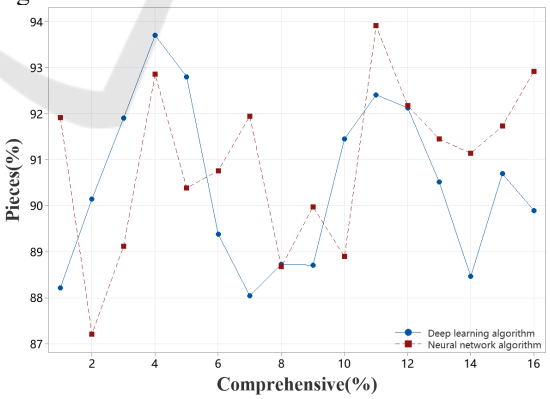

Figure 2: Design of error correction system with different algorithms

There are plenty of free and paid English learning resources on the Internet, such as tutorials, exercises, and mock tests. Use these resources for autonomous learning and evaluation. is shown in Table 3.

Table 3: Comparison of error correction system design accuracy of different methods

Algorithm	Survey data	Error correction system design	Magnitude of change	Magnitude of change
Deep learning algorithms	85.33	85.15	82.88	84.95
Neural network algorithms	85.20	83.41	86.01	85.75
P	87.17	87.62	84.48	86.97

Communicating with native English speakers or other learners can help you improve your oral skills and help you consolidate your grammar knowledge. Try to join an English corner, a language exchange partner program or a related group on an online social platform.

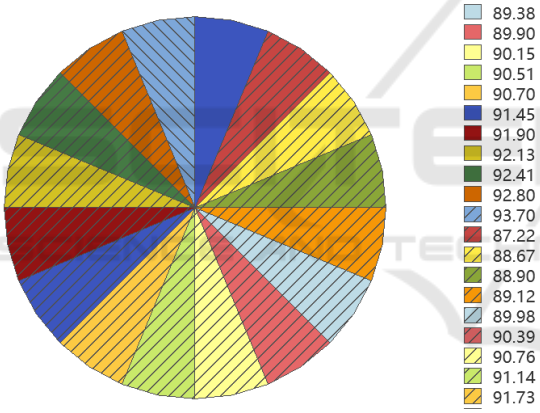

Figure 3: Design of error correction system for deep learning algorithm

Inappropriate use of language in a specific context, such as inappropriate expression of tone and politeness. Set clear learning goals and plans for yourself, and make sure to devote a certain amount of time and energy to learning English every day. Persistence in learning is one of the key factors to improve English level.

3.4 Rationality of Error Correction System Design

Learners should strengthen the study and training of basic grammar rules to ensure a deep understanding of grammar rules.

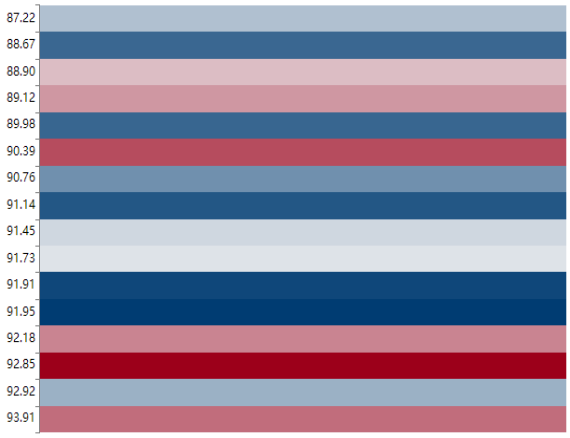

Figure 4: Design of error correction system with different algorithms

When learning grammar, learners should pay attention to applying grammar rules to the actual context in order to improve their language application ability

3.5 The Effectiveness of the Error Correction System Design

Teachers should adopt a variety of teaching methods, such as situational teaching and task-based teaching, to stimulate learners' interest and enthusiasm is shown in Figure 5 shown.

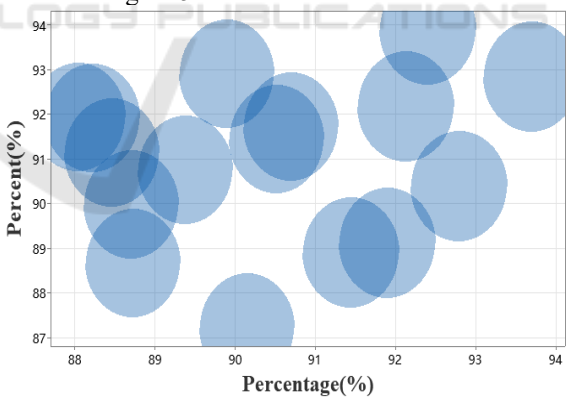

Figure 5: Design of error correction system with different algorithms

Learners should actively participate in various English practice activities, such as oral communication and writing exercises, in order to increase practical opportunities and improve their grammar application ability. is shown in Table 4.

Table 4: Comparison of the effectiveness of error correction system design of different methods

Algorithm	Survey data	Error correction system design	Magnitude of change	Error
Deep learning algorithms	82.21	85.92	84.59	82.85
Neural network algorithms	83.73	84.23	84.41	83.55
P	84.20	87.39	84.76	83.90

Some traditional English teaching methods pay too much attention to the explanation of grammar rules, while ignoring the application in the actual context. This kind of teaching method may lead to learners' lack of in-depth understanding of grammar rules and difficulty in applying them flexibly.

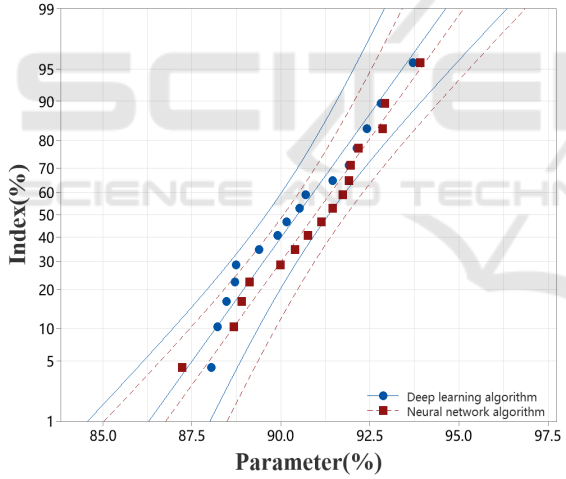

Figure 6: Deep learning algorithm error correction system design

Grammar learning needs a lot of practical opportunities, but many learners lack practical opportunities in practical application, which leads to a lack of in-depth understanding of grammar rules.

4 CONCLUSIONS

English grammar problems are an inevitable part of English learning, but as long as we carefully analyze the root causes of the problems and adopt effective strategies to solve them, we can overcome these problems and improve our English level. English grammar problems are an inevitable part of English learning, but as long as we carefully analyze the root causes of the problems and adopt effective strategies to solve them, we can overcome these problems and improve our English level. The correct use of English grammar is a constant challenge for non-native speakers. By adopting the above strategies, educators can improve the efficiency of correcting grammatical errors and help learners master English more effectively. Future research can explore more personalized and technology-driven grammar correction methods to adapt to the changing educational needs.

ACKNOWLEDGMENTS

This paper is funded by the research project of teaching quality and reform (Online course construction and practice of The History of English Language education based on the Superstar Fanya Platform) in Guangdong University of Science and Technology in 2021 (Project No.: GKZLGC2021143).

REFERENCES

Tian Jing, & Jia Zhiyong. (2022). Design of English grammar correction system based on deep learning algorithm. Automation and Instrumentation(9), 4.

Zhou Wang. (2020). Design and implementation of English grammar correction system based on deep learning.

Hui Dan. (2019). Design of wearable device gesture recognition system based on deep learning algorithm. Microcomputers and Applications, 038(009), 30-33.

Hui Dan. (2019). Design of wearable device gesture recognition system based on deep learning algorithm. Information Technology and Network Security, 38(9), 4.

Yang Wenyang, Guo Yaxin, & Li Mengdi. (2021). Design and implementation of ancient poetry VR interactive system based on deep learning recommendation algorithm.

Xie Yuying. (2021). Design and implementation of video voice extraction text system based on deep learning. Software Engineering and Applications(004), 010.

Chen Yan. (2020). Design of high school English grammar learning activities based on deep learning. English Journal: Advanced Level.

Li Xia. (2020). Analysis of design of high school English grammar teaching activities based on deep learning. English Journal: Advanced Level (2), 000(028), P.92-93.

Gu Fengmin. (2021). Research on the practice of deep learning concept based on the core literacy of English discipline in high school English grammar teaching - Taking the grammar lesson "Review and
Application of Noun Clauses" in English Elective Eight of People's Education Edition as an example. Overseas English. (2020).
Zhang Xiaoling, & Yin Gangkui. (2018). Teaching strategies for middle school English writing based on deep learning. Journal of Primary and Secondary English Teaching and Research(6), 6.