

# The Role of Artificial Intelligence in English Language and Literature Reading Management

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## ABSTRACT

Firstly, this paper analyzes the role of AI in the reading management of English language and literature, establishes the implicit knowledge base of neural network, designs the auxiliary reading system for learning English language and literature, and optimizes the English language and literature management model of AI. The experimental results show that its reading efficiency is increased by 0.48%, and the performance of the credibility model is improved by 0.53% compared with the original system, which greatly optimizes the running time of the system. To some extent, it helps users to manage their time in English language and literature reading, and greatly improves users' reading efficiency and quality. Based on this advantage of AI algorithm, this paper introduces that the algorithm optimizes the reading management model and the training process of neural grid, and constructs a model of English language and literature assisted reading system based on AI. The system can better meet the needs of users in English language and literature reading management.

## KEYWORDS

AI, English Language and Literature, Reading Management

As China's comprehensive national power and international competitiveness continue to grow, and trade and cultural exchanges with the rest of the world become more and more in-depth, learning English has become an important bridge for communication (Budhwar et al., 2022). The reading and learning of English literature plays a key role in the process of learning English. Reading not only enhances knowledge but also promotes thinking and social adaptability. Incorporating English literature into teaching can broaden students' knowledge, improve their reading ability and grammatical comprehension, and at the same time cultivate an interest in learning English (An, 2021). The application of information technology tools enhances the modernization of education, creates a rich learning environment, and strengthens students' motivation and engagement in learning (Zhang, 2022). Therefore, schools and educational institutions should pay more attention to the teaching of reading English literature and utilize information technology tools to provide students with better learning resources and platforms to help them achieve greater success in English learning (Krijgsman, 2018).

Learning English language and literature plays a significant role in improving language proficiency. The improvement of language proficiency requires continuous accumulation of experience, and in

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addition to exercising expression and comprehension through practical activities and communication, learning English language and literature is also an efficient way of accumulating experience (Fitria, 2021). Generally speaking, literary works make the most sense in terms of their language use after repeated refinements by the author (Wu et al., 2020). Different literary works involve different occasions in the use of language, and the most appropriate language is chosen according to the inner activities of the expresser. Through the rich study of English language and literature, it is possible to gain insight into the language skills of different occasions and subconsciously improve language expression (Elbechir, 2018). Therefore, studying English language and literature can enhance literary literacy, accumulate rich experiences in language expression, and improve language skills in a subtle way.

This paper implements the design of an assisted reading system for English language and literature, using generative and frame-based knowledge representation methods combined with uncertain reasoning techniques, aiming to improve the quality of reading. Artificial neural networks are utilized to generate ideal parameters through BP network training samples, establish a neural network-based implicit reading library, and construct a user-autonomous reading evaluation system. Meanwhile, a mathematical model of knowledge forgetting is established based on the Ebbinghaus memory forgetting curve, and an intelligent memory algorithm is developed to guide personalized learning, enhance users' independent reading ability and interest, and give practical value to the system.

The combination of artificial intelligence technology with the field of English language and literature to explore its application in reading management of English language and literature is interdisciplinary and innovative. This combination provides a new perspective and method for the traditional research on English language and literature and opens up a new research field.

For the field of language and literature, the generalization ability of the model may therefore be limited (Becerra-Fernandez, 2000). Different algorithm choices and parameter tuning may have different impacts on the results, so reasonable comparisons and adjustments are needed. Effective translation of research results into practical applications may face more complexity and practical issues, and challenges and limitations in real-world scenarios need to be addressed (Lubis et al., 2018). Future research should consider addressing the problem that current experiments may be limited by the size and diversity of datasets. For the field of English language and literature, research could explore larger and more diverse datasets to validate the applicability of the system model in a wider range of domains.

## RELATED WORK

With the rapid development of hardware performance, AI is undergoing a revolutionary change. "Artificial intelligence" is a brand-new concept, and the reading database based on artificial intelligence can better apply the existing "artificial intelligence technology" to the field of reading, which has attracted extensive attention in academia and industry at home and abroad. Many scholars and research institutions are carrying out research and have achieved many important research results in computer-aided reading, expert systems, aided design, intelligent management, automation, etc. (Gong, 2018).

Donepudi et al. (2020) plan to build a library digital resources promotion system. They believe that it is necessary to scientifically design the overall framework and functions of the system on the basis of artificial intelligence technology. The service measures of library digital reading promotion resource system based on artificial intelligence technology mainly include pushing personalized reading resources and providing intelligent agent services (Donepudi et al., 2020). Borges et al. (2021) think that from some current research, it can be predicted that AI may develop fuzzy processing, parallelization, neural network, and machine emotion in the future. Qianjing and Lin (2021) think from the angle of AI that a machine with the following typical abilities can be regarded as "intelligent" ability to classify various patterns and change its own behavior: the ability to learn, the ability to induce and reason, the ability to generalize, the ability to deduce and reason, the ability to form a conceptual model, and the ability to understand it by using this model (Qianjing & Lin, 2021). Zhang

and She (2021) and others put forward the Folin-Wu method, generalized intelligent information system theory, information-knowledge intelligent transformation theory, all-information theory, and pan-logic, which are proved by machine theorem, in the research of theoretical methods, and developed distinctive technologies. Liang et al. (2023) put forward the “emotional adaptation model of knowledge expression.” The computer provided candidate models, and people made emotional choices. Satisfactory information models can be effectively established through learning in complex situations (Liang et al., 2023). Ballamudi (2019) has created the methodology of information science and the information conversion mechanism of refining knowledge from information and creating intelligence from knowledge.

To improve the quality of English teaching, Zhu (2021) researched English teaching in artificial intelligence from a theoretical perspective. Through literature research, Zhu found the matching point between constructivism theory and artificial intelligence-assisted teaching, and used the second language acquisition theory and communicative teaching method to summarize the language acquisition process assisted by artificial intelligence.

English reading plays an important role in promoting oral English skills and comprehensive English ability. In order to change the shortcomings of traditional education, Meng et al. (2021) combine the spoken language spectrum algorithm to build the system. The contribution of Oktradiksa et al. (2021) is to take advantage of artificial intelligence (AI), which is used to increase creativity skills in the era of society 5.0. Artificial intelligence enables machines to learn from experience, adapt to new inputs, and perform human-like tasks (Oktradiksa et al., 2021). Rusmiyanto et al. (2023) did a literature review to investigate the function of AI in the development of communication skills in English language learners. The contribution of Rusmiyanto et al. (2023) is to look at the existing research and literature on the use of AI-based technologies in English language learning environments.

The traditional reading of English language and literature, there are often low reading efficiency, poor user experience, and low reading interest. This paper proposes a design scheme of English language and literature auxiliary reading system combined with AI, which uses the knowledge expression of production and frame to analyze the role of reading management in reading English language and literature, helping users to read independently, strengthening their reading ability, increasing their reading interest, giving full play to their subjective initiative, improving reading efficiency, and making the system have higher practical value.

## **METHODOLOGY**

### **Design of Auxiliary Read System for Learning English Language and Literature Base on AI**

In the process of learning English language and literature, users can not only accumulate vocabulary and master a variety of vocabulary and sentence pattern application skills but also learn about different language expressions, so that they can express themselves in an unconventional and more attractive way in the process of using English language (Chen, 2019). Different forms of language expression have different expressive effects. Mastering multiple language expressions requires not only rich vocabulary but also flexible use of language expression skills. Flexible use of language expression forms is a sublimation of language expression skills. Whether in English or Putonghua, there are cases where one word is polysemy, or multiple words express the same meaning, but each word has its own usage scenario. Generally speaking, everyone has a different understanding of the same thing, so it is difficult to master the rational use of different words in language expression. This problem can be solved by combining the reading of language and literature. Through independent reading of English language and literature, users' cognition of vocabulary can be deepened, and then their language expression ability can be improved.

System requirements analysis is the first step to building a database, which can find the problems in the process of system design in advance and improve the dialectical rationality of the system.

Through the requirements analysis stage, design and form requirements documents, which can help the subsequent system architecture and system implementation. At the same time, information security, user privacy, and system security should be protected. Therefore, it is necessary to build a simple and powerful auxiliary reading system for learning English language and literature.

The acquisition of reading knowledge by neural network means that under the same input conditions, the neural network can obtain the same output as the answer as possible, so that the network has the force of a rule-based expert system similar to that of experts in solving such problems; that is, the neural network has expert knowledge. The intelligent behavior of a neural network is biologically represented by the change of the connection weight between neurons (Aldahwan & Alsaed, 2020). The neural network is understood as a kind of expression and processing mode of reading knowledge sources (Zhao & Nazir, 2022), which together with other knowledge expression modes, such as rules and frameworks, expresses the knowledge of domain experts and faces different reasoning mechanisms (Liang et al., 2023). The steps of neural knowledge acquisition are: (1) Initializing reading domain knowledge, and knowledge engineers coordinate with domain experts to sort out a formal knowledge reading library (Wang, 2022). (2) According to the characteristics of domain knowledge, the initialization neural network is established, and the input feature library and output result set are established. According to the compilation rules, the formal reading knowledge is transformed into the coding form used by the neural network, and the network structure, input, and output of the network are determined. (3) Test the neural network. Input the sample set for training and determine the network parameters. (4) Learn from the formed network and constantly revise the parameters (Chen et al., 2020). Forward reasoning starts from known facts and gradually deduces the final conclusion, which is also called data-driven reasoning. The forward reasoning process is shown in Figure 1.

This system adopts the architecture of the mode browser server to construct an internet-based online reading assistance system. The system includes a two-module English language and literature reading assistance system and a user autonomous reading system. The whole system includes three kinds of user domain experts, users, and system administrators. When users log in, they have different module operation permissions according to different identities. The overall structure of the system is shown in Figure 2.

The learning ability of the network is mainly reflected in the ability of the neural network to adjust the weight matrix of the entire connection, and the method of changing the weight is called a learning algorithm. According to the connection mode between neurons, the neural network can be divided into two structures: hierarchical and interconnected. According to the flow of network information, it can be divided into feedforward network and feedback network. There are many kinds of neural networks. Considering that this model is only an initial theoretical discussion and moderate simulation, the decision of the neural network in the model will be realized by a multi-layer neural network with neural network error back propagation. In the years of development, it has shown good performance through the optimization of momentum factor, learning factor, sample factor, and many years of practical application. It is one of the most widely used neural networks.

Let the connection weight from the  $l_{th}$  layer neuron to the  $j_{th}$  layer neuron  $l + 1$  be  $w_{ji}^l$ ,  $x_i$  is the current reading sample,  $M$  is the output of the  $l + 1_{th}$  layer neuron under the  $P_{mi}^l$  sample, and the transformation function is taken as the Qgwin function, that is:

$$f(x) = \frac{1}{1 + e^{(-x)}} \quad (1)$$

For the  $M_{th}$  sample, the output error  $E_p$  of the network is:

Figure 1. Forward Reasoning

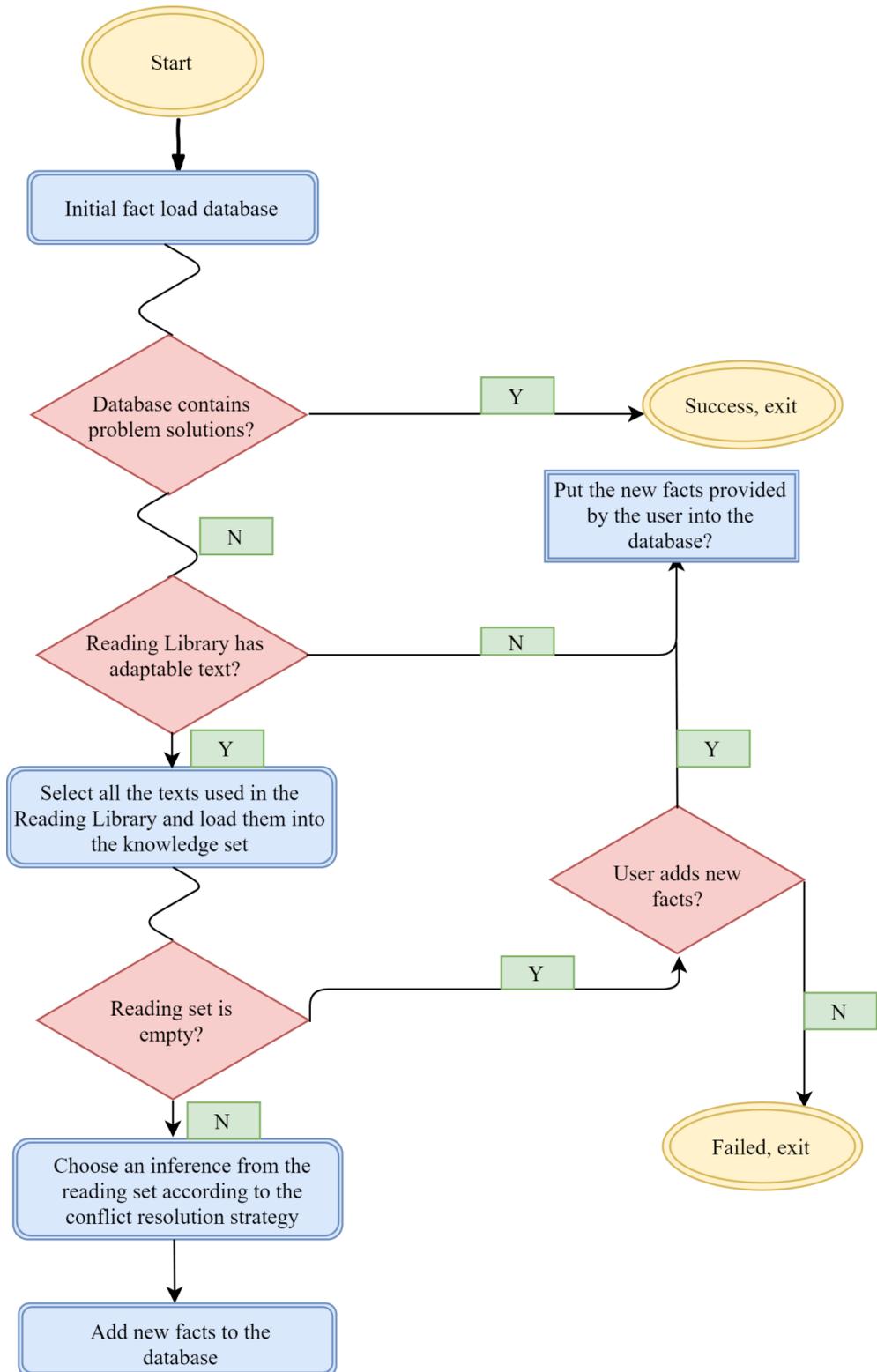
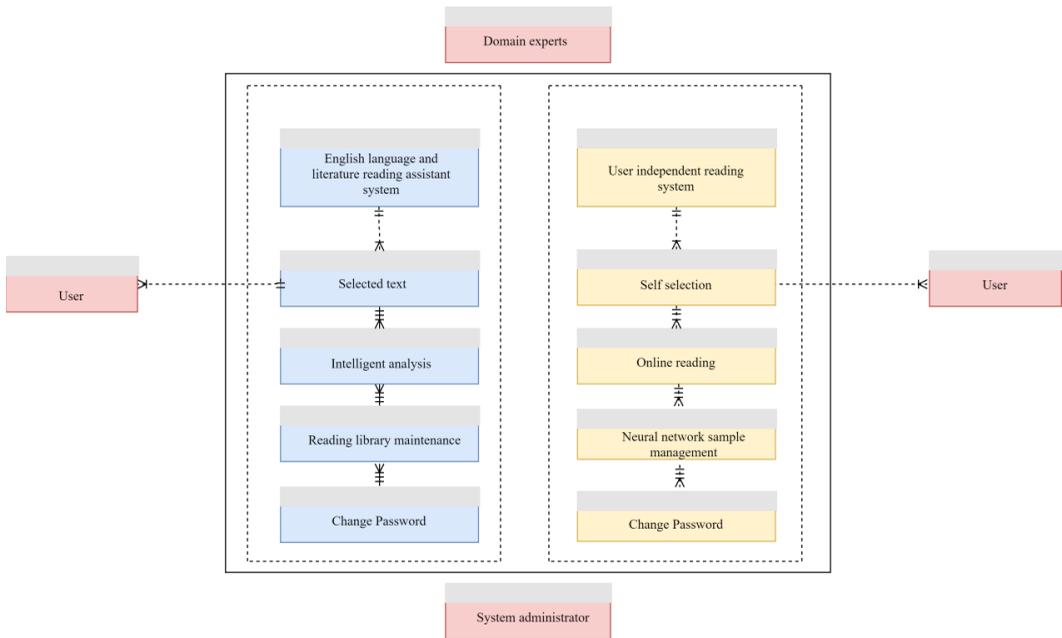


Figure 2. The Overall Structure of the System



$$E_p = \frac{1}{2} \sum_{i=1}^{n-1} (t_{mj} - o_j^{l+1}) \quad (2)$$

where:  $t_{pj}$  is the ideal output of the  $i_{th}$  neuron when the  $M_{th}$  sample is input, and  $o_{pj}^{(l)}$  is its actual output. The number of hidden layer nodes in the three-layer network is not arbitrarily selected. In this system, the number of input layer and output layer nodes can be determined, and the number of hidden layer nodes  $l$  can be given according to the empirical formula:

$$l = \sqrt{m + n} + a, a \text{ is a constant between } 1 \text{ and } 10 \quad (3)$$

The neural network is a forward network with one-way propagation. The algorithm is widely used in the training of multi-layer neural networks. Through repeated training of the sample group, the gradient descent method is used to make the weights change along the direction of the negative gradient of the error function. After the function of the characteristic function, it is passed down layer by layer finally to the output layer for output. The performance of traditional neural network algorithms is often restricted by the network weight and learning rate, and it is difficult to set parameters and meet the needs of practical engineering. If the parameters are not properly selected, there will be problems such as premature convergence and falling into local extremum.

The reading rate in traditional neural network algorithms is often obtained by empirical values, which makes it difficult for the reading rate, which plays a key role in convergence, to achieve the best results. The training process of traditional neural network is a process of classifying and learning samples. Among many types of neural networks, neural network is the breakthrough point of application. The introduction of momentum factor, learning factor, and precipitous factor in a traditional neural network algorithm can solve problems such as falling into local minimum and a

slow learning rate. In order to keep the error decreasing, the output of each neuron in the hidden layer and the output layer of the network is first calculated for each sample:

$$o_{mj}^l = f_j \sum_m w^j o_{l-1}^j - \theta_i^j \quad (4)$$

Calculate the output layer error:

$$\delta_{mj}^2 = o_{mj}^2 \left[ (1 - o_j^2) - (t_j^2 - o_m^2) \right] \quad (5)$$

Hidden layer error:

$$\delta_{mj}^1 \left( 1 - \delta_{mj}^1 \right) \sum_c \delta_{mt}^2 s_{cj}^j \quad (6)$$

The neurons are trained with samples to determine all the connection weights of the neural network and the thresholds of each neural network, which are represented by the connection weight matrix and the threshold vector, which constitute a part of the knowledge base of the students' autonomous reading system. Determine the network structure. All connection weights are preset to formalize the training samples. The training process is shown in Figure 3.

The training process of a neural network is a process of classifying and learning samples. The trained neural network already has prior reading knowledge and can make decisions after "generalization" according to the real-time situation. Online reading mainly imitates the reading user's decision-making. It is necessary to construct an accurate situation evaluation function. When a user's decision is implemented, its situation has great advantages over the previous situation or for the situation at this time, and usually reaches a certain value. It can be considered that the user's decision-making has learning value. The corresponding decision-making parameters of the reading user at this time can be saved, and the neural network can be retrained at an appropriate time. The general process of developing a neural network is as follows: First, define the data structure of the neural network and randomly initialize the weight array between the connecting layers. Then, calculate the total input value of the neural network of each layer and the output value processed by the activation function according to the formula from front to back. Finally compare the error between the actual value of the neural network and the training sample, and adjust the weight error from back to front.

### **An Optimization Model of English Language and Literature Management Based on AI**

The purpose of AI pattern recognition is to find the optimal matching position of the template, and its coordinate value is the optimal solution of AI pattern recognition. Therefore, the simplest encoding method is to directly use the binary code corresponding to the coordinates as the gene sequence. If there is a change in the angle or size between the identified AI and the template AI, the AI position, rotation angle, and scaling can be encoded into the genetic code at the time of coding (Qianjing & Lin, 2021).

The team progress algorithm is an AI evolution algorithm based on AI technology. It divides the members of the reading team into two groups, the elite group and the ordinary group, and imitates the reading and exploration process of the two groups. Under the combined action of exploration, reading and member update rules and other factors, members compete with each other, and the AI generates the optimal solution. The algorithm has the characteristics of strong robustness, simple implementation, and high success rate of global optimization. Different from the AI genetic algorithm,

Figure 3. Flow Chart of BP Training Algorithm

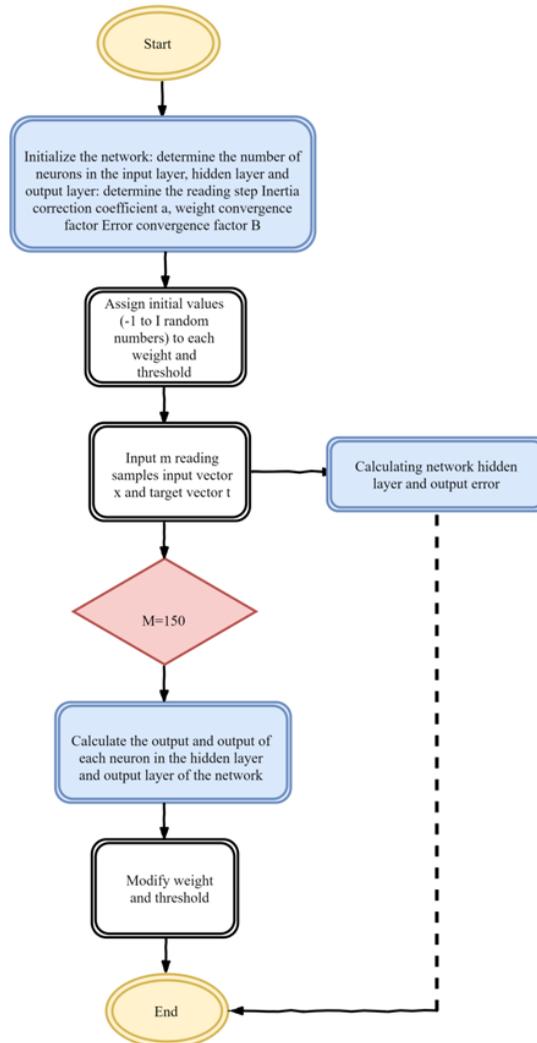
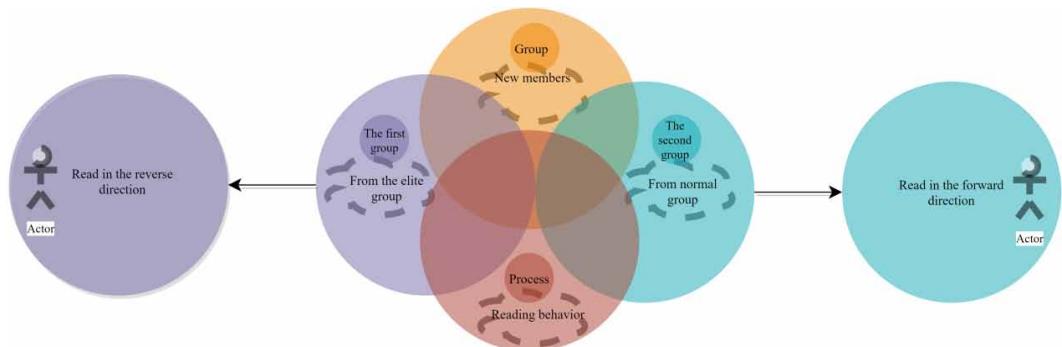


Figure 4. The Process of Reading Behavior



the algorithm can directly optimize and solve the objective function without the need for a fitness function. The algorithm is mainly to continuously update the members of the ordinary group and the elite group in the process of learning and exploration so that its AI members can achieve the evaluation value under the expected target. For the minimum value problem, the evaluation value of the function value takes the most AI minimum value, and the opposite is true for the maximum value problem. After reading the behavior as shown in Figure 4, candidate  $x_c$  can be obtained.

If the freshmen choose to learn behavior, they will approach the reference target value through learning. The reference target is divided into two types: elite AI target template and ordinary target template. The target template value is the average value of the team, and the elite target AI template is  $e_e$ ; the calculation formula is as follows:

$$e_e = \frac{1}{N} \sum_{j=1}^N x_{ej} \quad (7)$$

The common target template is  $e_p$ , and the calculation formula is as follows:

$$e_p = \frac{1}{M} \sum_{j=1}^M x_{pj} \quad (8)$$

If the new member  $x_r$  chooses to explore the behavior, the random function is used to change its ability factor  $x_{ri}$  ( $i = 1, 2, 3, \dots, n$ ). The bounds of the exploration intensity  $t_{e,p}$  are:

$$t_{e,p} = 1 - y_i \left( 1 - \frac{\beta}{K} \right)^{\partial_{e,p}} \quad (9)$$

The initial reachable bounds of the search space are:

$$x_{ci} = \left\{ x_{ri} + t_{e,p} (x_{ri} - b_i) \right\}, \quad m_i = 0 \quad (10)$$

where  $k$  represents the current cumulative number of computations, parameter  $\beta$  is the shrinkage index of the elite group,  $\partial_{e,p}$  is the shrinkage index of the normal group, and  $K$  is the maximum number of iterations that the algorithm overflows. One function value can correspond to multiple variable points, which is a basic feature of dimensional multi-extremum optimization problem. When looking for the optimal point of the function, the variable is easily trapped near the local extreme point, which is a more difficult problem to solve. However, the evaluation value function is only called once at a time, and at most one member is updated. In addition, the algorithm sets the reading behavior so that the AI algorithm has the ability of automatic global search, local search, and random directional search, avoiding falling into local extremum due to repeated calculation. All of this means that this is a feature of AI algorithms superior to other intelligent swarm algorithms.

## RESULT ANALYSIS AND DISCUSSION

The biological brain can process a large amount of information and make decisions based on neural network. The mathematical model of artificial neural network algorithm is based on this. Among

many types of neural networks, neural network is the breakthrough point of application. After years of theoretical improvement, it shows good characteristics. For example, the introduction of momentum factor, learning factor, and abrupt factor can solve problems such as falling into local minimum and slow learning rate. The reading library includes two aspects: first, submitting reading texts and controlling reading; second, storing reading according to the expert model, which makes the reading library easy to maintain. In the English language and literature reading assistant expert system, the reading library stores two aspects of static reading library and dynamic reading library.

The English reading acquisition of this system is a passive one. After the reading structural processing of reading engineers and English experts is completed, it is necessary to establish a reading acquisition module for reading acquisition. The established reading acquisition module is shown in Figure 1. English experts log in to the system and enter the reading acquisition module. They can operate according to the prompts. This is actually the passive reading acquisition process.

The learning ability of the network is mainly reflected in the ability of the neural network to adjust all the connection weight matrix. The method of changing the weight is called learning algorithm. According to the connection mode between neurons, neural networks can be divided into hierarchical and interconnected structures. According to the flow of network information, neural networks can be divided into feedforward networks and feedback networks. There are many kinds of neural networks. Considering that this model is only the initial theoretical discussion and appropriate simulation, the decision-making of neural networks in the model will be realized by multilayer neural networks with neural network error back propagation. Throughout many years of development, it has shown good performance through the optimization of momentum factor, learning factor, sample factor, and many years of practical application. It is one of the most widely used neural networks.

The inference engine of English teaching expert system is composed of positive and negative inference. In the reasoning process, the uncertainty of information including rule uncertainty, reasoning credibility, and conclusion credibility also propagates in turn. The numerical expression of the fuzzy quantifier of its reliability is shown in Table 1.

**Table 1. Values of Confidence Fuzzy Quantifiers**

Fuzzy words	Numerical value	Scale
Absolutely credible	1.00	1.00
Strong credibility	0.9	$1.00 < v < 0.9$
The credibility is weak	0.75	$0.9 < v < 0.75$
General credibility	0.5	$0.75 < v < 0.5$
Weak credibility	0.35	$0.5 < v < 0.35$
Very weak credibility	0.1	$0.35 < v < 0.1$
Incredibility	0.00	0.00

**Table 2. User Basic Information Table**

Field name	Data type	Explain
Sequence	Int	Serial number of the user in the system, increasing
UserID	Varchar	User name, unique in the system
Password	Varchar	Password
UserTyper	Int	User category: 0 System administrator; 1 Field experts; 3 Users

The experimental platform provides a variety of comparison modes, including standard heuristic function, value local weighting function, and value local weighting function. For the later proposed value local weighting, static weighting and dynamic weighting analysis modes are provided, and the static weighting effect is not very obvious.

For the logical design of the reading database, the user information table is shown in Table 2.

Compared with the traditional neural network model, the effect of element confusion is not considered. According to the artificial intelligence algorithm, the extraction time increases with the increase of data. The larger the data, the more objects to be evaluated, and the longer it takes. Compared with the traditional neural network model, since the influence of element confusion is not considered, sample factors and iteration errors are added in this experiment. 800 reading records are selected from the English language and literature reading database, and the data are stored in the SQL database, which can reduce the shock in the reading process. The time consumption of the algorithm mainly includes three parts: sample factor, iterative error, and feature template mining. Under the condition of constant threshold and constant number of groups, experiments were carried out with different reading times, as shown in Figure 5 and Figure 6.

Under the condition that the sample factor and threshold remain unchanged, the extraction time increases with the increase of the data volume according to the AI algorithm. The larger the data volume, the more evaluation objects, and the longer the time required. When the number of readings is 800, the algorithm can also produce results within 10 minutes, so the algorithm is more efficient and feasible.

At the same time, the reading rate in the traditional neural network algorithm is often obtained from the empirical value. Such a value method makes it difficult to optimize the reading rate, which plays a key role in convergence, resulting in the later network training weights falling into an infinite loop so the empirical value affects the reading rate and the resulting iteration error, as shown in Figure 7.

According to the experimental results, it can be found that the model proposed in this paper is superior to other models in terms of reading efficiency. In this paper, a neural network algorithm

Figure 5. Influence of Sample Factor on AI Algorithm Time

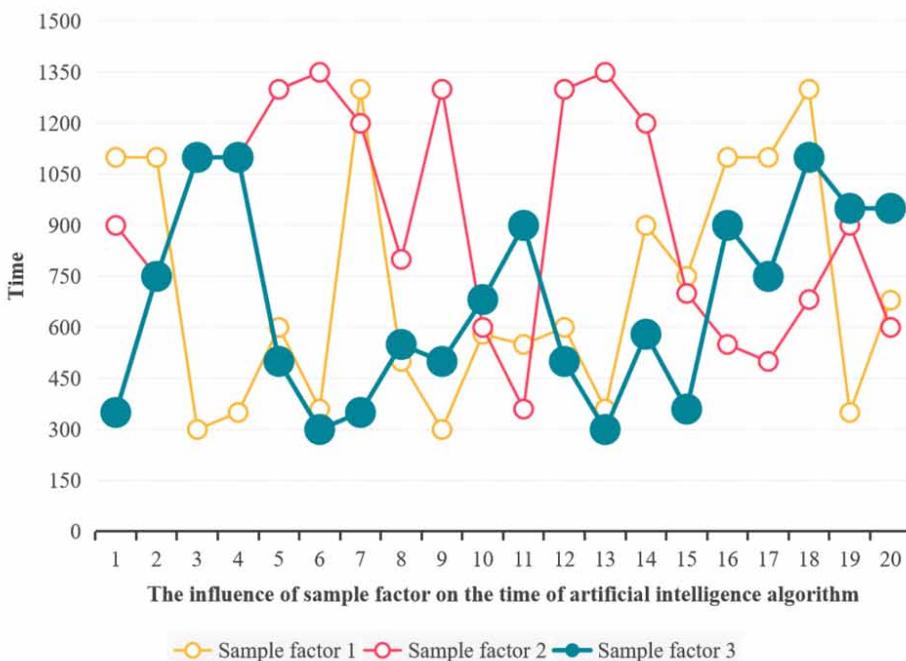


Figure 6. Influence of Threshold on AI Algorithm Time

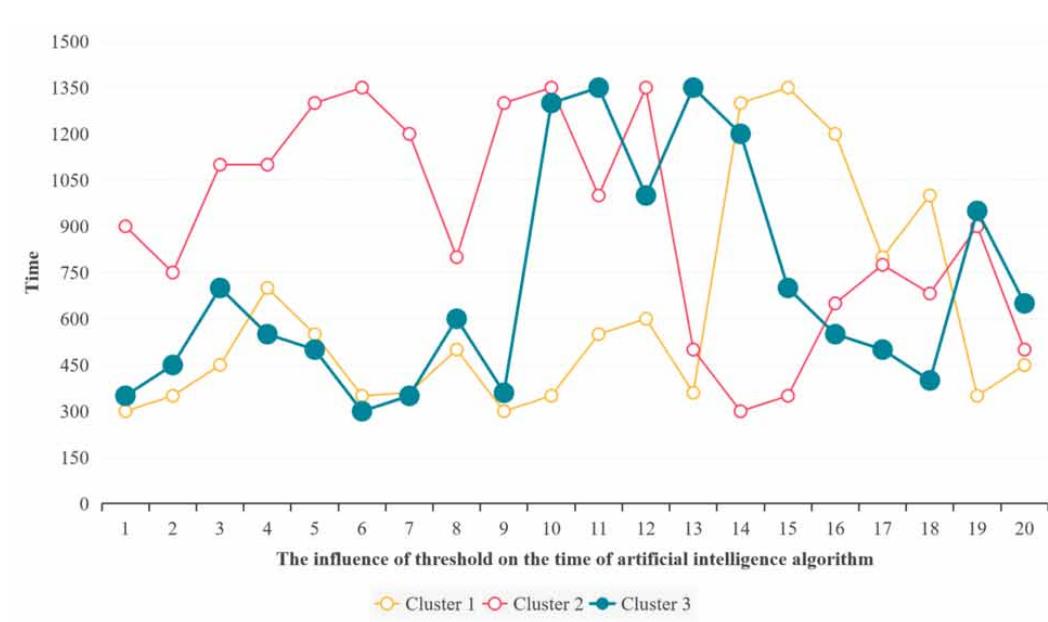
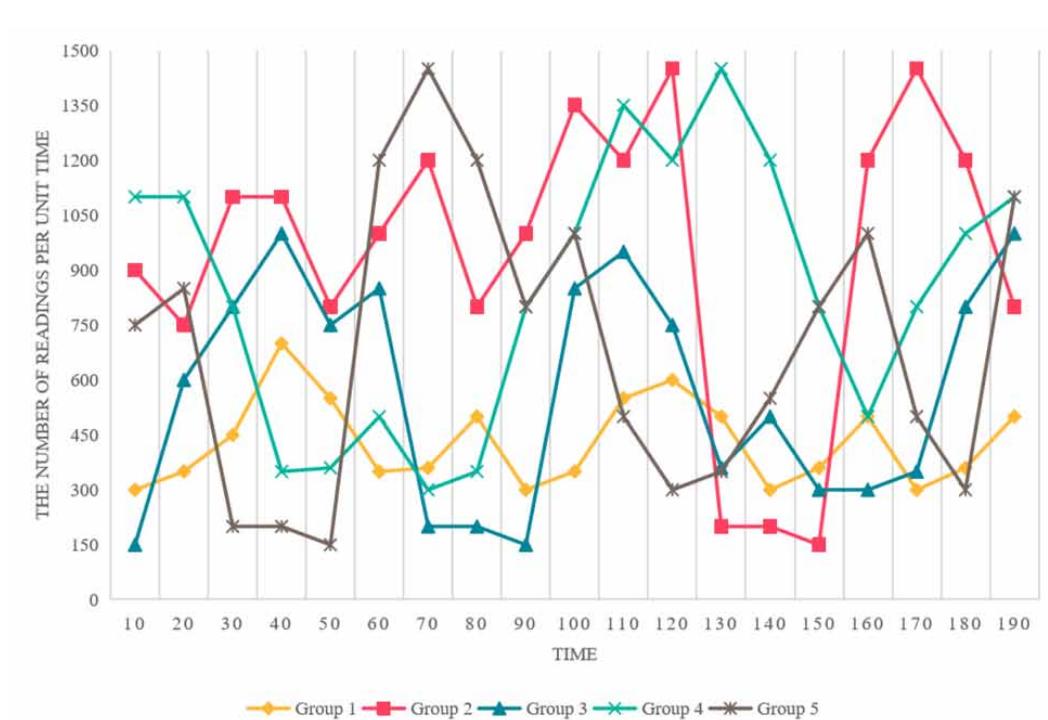


Figure 7. Iterative Error Results



based on a feedforward multi-layer network structure is used, and the reading training function in the neural network toolbox is used to improve the network reading rate and reduce the number of network training. As the number of nearest neighbors increases, the iteration error shows a downward trend. The algorithm based on the AI model in this paper decreases faster and stabilizes faster than the traditional algorithm. Through the above test and analysis, the English language and literature reading assistance system designed in this paper can run stably on the operating system. It can improve the reading quality by using uncertainty reasoning technology and the knowledge expression method combining production and frame type. The artificial neural network is used to design the autonomous reading system. According to the characteristics of English reading, this paper studies the implicit reading library, reading expression, and knowledge acquisition based on neural network. Using the network to train the samples, the ideal neural network parameters are generated, which constitute students' autonomous reading system.

In this paper, a reading assistance system for English language and literature based on neural network algorithm is proposed, which successfully improves the reading rate of the network and reduces the number of network training times by utilizing the reading training function in the neural network toolbox. In order to solve the problems of the traditional neural network model that may fall into local minima and slow learning speed, methods such as momentum factor, learning factor, and mutation factor are introduced, which makes the system perform well.

In the inference process, special consideration is given to the propagation of information uncertainty, including rule uncertainty, inference credibility, and conclusion credibility. In order to improve the reliability of the reasoning, a fuzzy quantizer is used for numerical representation.

In addition, the logical design of the reading database is also described in detail, including the field names, data types, and interpretations of the basic user information table. This helps the stable operation of the system and user management.

Through the verification of experimental results, the model proposed in this paper outperforms other models in terms of reading efficiency, especially in terms of the reading rate and iteration error of the neural network algorithm, which has achieved significant improvement.

## CONCLUSION

In this paper, a neural network-based autonomous reading assistance system for English language and literature is constructed. By using uncertainty fuzzy inference analysis and BP neural network, it successfully improves the quality of reading resource sharing, reduces the reading burden of users, and enhances their autonomous reading ability. The experiments proved that the new system, compared with the original system, improved the performance of the plausibility model by 0.53%, increased the reading efficiency by 0.48%, and dramatically optimized the system's running time. This research result is of great significance in improving the efficiency and quality of English language and literature reading management.

At the same time, the research also delves into the learning ability of artificial neural networks and the design optimization model of assisted reading system, which provides practical solutions for English language and literature reading management. Through the reasonable design of neural network structure and training samples, as well as the flexible use of language expression forms, users can deepen their knowledge of vocabulary and improve their language expression ability while the online reading assistance function of the system is also fully demonstrated and applied.

## DATA AVAILABILITY

The figures and tables used to support the findings of this study are included in the article.

## **CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interest.

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## **PROCESS DATES**

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