

Application of Deep Learning in Natural Language Processing

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Abstract

Deep learning means that in the process of learning, scholars can not only understand the main points of knowledge, but also can critically comprehend new knowledge content. Scholars can use deep learning to combine the knowledge they have learned with existing knowledge and apply them to new situations. In the process of cultivating talents, cultivating their deep learning ability is very critical. The implementation of deep learning can have a significant impact on the quality of learning and the development of personal learning ability, but it also faces some challenges. However, our country is still in the early stage of development in the field of deep learning, and there is not much research on deep learning. It is necessary for us to conduct in-depth exploration and propose practical strategies. This paper proposes a LSTMCNN network problem classification method based on word frequency, and conducts a test experiment on the classification method. Through the analysis of the experimental results, we can clearly know that in the problem system, compared with the MFCNN model, the F1 value of the large/small class classification predicted by the method in this paper has increased by 1.07% and 4.83% respectively. In further experiments, the method in this chapter has predicted F1 values higher than 90% for the classification of numbers, descriptions, time, people, and places in the six systems of large categories, which proves the efficiency of this method in problem classification.

Keywords

Deep Learning, Computer Teaching, Learning Efficiency, Education Reform.

1. Introduction

In recent years, the topic of deep learning has received widespread attention, and research has increased year by year, but domestic research is still insufficient, and most of the articles are concentrated on the descriptive level [1]. First of all, at the theoretical level, the existing deep learning research is relatively general and lacks pertinence to the group. At the same time, the solutions proposed for deep learning are also relatively broad and not very practical. Secondly, in terms of research methods, the existing research is mainly speculative discussion, while empirical research is still insufficient, and there is obviously a lack of research and interviews [2]. Finally, the combination of deep learning research and classroom is very rare, and it cannot reflect the current situation of different student groups in deep learning. However, we can see that the domestic research on deep learning is growing and receiving more and more attention. The research on deep learning is becoming more and more comprehensive. Therefore, if the research group on deep learning is more targeted, the research More in-depth and specific, then it will definitely improve the practicability of deep learning related strategies [3].

Chinese scholar Guo Lili believes that deep learning is a research field that has attracted much attention in recent years and plays an important role in machine learning. If shallow learning is a wave of machine learning, then deep learning, as a new field of machine learning will set off another wave of machine learning. Deep learning is established to simulate the hierarchical

structure of the human brain to extract features from low-level to high-level externally input data, thereby being able to interpret external data [4]. Shan Shiguang and others believe that artificial intelligence has entered a new period of vigorous development. Driving this wave of artificial intelligence are the three engines, namely deep learning, big data and massively parallel computing, with deep learning as the core [5]. Kang Shumin believes that the goal of knowledge acquisition in today's era is the creation and realization of knowledge. Learners need to have the learning qualities that are good at thinking and dare to question, the spirit of inquiry that constantly transcends, and the use of high-level cognitive skills to carry out deep learning ability. The promotion of deep learning should be based on the creation of a creative learning culture, strengthen the cultivation of learners' deep learning literacy, and cultivate their multi-thinking learning habits and problem-solving abilities by providing learning tasks with space for thinking, which are realized in the process of inquiry Knowledge construction and learning transfer, from knowledge mastering to wisdom generation and ability development [6].

In natural language processing, due to the huge differences in sentence patterns, semantics and words between Chinese and Western languages, it is a difficult task to implement problem analysis in Chinese question answering systems [7-8]. In the problem analysis stage, word segmentation and problem classification are the key steps in the entire problem analysis stage. The result of the processing will directly affect the understanding of the problem analysis in the subsequent steps, and ultimately affect the accuracy of correctly analyzing the user's true intentions. After the question sentence is preprocessed, the final question classification should be done in the question classification link. The efficient word segmentation processing and question classification methods can not only greatly reduce the search range and shorten the retrieval time, but more importantly, its precise word segmentation and classification effects provide accurate directions for the subsequent answer extraction stage [9-10]. In the question analysis stage, word segmentation is used to mark the question sentences. Question classification is to classify the question. These two steps are the key to the preprocessing of the question sentence. In the past, machine learning methods still have some unresolved problems for Chinese word segmentation, such as the inability to handle the long-distance relationship between texts, the inability to conduct a comprehensive analysis of the content of the problem, and the inability to grasp the meaning expressed by users. In response to these problems and the retention of text-related information, the article uses a two-way threshold recurrent neural network to solve and analyze sentence-level problems through the CRF model, and proposes a new word segmentation processing method.

2. The Application of Deep Learning in Natural Language Processing

2.1. Research on Deep Learning

The concept of "deep learning" comes from abroad. Since its introduction to China, many scholars have redefined this concept. The so-called deep learning refers to the ability of students to critically learn new theories and ideas based on understanding and learning. By integrating new theories and ideas into the existing cognitive structure, they can establish connections between a wide range of ideas, and you can transfer the knowledge you already have to new situations as learning to make decisions and solve problems Methods. Research on deep learning has always been on the increase in foreign countries. Most of the existing researches can clarify the connotation and characteristics of deep learning, and the theoretical explanations are relatively comprehensive. Among them, deep learning is more deeply studied from a specific aspect, and they basically have unique views and can make certain suggestions. . However, there are some shortcomings. Foreign research on deep learning focuses more on the relationship between deep learning and individual aspects. The research is theoretically strong,

but it ignores the characteristics of deep learning students. Sexual, practical guidance is of weaker significance. The research methods are mainly speculative, and the number of empirical studies is insufficient.

2.2. Research on Natural Language

Human life style has changed because of the development of the Internet. People have not only felt the high efficiency of the Internet, but also the security and convenience of the Internet. The Internet has become an important way of human life. In the relationship between humans and machines, natural language processing can understand this relationship well. The Internet can allow information exchange between machines. Combining the Internet and natural language processing is the basis of this research. In China, the research on natural language processing is relatively late, and the research on the related technologies of word segmentation and ambiguity analysis is not mature enough. The research content of this paper is to improve the word segmentation algorithm, and complete the expression through analysis and processing, which obviously improves the accuracy of natural language. This paper designs a new way of thinking about the real-time performance of intelligent control, which improves the shortcomings of domestic natural language processing.

2.3. Deep Learning Methods for Problem Analysis

In the study of the combination of natural language processing and deep learning methods, activation functions can better promote the ability of neural networks to learn useful information, so that the model can understand complex information features and process difficult nonlinear functions. These effects show activation Functions have an irreplaceable role in the application of deep learning. Simple linear functions contain limited useful information, and neural networks cannot learn valuable features from them. If the activation function is missing in the neural network model, then the number of layers of the neural network does not help to change the nature of the function. If there is an activation function in the model, it will bring non-linear factors to the model. Such a model can tend to the non-linearization of the function, and then universality can be obtained in the non-linear model. The neural network used in the deep learning network contains a large number of neurons. If all the input data is to be calculated non-linearly through the neurons of each layer, the computational complexity will rise sharply and the training effect will be low.

3. The Application Method of Deep Learning in Natural Language Processing

3.1. The Meaning of Inquiry

The early research of problem analysis was limited by calculation conditions, and did not make a substantial breakthrough, so it is difficult to understand the real intentions of users. If the user's question information cannot be obtained, then the analysis of the question will naturally be ambiguous. In severe cases, it will lead to incorrect judgments of the user's intentions, resulting in contradictory answer results, so the results obtained without a clear understanding of the user's intentions There is no exact guarantee for the answer and it loses its credibility. With the development of science and technology, deep learning technology can solve difficult computational problems through autonomous learning. Therefore, applying deep learning methods to the research of problem analysis methods can further improve the performance of the question answering system and solve the shortcomings of poor problem classification accuracy, difficulty in finding answers, and long time-consuming. The problem analysis method based on deep learning technology can process and analyze the problems expressed in natural language, automatically classify the problems, and give directional instructions for the subsequent stages, so that the problem system can feedback the corresponding answer to the

question . Such performance greatly improves user satisfaction, and thus meets the urgent needs of users better, faster, and more accurately.

3.2. Way of Inquiry

In traditional word segmentation processing methods, the method of using features for word segmentation processing requires effective verification of features, and it is difficult to preserve the long-distance dependence of question semantics. The bidirectional long and short-term memory neural network can autonomously save the semantic long-distance dependence relationship through the memory unit and the control gate, and does not require feature verification. The model itself is complicated in structure, and the training and prediction time is costly. This paper solves these problems well. The experimental results show that the use of the hybrid model not only improves the accuracy of word segmentation, but also reduces the training and prediction time.

3.3. Data Processing

Through the use of SPSS22.0 calculation software, the following calculation formulas are used to calculate and process the experimental data:

Mapping function:

$$f: X \rightarrow \{y_1, y_2, \dots, y_n\} \quad (1)$$

The expansion of and:

$$(1 + x)^n = 1 + \frac{nx}{1!} + \frac{n(n-1)x^2}{2!} + \dots \quad (2)$$

4. Experimental Results and Analysis

The data used in the experiment comes from MSRA and PKU. These two data sets contain test sets and can be used directly.

The Comparison of MSRA and PKU Test Sets is Shown in Table 1.

Table 1. Comparison of MSRA and PKU test sets

model	MSRA(%)	PKU(%)
CRF	88.1	87.8
LSTM	96.7	95.8
GRU	96.9	96.4
BIH	97.1	96.8

According to the experimental data in Table 1, the word segmentation processing method in this paper is the same as the CRF network in terms of accuracy. The experimental results show that the bidirectional neural network can better perform word segmentation processing in terms of preserving the overall information of the problem.

The Comparison Results of Different Models on the MSRA and PKU Test Sets Are Shown in Figure 1 and Figure 2.

From Figure 1 and Figure 2, it can be concluded that the accuracy of the network word segmentation processing method proposed in this paper is higher than that of the CRF log-linear model, indicating that the method of this paper has stronger ability in word segmentation processing, and for other. The neural network model can also realize the long-distance connection of the information in this article.

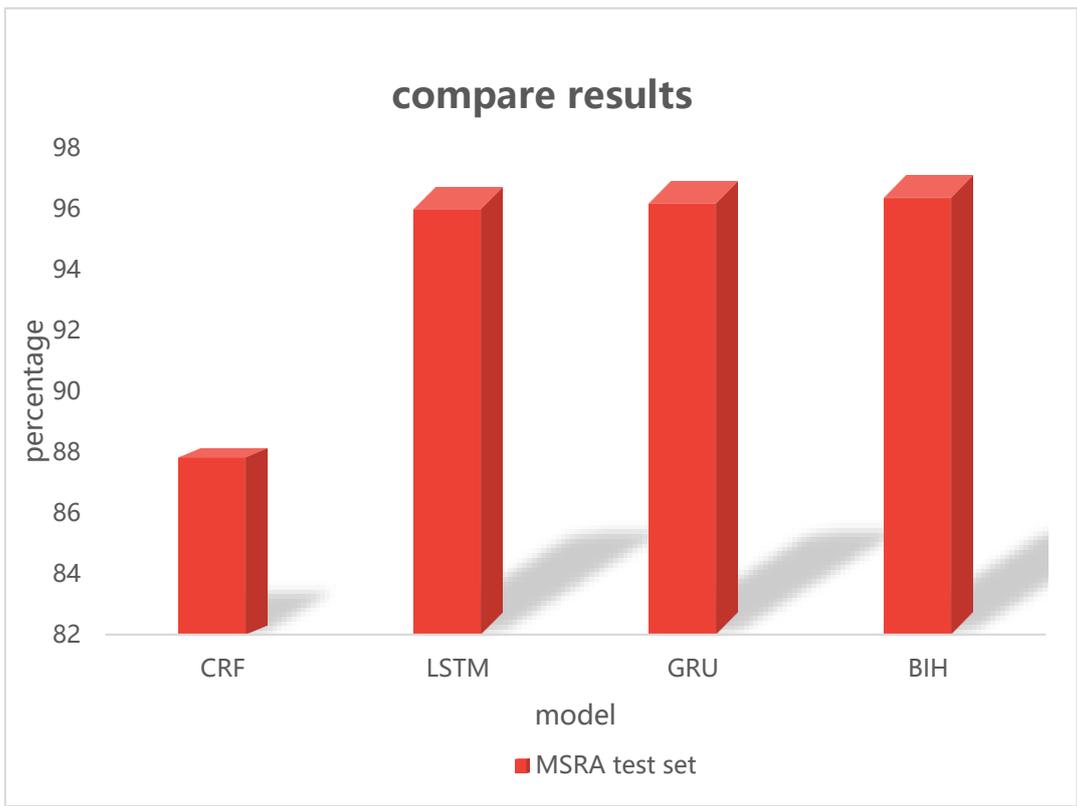


Figure 1. Comparison results on the MSRA test set



Figure 2. Comparison results on the PKU test set

5. Conclusion

In the deep learning method, this paper has done a detailed study on word segmentation and problem classification, and proposed corresponding methods, and compared them through

experiments. It shows that the methods proposed in this paper have good effects in all aspects. The model proposed in this paper is not only better than other models in accuracy, but also better than other network word segmentation processing methods in terms of speed. According to the data obtained, it can be explained that the hybrid network word segmentation processing method proposed in this paper has excellent functions.

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