Research on the Comparison between Human Computer Translation Based on Neural Network Algorithm and Traditional Translation

Chengxiao Xiao1,2*
1Public English Teaching and Research Department, Harbin Normal University, China
2School of Liberal Arts, Heilongjiang University, China
*Corresponding author e-mail: Xue_xi2019@hlju.edu.cn

Abstract. With the improvement of computer processing ability, we have been able to apply a variety of algorithms to deal with problems in life. Traditional translation is a kind of artificial translation or cat translation, which is a simple translation of vocabulary and grammar. With the deepening of international trade, traditional translation can't meet the needs of people, which needs to improve the level of human-computer translation. With the rapid development of machine learning, neural network algorithm and deep learning algorithm have been gradually applied to machine translation, which has made machines process text, language and other information like human beings. In recent years, neural network algorithm has brought a broader prospect to natural language processing, which can deal with text semantics more naturally. Traditional translation is difficult to process information semantically, which is a way of relying on artificial information. With the implementation of neural network algorithm, human-computer translation system can improve the speed of language translation, which can better improve the ability of autonomous learning. Firstly, this paper analyzes the related concepts. Then, this paper analyzes some neural network algorithms. Finally, this paper analyzes the differences between man-machine translation and traditional translation.

Keywords: Human Computer Translation, Neural Network Algorithm, Traditional Translation

1. Introduction
Human computer translation is a kind of intelligent translation system which can exchange information through the network. It needs the corpus of opportunity words, phrases and sentences. Through the centralized implementation of intelligent translation, we can realize the neural network human-computer translation, which can improve the intelligence and accuracy of translation [1]. With the increase of international communication, the technology of machine translation has developed vigorously. Through machine translation, we can realize the translation between different languages, mainly divided into rule-based and corpus based machine translation methods. In recent years, corpus based machine translation technology has become the mainstream of translation, which has been widely recognized by the market [2]. Human computer translation based on neural network algorithm is a new auxiliary translation method, which is different from traditional translation methods. Human computer translation does not rely on the automatic learning of the machine. It is a way to obtain bilingual parallel corpus through web crawler technology [3]. In the process of translation,
manual work needs direct intervention. Compared with independent machine automatic translation, human-computer translation has higher translation quality, which can also improve translation efficiency [4-7].

2. Analysis of related concepts

2.1. Man machine translation

Human computer translation is a corpus translation based on big data and artificial intelligence. By combining machine intelligence with artificial translation, the human-computer translation platform can balance the high efficiency of machine translation and the high quality of human translation, which can form an intelligent translation mode of "manuscript machine translation human translation" [8]. Neural network based machine translation (NMT) has replaced the traditional statistical machine translation (SMT). Neural network machine translation technology has greatly improved the speed and accuracy of the translation system. Through the cyclic neural network and LSTM algorithm, human-computer interactive translation platform has been developed in the society, which can realize the high-efficiency and high-quality translation of translation practitioners. Through the human-computer translation platform, the translation industry can meet the needs of efficient workflow on a large scale [9].

2.2. Features of human computer translation platform

Human computer translation platform is a way of interaction between the system and users, which can provide users with a visible operating environment. Man machine translation platform has many functions, such as cooperation between translators, asset replacement between teams, online cooperation, mutual penetration between managers and customers. The human-computer translation platform will send different links, which will connect different roles, including translators, proofreaders, typesetting and customers. Through the human-computer translation platform, different machines and translators can be linked together, which can more efficiently complete a project. By connecting, we can solve multiple personal tasks, such as capacity aggregation, quality assurance, efficiency improvement, knowledge base accumulation, etc [10].

3. Basic theory of artificial neural networks

3.1. Overview of neuron model

The nervous system is connected by neurons. Therefore, neurons are the basic unit for processing human information. In this paper, a mathematical model of neuron is established, which is a nonlinear unit with multiple input and single output, as shown in Figure 1. Among them, the weight is the connection strength between neurons.

![Figure 1](image.png)

In this paper, a mathematical model is established, as shown in Formula 1.

\[ y_j = f(\sum_{i=1}^{p} w_{jp} x_p - \theta) \]  

(1)

Among them, \( w_{jp} \) is connection weight coefficient; \( x_p \) is the input signal at the input end; \( \theta \) is the neuron threshold; \( p \) is the number of input signals; \( y_j \) is the output at the j-time.

3.2. BP model
BP model is also called Back Propagation Network. The structure of BP model is shown in Figure 2.

![BP Model Structure](image1)

**Figure 2.** The BP model structure.

### 3.3. CNN principle

CNN is a data-driven model training, which is a multilayer neural network, as shown in Figure 3.

![CNN Architecture](image2)

**Figure 3.** The CNN Architecture.

### 3.4. Basic model of CNN

The basic model of Alexnet is the most classic one. In this paper, the size of convolution kernel is $2 \times 2$ and the step size is 2. By inputting the original image, we can extract the features of the image, as shown in Figure 4.

![Basic Model Based on Alexnet](image3)

**Figure 4.** Basic model based on Alexnet.

### 4. Human computer translation based on neural network algorithm

#### 4.1. Coder language model
NNLM is a systematic research, and the basic framework is shown in Figure 5. Among them, the first n-1 words can be used to predict the current word. Nnlm is a simple matrix. Through convolution neural network, we can make better coder language model. The input layer of the dashed part will be directly connected to the output layer, which can convert the original input into another input.

![Figure 5. NNLM model.](image)

4.2. Neural network machine translation model
GNMT system is an end-to-end neural machine translation system. The model architecture is shown in Figure 6. GNMT system is mainly composed of three basic components: encoder network, attention network and decoder network. The encoder network transforms the source language sentences into a series of vectors. The decoder network decodes the vector into the character sequence of the target language. The attention network module is connected between the top layer of the encoder and the bottom layer of the decoder, which can focus on different regions of the source sentence.

![Figure 6. GNMT system model architecture.](image)

5. Comparative analysis between human machine translation and traditional translation
Human machine translation system can be applied on different platforms, which can provide a variety of user applications, including hardware platform users, web users, online use, translator, etc. Therefore, users can choose different carrier platforms according to different specific scenarios. Machine translation can easily enjoy translation services, which can expand search engines, social media and other tools. By expanding access to information, we can improve efficiency and experience. However, there are still many problems in human-computer translation system. For example, when it comes to ambiguous texts, the quality of machine translation is often unsatisfactory. At the same time, human-computer translation relies heavily on corpus. The comparison between man-machine translation and traditional translation is shown in Table 1.

### Table 1. The comparison between man-machine translation and traditional translation.

| Advantages of human computer translation | Disadvantages of human computer translation |
|-----------------------------------------|-------------------------------------------|
| □ Convenience                           | □ Ambiguity                                |
| □ Fast                                  | □ Context is not well considered           |
| □ Low cost                              | □ Emotional color is not well considered   |
|                                         | □ Highly dependent on Corpus              |
|                                         | □ Lack of literariness and artistry       |
|                                         | □ Legal issues of data sharing            |

### 6. Conclusion

Human machine translation combines the advantages of neural network algorithm and artificial, which can make language translation more convenient. Through human-computer translation, we can reduce the cost of translation. However, compared with traditional translation, human-computer translation also has many shortcomings, which need to be improved. Through the use of platform learning, we can form the current situation of human-computer co translation, which can greatly save time and labor costs.

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