

# Application of Deep Learning in the Construction of Public Information Platform during Covid-19

Jing Li<sup>a,\*</sup>, Shulin Zou<sup>b</sup>, and Jiayang Du<sup>c</sup>

School of Public Affairs & Law, Southwest Jiaotong University, Chengdu, China

<sup>a</sup>1305073419@qq.com, <sup>b</sup>1143116808@qq.com, <sup>c</sup>djyseven@163.com

\*corresponding author

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**Abstract:** Under the circumstance of COVID-19 outbreak, the construction of public information platforms under the epidemic becomes an important guarantee for maintaining social stability and boosting the confidence for the people. At present, public information platforms are facing several problems: information collection is massive and complex, information release is random and subjective, information collation is scattered and fragmented, and information security. As an important part of artificial intelligence, deep learning can improve the collection, processing and transmission of information, and improve the speed and accuracy of information processing. Given the current situation, combined with deep learning, setting up public information classification models, designing intelligent auditing technical solutions, establishing epidemic information classification management system, and plan privacy protection technology processes based on homomorphic encryption and deep learning to explore The deep integration of artificial intelligence and public information platform construction provides a reference for improving the intelligence of public information platform construction.

## 1. Introduction

In 2020, global social security and economic development are being severely affected by the outbreak of COVID-19. Building an efficient and intelligent public information platform is conducive to maintaining social stability and boosting public confidence. The traditional public information platform is facing a series of challenges, such as complexity in information collection, randomness and subjectivity in information release, fragmentation in information, information security and so on. Therefore, it is urgent to take more intelligent measures.

## 2. Problems in Public Information Platforms

### 2.1 The Collection of Public Information is Mass and Complex

During COVID-19, the public information platform needs to integrate information related to the COVID-19 and identify the unrelated information efficiently. However, it is difficult to obtain useful information by only relying on manual analysis among a very large amount of data.

### 2.2 The Publication of Public Information is Arbitrary and Subjective

The easy access to the network make it very easy for people to post any information on the internet, which makes the information publication prone to subjective and arbitrary.

### 2.3 The Public Information is Disorganized and Fragmented

Related information should be extracted to form “COVID-19 column” in public information platform. There are various kinds of COVID-19 information demand, but the collections of the corresponding information are disorganized and fragmentation.

## 2.4 The Public Information Involves Privacy and Security Issues

During the COVID-19, personal information privacy is an important issue. Current information platform is prone to problems like poor information management, making the privacy information difficult to be protected and insecure.

## 3. Introduction of Deep Learning

In 2012, a model based on deep learning called AlexNet won the championship of ImageNet image classification competition with overwhelming advantage<sup>[1]</sup>. Since then, the model based on deep learning has been widely used in fields like computer vision<sup>[2]</sup>.

As a branch of machine learning, deep learning is an algorithm for end-to-end learning of data based on artificial neural networks. The core of it is to use deep neural network to analyze and model the mapping relationship between input data and output target. Deep learning model takes neural network as the basic computing unit, where the most basic fully connected network structure is shown in Figure 1.

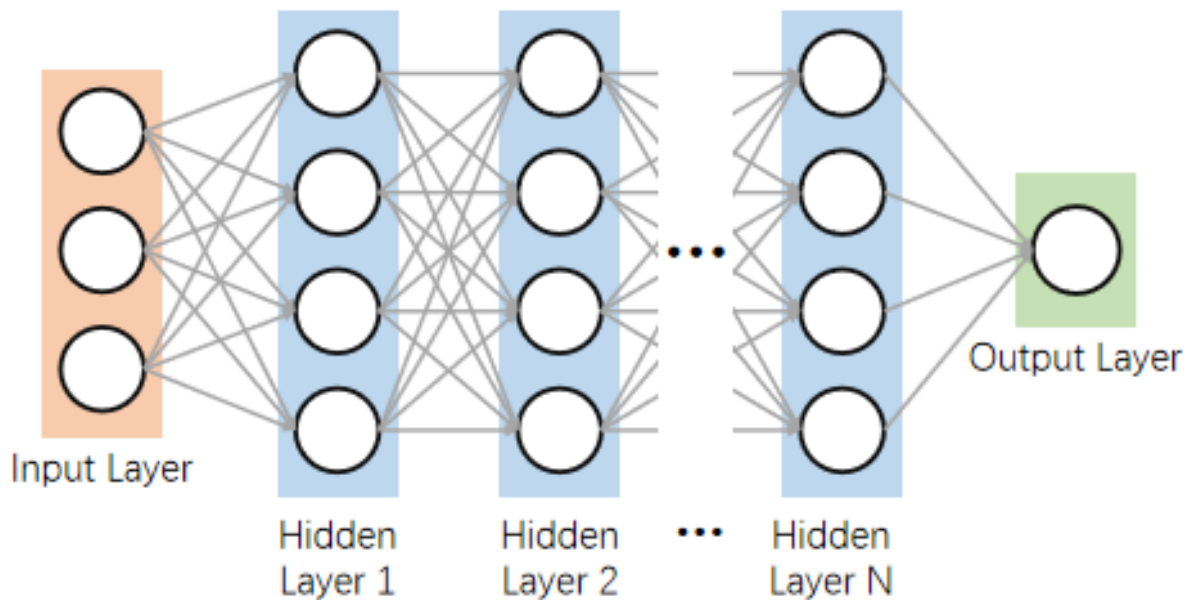


Figure 1 Structure of Fully Connected Neural Network

At present, deep learning is widely used in many fields. From the extensive applications of deep learning, we can sum up the following two main advantages of deep learning: excellent computing ability and fast computing speed to all kinds of information processing tasks, and high accuracy of information processing results.

## 4. Application of Deep Learning in the Construction for Public Information Platform

### 4.1 Setting up a Classification Model for Public Information

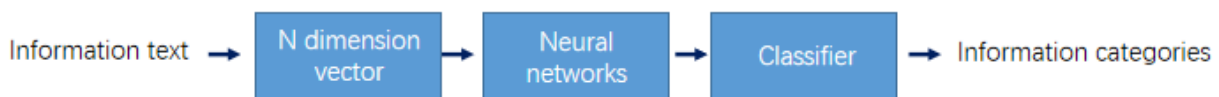


Figure 2 The Public Information Classification Model Based on Deep Learning

During the COVID-19, the relevant information should be obtained from various fields and be integrated to form a “ COVID-19 column “.The deep learning algorithm can screen and collect related information from many data effectively, eliminating the unrelated information, which is helpful to the real-time prevention and control of the COVID-19. A number of deep learning-based models are designed to extract epidemic information topics. The basic data processing flow is shown in Figure 2. At present, the deep learning models that can be used for information collection

have achieved high accuracy and fast computing speed, such as the deep pyramid CNN model, which uses convolutional neural networks for feature extraction [3].

#### 4.2 Designing an Intelligent Audit System

The public information platform can achieve efficient and intelligent audit process with the help of the audit system based on deep learning. In the intelligent audit system, the input information will first be judged whether it is COVID-19 related information, and only the related information can be passed to the next screening step. During the machine screening, the information will pass through N different deep neural networks, which will separately determine whether the information meets its corresponding requirements. As long as any provision of this information fails to comply, it will be forbidden by the machine. When the information meets all the rules, the network will finally determine whether it is relevant to the COVID-19. Because the current deep learning algorithm cannot guarantee 100% accuracy, therefore, there will be a small number of information that cannot be judged by the network. At this time, the machine will distribute this kind of information to the human auditor for further judgements, thus ensuring the accuracy of the final audit process. The whole process is shown in Figure 3

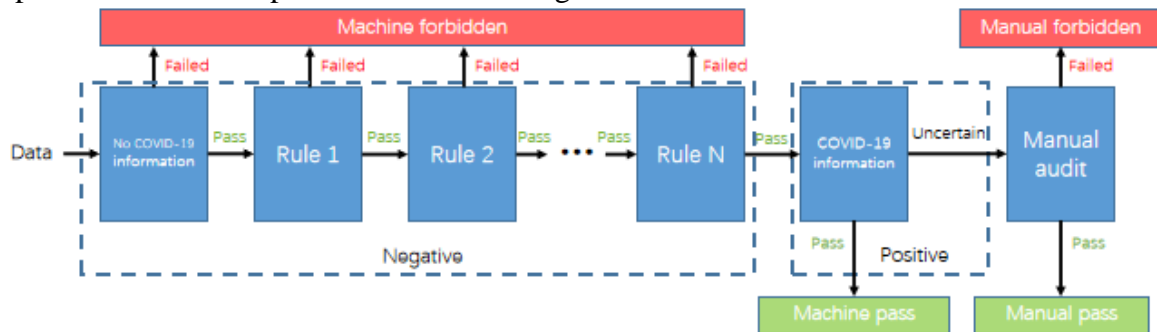


Figure 3 Intelligent Audit Technical Scheme

#### 4.3 Establishing a Management System for Covid-19 Information Classification

Deep neural networks can effectively learn potential internal relationships from input data. The deep neural network can be applied to the management system for information classification. A feasible system is shown in Figure 4.

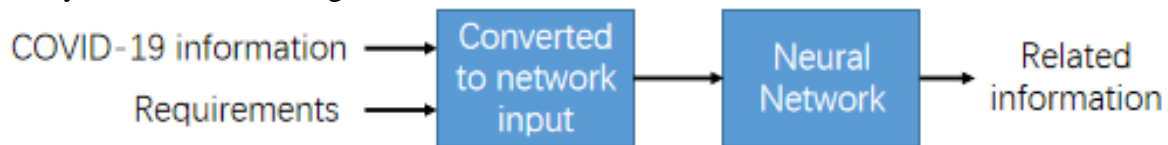


Figure 4 Management System for Covid-19 Information Classification

In this management system, the COVID-19 information and the requirements for data are first converted into certain appropriate mathematical forms (vectors or matrices, etc.) through some specific algorithms as input to deep neural networks. After a series of mathematical operations, such as feature analysis and extraction, the COVID-19 information related to the requirements will be automatically classified by the neural networks.

#### 4.4 Privacy Protection Technology Based on Homomorphic Encryption and Deep Learning

The privacy protection system of COVID-19 information platform can be constructed by combining homomorphic encryption with deep learning technology [4]. The technology flow of such privacy protection system is shown in Figure 5.

In the process of privacy protection based on homomorphic encryption and deep learning, the original privacy data of patients is encrypted by homomorphic encryption algorithm, and the encrypted information is further processed by deep neural network. Finally the processed privacy information can be output with encryption. If authorities need to access patient-related privacy information, they need to use the corresponding secret key to decrypt processed encrypted data.

Therefore, this data processing mode based on homomorphic encryption can effectively protect the user's privacy data.

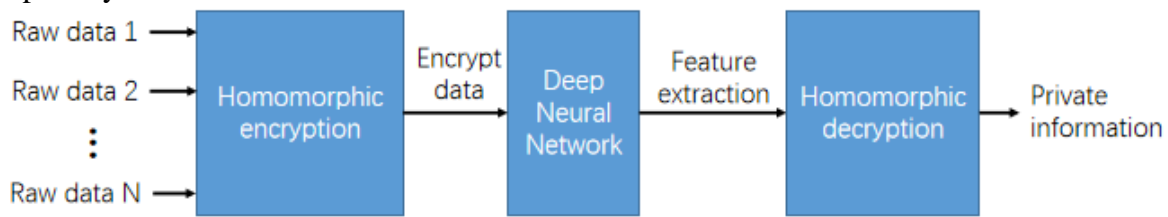


Figure 5 Privacy Protection Technology Flow Based on Homomorphic Encryption and Deep Learning

## 5. Conclusion

In the era of big data, the mass and complexity of public information, the randomness and subjectivity of information release, the fragmentation and fragmentation of information collation, and the leakage of personal information have all kinds of negative effects on the construction and development of public information platform. The deep learning technology should be properly applied, to set up the public information classification model to accurately collect the COVID-19 information, design intelligent audit system to standardize and facilitate information audit process, establish the management system for COVID-19 information classification to meet public information needs, plan privacy protection technology flow based on homomorphic encryption to protect information security and improve the intelligence of public information platform. It can be predicted that with the in-depth study of deep learning in information gathering, information standardization, information classification, and information security and so on, in the future, deep learning and artificial intelligence will give the public information platform profound changes and become the driving force of public management innovation.

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