

Research on the Application of Machine Learning and Artificial Intelligence in Business Analysis

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Abstract—Artificial intelligence is widely used in various fields, and how to apply artificial intelligence to the financial area has attracted more and more attention. It is also a hot issue of current research. The application of artificial intelligence in the economic field is critical and vital because artificial intelligence can bring substantial benefits to the economic area and transform artificial intelligence technology into products conducive to the development of the economic field. These intelligent products are used in the financial field. The field can create a more excellent value. The application of artificial intelligence in the financial field can improve the technological level of financial institutions, improve their efficiencies, and provide customers with better financial services. This paper first introduces some vital machine learning technologies. Then it analyzes the applications of big data in finance by example analysis and computational certification methods. Besides, the roles of artificial intelligence in some other fields are discussed.

Keywords- big data, artificial intelligence

1 INTRODUCTION

Artificial intelligence was established in the 1950s, and for the next half a century, it has been unknown and brought no obvious practical benefits. But now, with the rise of big data and the improvement of computer capabilities, image recognition, smart home, driverless cars, and other AI products and applications have to be seen everywhere, indicating that AI has entered the field of business, life, and public dialogue and plays a pivotal role. Experts have asserted every few years since the 1950s that it doesn't take long to reach the universal AI phase when AI systems exhibit the same behavior as humans and have cognitive, emotional, and social intelligence. But many people think that artificial intelligence is not natural intelligence, so it "greatly reduces" its role and development potential, resulting in an "AI effect." Of course, we should still maintain an objective and calm attitude exactly how to view artificial intelligence [1].

In an era of high convergence of big data, the Internet, and artificial intelligence, can we think that big data is approaching complete information in information directly or potentially? As shown in Figure 1, the answer to this question is determinative for rational innovation. All the information covered in big data is two different things from whether people can get information from big data. In other words, people's ability to bring big data is different from their ability to get information from big data. All the information covered by big data refers to all the traces left by human activities. If people want to obtain all the essential data information, the development and application of new technology must reach the top level. Expressly, all human

activities should be incorporated into the data intelligence platform (mobile Internet, Internet of Things, machine learning, block-chain, sensors, social media, positioning equipment, etc.), machine learning must reach the price and processing ability of both large quantities, multi-dimensions, and completeness, so that it can accurately predict information on the premise of searching all data. For the future, no one is sure whether it is possible to use new technologies such as cloud platforms, cloud computing, and artificial intelligence to get complete information from big data. Therefore, the most fundamental innovation in the theory of rational choice is the consideration of establishing entirely valid (unlimited data) assumptions.

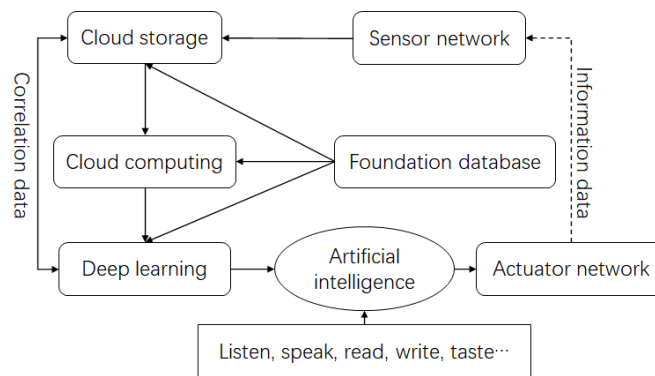


Figure 1. Artificial intelligence is based on big data, cloud computing, and deep learning

2 MACHINE LEARNING METHODS IN BIG DATA

Machine learning methods have substantial power to reveal the non-linear relation model, which is hard for the analytic mathematic methods. Generally, the Artificial Neural Network (ANN) and Convolutional Neural Network (CNN) are the two most popular machine learning methods in various fields.

2.1 Artificial Neural Network

Artificial Neural Network is abbreviated as Neural Network in Figure 2, based on the basic principles of neural networks in biology.

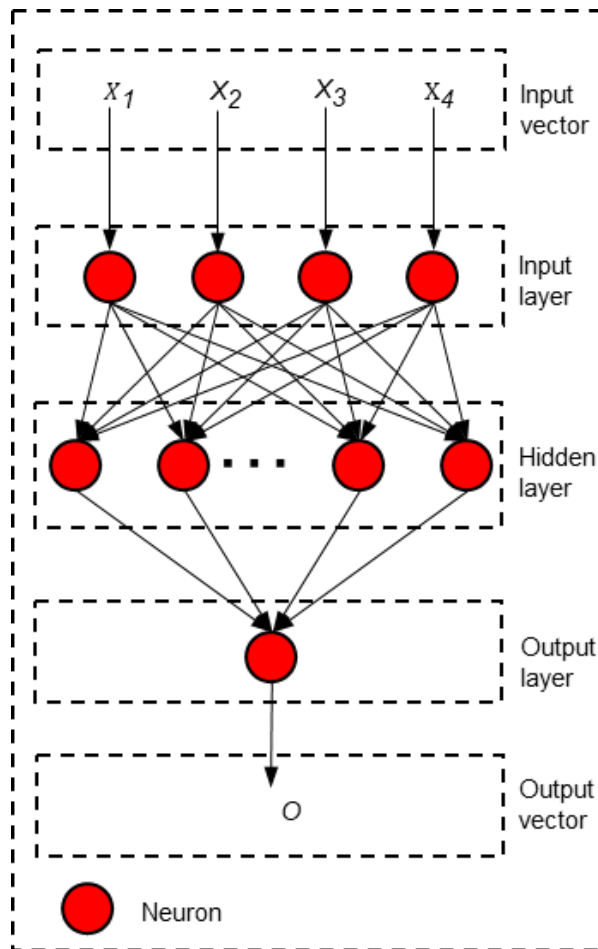


Figure 2. The structure of an artificial neural network

A neural network is a computing model composed of many nodes (or neurons) connected. In There are three types of processing units in the network form Figure 3: input, output, and hidden units. The input unit accepts signals and data from the external world; the output unit realizes the production of the system's processing results.

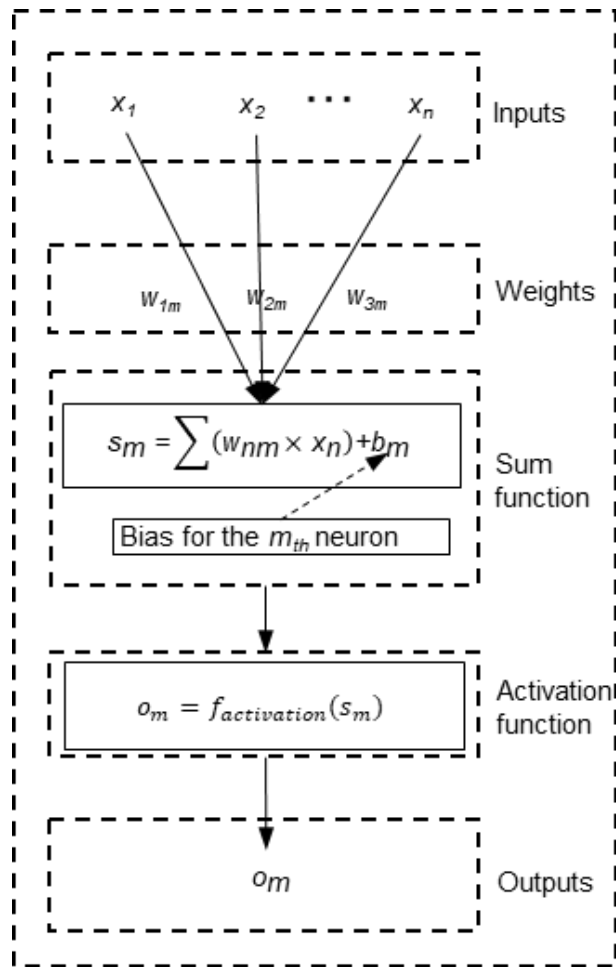


Figure 3. The data processing of neuron

2.2 Convolutional Neural Network

The difference between a convolutional neural network and an ordinary neural network is that the convolutional neural network contains a feature extractor composed of a convolutional layer and a sub-sampling layer.

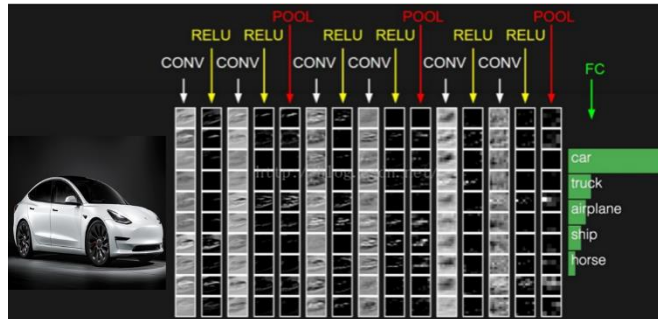


Figure 4. An example structure of a Convolutional neural network

As shown in Figure 4, convolutional neural networks are mainly composed of these layers: input layer, convolutional layer, ReLU layer, pooling layer, and fully connected layer (the fully connected layer is the same as the conventional neural network).

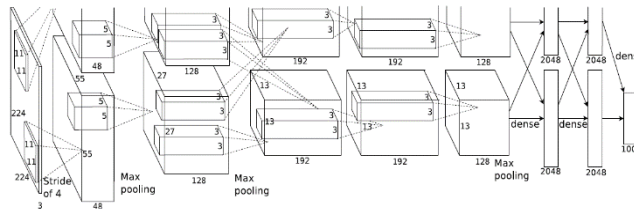


Figure 5. The structure of Alex CNN

ImageNet LSVRC is a picture classification competition. The training set includes 127W+ pictures, the validation set has 5W pictures, and the test set has 15W pictures. This article intercepts Alex Krizhevsky's CNN structure in 2010 for an explanation in Figure 5. This structure won the championship in 2010 with a top-5 error rate of 15.3%. It is worth mentioning that in this year's ImageNet LSVRC competition, GoogNet, which won the championship, has reached a top-5 error rate of 6.67%. It can be seen that there is still considerable room for improvement in deep learning. Figure 5 is the structure diagram of Alex's CNN. It should be noted that the model adopts a 2-GPU parallel structure. The first, second, fourth, and fifth convolutional layers divide the model parameters into two parts for training. Here, further, the similar system is divided into data-parallel and model parallel. Data parallelism means that on different GPUs, the model structure is the same. Still, the training data is segmented; other models are trained separately and then merged. In model parallelism, the model parameters of several layers are segmented. The same information is used for training on different GPUs. The results obtained are directly connected as the input of the next layer.

3 SUGGESTIONS FOR THE APPLICATION OF BIG DATA IN FINANCIAL RISK MANAGEMENT

3.1 Application of big data analysis techniques in the pre-loan link

The main risk in the pre-loan link is that the asymmetry of customer credit information occurs. In the process of traditional financial risk management, the collection and sorting of customer information such as individuals and enterprises lag. And the use of big data in financial risk management, with its advanced technology and strong technology application level, based on this, financial institutions related staff makes full use of big data analysis technology, collection, sorting, classified customs, taxation, and other authoritative government information data; the information accuracy is very high, often can reflect the customer actual business situation, extensive information, not only customer basic information, but also its daily business data, through the analysis of the information, and understand the current enterprise operation, essentially make up for the info not object defects. In addition, this information is often true and accurate, financial institutions on customer capital flow research, customer credit into different grades, to ensure more effective decisions, in the process of the credit evaluation system, can provide strong information support for subsequent credit transactions, conducive to the credit and after credit evaluation link corresponding risk management measures, prevent risk occurrence, to ensure the smooth and orderly development of financial risk management activities [2].

3.2 Application of big data analysis techniques in the loan link

If the information asymmetry of financial institutions in the development of credit business activities, it is easy to cause wrong approval results, which affects the smooth completion of transaction action and increases some potential financial risks. At the same time, due to the different cognition degrees of other enterprises, even the same financial institutions, the approval personnel will gain different approval results, which increases the risk of the link to the loan to a large extent. And the application of big data analysis techniques in the loan link, it's based on scientific and reasonable, accurate and practical construction, a large amount of customer information integration, and in the financial institutions, the information and data dynamic, real-time update, and then complete sharing, for information asymmetry risk avoidance, to ensure that the financial institution's staff make approval results are more fair, fair, objective and accurate. At the same time, financial institutions with the use of big data information platform for scientific and reasonable use of data, staff can in the first time to understand enterprise products, capital flow, and other aspects of information, build a financial institutions internal information and data exchange platform, make each other institutions can timely grasp enterprise information, and then make a comprehensive, objective evaluation, on this basis to carry out a series of information risk management work [3].

3.3 Application of big data analysis techniques in the post-loan link

In the operation link of the credit model of the traditional financial industry, it is challenging to collect post-loan information related to enterprises obtaining loans, which increases the probability of post-loan risk of financial institutions. Therefore, it is also essential for financial institutions to do an excellent job in post-loan risk management. Practical application of big data in Financial Risk Management, Financial institution staff are based on big data technology, Collect and organize the relevant information after the loan through the corresponding platform, It contains not only the outflow and inflow of capital, And there are product sales and other aspects of the content, After summarizing and organizing the collected information, Financial institutions, with comprehensive data analysis technology, Accurately understand and grasp the

operation of the enterprise after the loan, Track and monitor business operations in real-time, Timely discover its possible problems in the process of operation, Rein the first time, Adopt effective response measures, To continuously strengthen the effectiveness of financial risk management, This can also essentially minimize the chances of risk[4].

In the context of important social data, financial marketing needs to be more accurate. First, the launch end directional upgrade, the economic attributes are more prosperous and more granular dimensions: subdivided school age, vocational information, second, higher accuracy, optimize training samples, increase more feature set, divide long-term interest and short-term interest demand; third, more behavior integration, payment behavior data depict consumption state and sub-cultural characteristics [5].

4 PERFORMANCE OF AI IN VARIOUS FIELDS

4.1 AI + Medical

Big data has opened the development trend of digitalization and informatization in the medical field, and artificial intelligence technology analyzes complex medical data through algorithms and software to approximate human cognition. The AI thus makes it possible for computer algorithms to pre-order conclusions without direct human input. In particular, AI can also improve the input efficiency of electronic medical records, and the electronic input of patient information requires a lot of time and energy. It is already feasible to record every patient's medical history through video, and AI and machine learning obtain more valuable information by retrieving the information in the video. In addition, virtual assistants like Amazon Alexa can enter real-time data at the patient's bedside or help caregivers handle routine patient requests, such as drug additions or notify detection results. All in all, AI can significantly reduce the management workload of healthcare workers.

In 2017, a medical robot called Xiao, which exceeded 96% of candidates with 456 points, passed the national physician license. In August 2018, there was a competition between doctors and machines involving 36 sociologists from all over the country, representing the highest level in the field in China. They compete with AI in terms of time consumption and accuracy. Diagnosis of whether the shadow on breast ultrasound is malignant in terms of speed and accuracy. In the end, AI beat human doctors with a total of 91 points. At present, the annual growth rate of Chinese medical imaging data is about 30%, while the yearly growth rate of the number of radiologists is only 4.2%. This phenomenon means increasing pressure on radiologists to process imaging data in the future, yet AI technology can solve this difficulty.

One of the methods for AI detecting medical images is the Sobel operator [6] detection, for each pixel of the image $\{f(i, j)\}$, considering its weighted difference in the upper, bottom, left, and right collar points, with the most significant weight close to the neighborhood. Artificial Intelligence + financial investment in Figure 6.

The application scope of finance is also constantly expanding. And the financial, economic structure, and financial foundation in the traditional sense differ significantly from the development of the modern social market in the new era. In the financial investment sector, Artificial intelligence has intelligent investment, anti-fraud, investment prediction, and other directions of the application, Combining machine learning and knowledge mapping techniques,

Conduct data modeling and calculation, By analyzing historical transactions and big financial data, Automatically identify abnormal behavior and malicious fraud from the data, And to monitor the alarms, Or so to predict the stock market (using deep learning systems and network maps, Deep capture user information and user behavior, Then accurately depict the user portrait from different dimensions of occupation, income, risk preference, social class, and character characteristics, To provide customers with accurate and personalized investment solutions and suggestions.

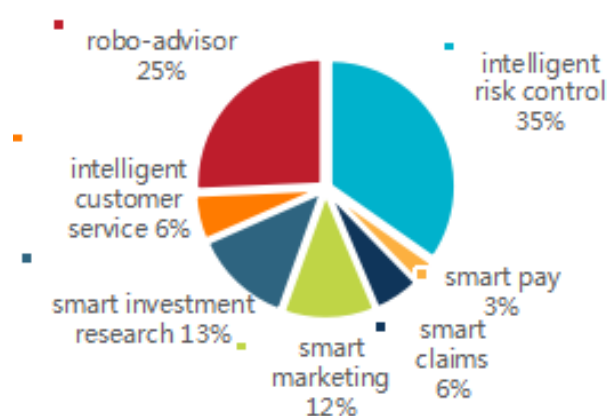


Figure 6. Distribution of investment and financing enterprises in China's artificial intelligence + financial-industry

4.2AI + risk control

The development stage of financial technology represented by "Internet + Finance" belongs to the "channel revolution." Due to its technical attributes, artificial intelligence has more advantages in identifying and responding to systemic financial risks. Currently, some international regulators such as the Australian Securities and Investment Commission (ASIC), Singapore Monetary Authority (MAS), and the Securities and Exchange Commission (SEC) are using artificial intelligence for suspicious transaction identification, such as identifying and extracting stakeholders from evidence documents, analyzing user trading trajectory, behavior characteristics, and related information, and cracking down faster and more accurately against crimes such as underground money laundering. In China, the application of artificial intelligence in risk control is mainly data collection and processing, risk control and prediction model, credit rating and risk pricing, and realizing real-time monitoring of financial supervision. In terms of risk control and management, artificial intelligence relies on high-dimensional big data and artificial intelligence technology to conduct timely and effective identification, early warning, and prevention of risks, including four processes: data collection, behavior modeling, user portrait, and risk pricing [7].

On the evening of August 12, 2021, Huaxi Securities (002926. SZ) disclosed the semi-annual report of 2021, the first half to achieve the operating income of 2.508 billion yuan, up 19.79% year on year; the net profit of 930 million yuan, up 0.81% year on year.

5 CONCLUSION: FUTURE OUTLOOK FOR AI TECHNOLOGY

With the empowerment of AI technology, the transformation of global enterprise competition mode, coupled with the urgent internal transformation and upgrading of the industry, the new finance will be a long-term "gold" industry both in the development trend of The Times and driven by social and economic development. There is no doubt that a new gold financial feast is coming. The world will become a typical representative of the successful application of 'AI + finance' in the future. The development of the modern financial industry cannot be separated from big data. The era of big data makes the financial sector achieve a brand-new improvement.

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