

A CRITICAL STUDY ON BIGDATA AND AI CONCEPTS IN NETWORKS

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ABSTRACT:

The applications of network technology have exerted profound influence on the artificial intelligence. This big data contains enormous economic, social, industrial, scientific values and has become the focus of attention of all walks of life. Further Artificial intelligence (AI) improves the performance and effectiveness of computer network technology. Now the computer network technology has been upgraded constantly and the computer technology has been applied more and more extensively, which bring a lot of convenience to people's life. An attempt made in this article takes artificial intelligence in the background of big data concepts by exploring network technology applications, which provides some reference for the research. Therefore, artificial intelligence is in computer network technology plays a very important role with Big data.

Key words: big data, application; network management; artificial intelligence; computer network technology

1. INTRODUCTION: The use of artificial intelligence in computer networks can improve the ability of computer information processing, take corresponding treatment methods for different problems and ensure rapid information processing in case of information security. Big data contains a lot of information, including economic, social, scientific value and other aspects. Artificial intelligence is a combination of network technology, computer technology and communication technology. It has amazing data processing capabilities and has unique advantages in the processing of big data. Therefore, in the context of big

data, it is of great significance to study the application of artificial intelligence in computer network technology. In general, big data has the following characteristics:

1. Volume: - Big data contains large amounts of data. Judging whether a problem belongs to big data is also based on this judgment.
2. Generate Velocity: - The data contained in big data changes very quickly and generates a large amount of data in a short time.
3. Multi-source heterogeneous:- There are many sources of data and the modes are complex.
4. Value:- The data contained in Big Data is disorganized and has a particularly low value density.

For any data research, the ultimate goal is to convert to value and big data research is no exception. The key technologies for analyzing big data include three aspects. (1) Data platform (2) Data Analysis Platform (3) Display platform

2. LITERATURE REVIEW

[Li Jie ,Wu Jinsong , Hu Bin Wang, Chonggang et, al., 2020] examined the deployment of Big Data and artificial intelligence for network technologies in e-health, Intelligent Transportation Systems (ITS), Industrial Internet of Things (IIoT), and smart cities in the term of computing networks. The big data and AI driven network technologies also provide an

unprecedented patient to discover new features, to characterize user demands and system capabilities in network resource assignment, security and privacy, system architecture, modelling and applications, which needs more explorations. The focus of this special section is to address the big data and artificial intelligence for network technologies.

[Bolanle A.Ojokoh, Oluwarotimi W.Samuel, OlatunjiM.Omisore et, al., 2020] presented a research approaches to Big Data, Analytics and Artificial Intelligence in different domains. Here presents the challenges and issues that can be explored in the future. Big data technologies, Analytics and Artificial Intelligence are great tools with capabilities to accomplish complex tasks at levels beyond human skills.

3. ARTIFICIAL INTELLIGENCE – CONCEPTS

The development of computer network technology depends on artificial intelligence technology. Artificial intelligence mainly refers to the use of computing technology in order to achieve human thinking and behaviour and achieve the intelligent computer technology through the simulation of computer technology. The artificial intelligence is characterized by the integration of different disciplines, different technologies, different resources and data in order to realize the embodiment of intelligence, mutual transmission of information, and sharing and exchange of resources. The methods that can be implemented through genetic algorithm and artificial neural network. The genetic algorithm is mainly combined with the evolutionary mechanism in genetics to

realize artificial intelligence; artificial neural network is to realize intelligence by simulating the activity of nerve cells inside the brain. Both genetic algorithm and artificial neural network can realize the application of artificial intelligence in computer networks to have more targeted data analysis capabilities and computational capabilities and to improve computer data processing. Figure 2.1 is the most common AI-machine learning platforms currently in use. These learning platforms use their own programming paradigms and are based on AP, BSP and SSP parallel models.

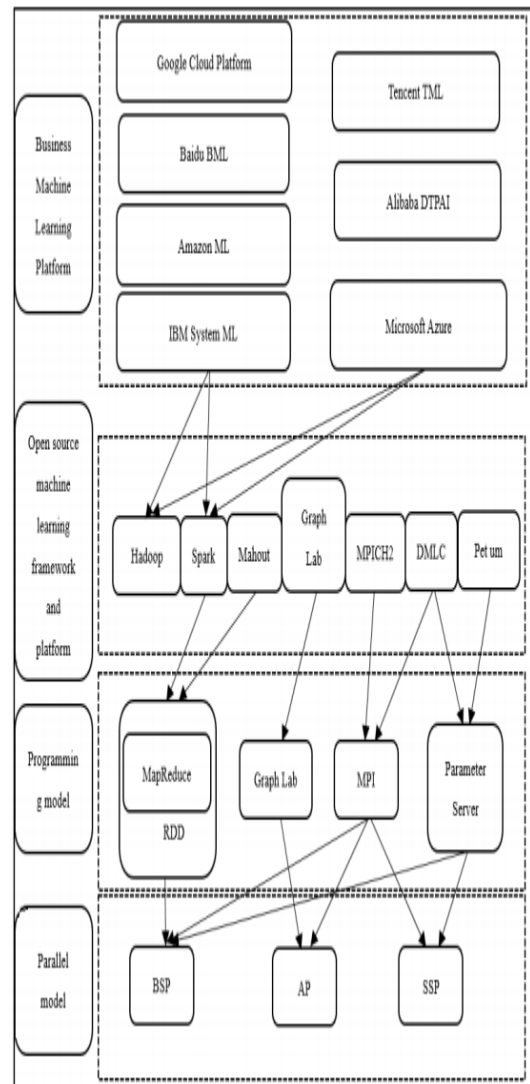


Figure2. 1 Typical machine learning platform architecture

Machine learning platforms are in comparison, which includes the parallel computing model, the abstract data structure used and the fault tolerance mechanism, as shown in Table 2.1 From the comparison data, we can conclude that no platform is suitable for the design of the learning platform. No platform is the best. In practice, only the most suitable one is selected according to different requirements.

Table 2.1 Comparison of typical machine learning platforms

Platform	Data Structure	Parallel Model	Fault Tolerance Mechanism	Extensibility	Communication efficiency	Stability	Applicable scene
Mahout	---	BS	Checkpoint	Low	Low	Higher	Recommended System + Smallscale Machine Learning
Spark	RDD	BDP	Checkpoint	Higher	Higher	Higher	Largescale

			nt linkage				e data processing + smallscale machine learning
GraphLab	Graphable	AP	Checkpoint	Higher	High	High	Largescale graph calculation
Preminum	Non	SSP	----	High	High	Low	Largescale machine learning

The application of artificial intelligence in the field of computer network security management includes only three aspects: intrusion detection technology, intelligent anti-spam system, and intelligent firewall technology. (1) Intrusion detection technology. (2) Anti-spam technology. (3) Firewall technology.

4. THE MELDING OF AI , ML AND BIG DATA IN NETWORKS

AI and big data can work together to achieve more. First, data is fed into the AI engine, making the AI smarter. According to software company XenonStack, the ultimate goals of AI are as,

1. Reasoning
2. Automated learning and scheduling
3. Machine learning
4. Natural language processing (the ability to understand human speech as it is spoken)
5. Computer vision (the ability to extract accurate information from an image or series of images)
6. Robotics
7. General intelligence

The ML and AI are two very powerful tools that are emerging as solutions for managing large amounts of data, especially for making predictions and providing suggestions based on the data sets. They are, however, very often appear to be used interchangeably in spite of some parallels. ML is sometimes brought up as a subspace of AI based around the concept that we can let the machines learn for themselves by providing them access to large amounts of data. On the other hand, AI is the extended and wider perception of machines becoming capable of carrying out tasks in an intelligent way. Compared to the generalized AI (a generalized AI system, in theory, can handle any task), applied AI is more suitable for next-generation communication systems as the applied AI system can be devised to adeptly controlling and optimizing the wireless networks. Unlike ML models, AI models reach out the world, accustom to the changes and rebuild themselves . While ML is great for predictive analytics, AI

goes beyond predictions and prescribe plans/suggestions with implications to realize a benefit. Managing wireless networks that grow in size and complexity becomes very difficult since there is need to integrate new elements and technologies to benefit from the technological advances. The amount of data such large and complex networks produces are too large and too complex. Machine learning and artificial intelligence are useful for analytics as they can extract valuable information from the raw data and generate insightful advice and predictions. ML and AI are expected to assume the primary role in the development and evolution of analytics, but analytics will not reduce to them. ML is largely developed from AI, hence the two overlap. ML has tools to extract relevant information, suggestions, and predictions from the data sets that are too large and too complex. While AI has a wider scope: to replicate human intelligence or some aspects of it and other cognitive functions. Furthermore, for non-recurring events, there is no historical data to rely on, hence the real behavior of the network will diverge from the predictions. The ML and AI are becoming potential to help MNOs to address areas which are new and there are no historical data, or too complex to understand with traditional approaches. The ML and AI tools can correlate multiple sources of Big data and find what is relevant. They may also reveal interrelations and dependencies that were not previously identified because their automated mechanisms have the capability of anatomizing and inspecting Big data more intensely and more methodically. Although human expertise is useful in confining the focus to produce solutions

and to manage complex problems, it has limited capability in finding novel solutions and insights.

4.1 Data-Driven Coverage and Capacity Optimization of Next-Generation Cellular Wireless Networks: The conventional network-centric architecture cannot capture all of the nuances that can affect service quality. Mobile operators need solutions that provide them with an analysis capability that captures all the information relating to the network and subscribers into a single enterprise relocation platform that can help remove the assumptions involved in fault isolation and reduce mean time to repair. The MNOs are suitably positioned to exploit big data analytics because of their access to huge amounts of data. The big data analytics engine/agent can produce/predict the following analytics based on its data, primarily from two sources, such as the network data and the subscriber data, which are then exploited to design and optimize the network.

4.2 Challenges and Benefits: Although employing big data analytics for control and optimization of networks and wireless networks is very attracting to the MNOs (mobile network operation), it comes with some challenges. The process of managing and leveraging of a huge amount of data, designing algorithms for dynamic and effective processing of sizable data sets and then exploiting the insights from the data analytics in networks can pose unique challenges. The prime concerns for the MNOs emerge from the extent of effort, skills, and workforce needed to manage and operate a big data platform. However, the most important and difficult challenge is more likely to stem from the loss of

direct control that the MNOs still have over the wireless network. The loss of direct control is incurred from the combination of automation and real-time operations within the big data analytics framework. However, the huge complexity of the next-generation networks makes the automation inevitable and handover or relinquish that level of direct control is imperative.

5. CONCLUSION: The artificial intelligence will play a more and more big role when it is applied to computer network technology now and in the future. The artificial intelligence in computer network possesses a strong application prospect. The study of this paper, it can be concluded that in the context of big data, many things in the work need computer network support to complete and people's lives cannot be separated from the computer network. But so far, the application of artificial intelligence technology in computer networks has been still in the process of research. Artificial Intelligence in the Network Applying artificial intelligence technology to computer network technology can ensure the security of data in the network. Future in big data and artificial intelligence can handle data sets, orchestrate multiple infrastructures, monetize data, and make decisions based on valuable analytics insights. For feature selection, data-size and feature space compliance, active-incremental-manifold-imbalance learning on big data, uncertainty modelling, sample selection, classification/clustering, etc., there are many tools and methodologies that can be applied for big data analysis.

REFERENCES

1. Cai Zixing. *Artificial Intelligence and Its Applications [M]. 5th Edition. Beijing: Tsinghua University Press, 2016.*
2. Chuanlin Wei. *Discussion on the Application of Artificial Intelligence in Computer Network Technology [J]. Computer Knowledge and Technology, 2015,29:151-152.*
3. Cheng He. *Discussion on the Application of Artificial Intelligence in Computer Network Technology [J]. Information & Communication, 2016,03:180-181.*
4. He Yumei . *Analysis of Application of Artificial Intelligence in Computer Network Technology [J]. Electronic World, 2017(11):38-39.*
5. Huang Liping. *Application of Artificial Intelligence Technology in Computer Network Education [J]. Computer Optical Disk Software and Application, 2014, 10(12): 134-135.*
6. *Institute of Telecommunications, Ministry of Industry and Information Technology. Big Data White Paper [R]. Beijing: Institute of Telecommunications Research, Ministry of Industry and Information Technology, 2014.*
7. Jia Guofu, He Shumeng. *Artificial Intelligence in Computer Networks [J]. Digital Technology and Applications, 2015(7):100 - 103.*
8. Ming Mao. *Research on the Application of Artificial Intelligence in Computer Network Technology [J]. Electronic Technology and Software Engineering, 2016,09:255-256*
9. Shiping Tan. *Analysis on the Application of Artificial Intelligence in Computer Network Technology [J]. Silicon Valley, 2013,18:11+4.*
10. Yifei Peng. *The Application of Artificial Intelligence in Computer Network Technology [J]. Scientific Consultation (Technology and Management),2016,06:38.*
11. Zhang Lei, Zhang Yi. *Big data analysis by infinite deep neural networks [J] . Journal of Computer Research and Development, 2016, 53(1) : 68 – 79.*
12. Zhang Ni et al. *Review of Artificial Intelligence Technology Development and Application Research [J]. Coal Mining Machinery, 2009, (02): 4-7.*
13. Li, Jie , Wu Jinsong , Hu BinWang, Chonggang , et .al., (2020) , *Introduction to the Special Section on Big Data and Artificial Intelligence for Network Technologies , (English)In: IEEE Transactions on Network Science and Engineering, ISSN 2327-4697, Vol. 7, no 1, p. 1-2*
14. Bolanle A.Ojokoh, Oluwarotimi W.Samuel, OlatunjiM.Omisore et, al., (2020), *Big data, analytics and artificial intelligence for sustainability , ScienceDirect Scientific African journal Scientific African 9 (2020) e00551 .*