



## Role of Artificial Intelligence in the Computer Network: Review

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### دور الذكاء الاصطناعي في شبكة الكمبيوتر

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Accepted:

17/7/2024

Published:

30/9/2024

### ABSTRACT

A combination Artificial Intelligence (AI) with networks systems increases from efficiency and performance of the networks. Today routine life needs huge of data and applications shared between people that lead to a traffic load on networks, therefore intelligence networks produces are important abilities of AI in controlling and avoiding troubleshooting. Also AI improves from security and management of databases. Effective high-intelligent networks operate networks in automation systems. It is one of the most hopeful computer networks future. The development of artificial intelligence in the computer network relies on the importance of applications security and cloud computing.

In recent years, a big development has occurred in Artificial Intelligence and majority of computer networks that leads to the of AI in the applications of network techniques. This paper reviews a role of combination of Artificial Intelligence with Computer Networks. Discussed two topics combination of AI in the computer network (Cloud Computing and Security). AI in cloud computing increases efficiency and significant networking. In addition, reduced the cost and minimized base of clouding. Artificial Intelligence controls huge amounts of databases in the cloud avoiding problems in heavy traffic networks. AI is a good solution in cyber-attacks, also solving most problems of security. Today more intelligent interaction with computer networks. Automate solutions in more application applying successful training and testing data sets. Artificial intelligence contributes to all fields of life and encourages the development of new technologies and uses. More robots, data automation, and many applications in the Internet of Things are expected.

**Keywords:** Artificial intelligence; Computer network; Cloud Computing; Security, Network.



## INTRODUCTION

Artificial intelligence (AI) is a set of technologies that aim to create systems capable of understanding, learning, thinking and making decisions similarly to humans. Artificial intelligence can provide best service technologies in intelligent technologies that improve the quality and efficiency of the computer network operations and provides expert decision-making producers, which will solve problems with easier methods, in addition its improves maintenance of the management of complex of network [1]. Artificial intelligence plays an important role in developing and improving networks [2]. It is used to improve network performance by improving the speed and efficiency of communications and improving quality of service. AI is also used to detect cyberattacks, protect data, and provide network security [3]. In addition, artificial intelligence is used to analyze data and to make strategic decisions, guide policies and plan in the field of networking.

The field of cybersecurity has faced big problem in the hacking attacks of various species harming forms. All attacks caused losing billions of dollars in companies. Security companies are used Security Information and Event Management (SIEM). They are examples of artificial intelligence and natural language processing (NLP). There is another way to solve problems of attack by sorting data from high risk to low risk and protecting attacks types .Therefore, using AI in the field of computer network leads to developing the skills of ethical hackers, it is a solution to understanding security threats, as well as the ability of machine learning to derive a new technique to protect information and achieve security.

The two popular applications of artificial intelligence in the computer networks are clouding computing and security. This paper is organized for reviewing role of Artificial Intelligence in computer network and explain steps of development AI in security network. The following sections as giving more details in subject.

## Artificial Intelligence in Clouding Computing

Hybrid Artificial Intelligence (AI) and Cloud Computing have been fields in recent years .Cloud computing refers to computing services on the internet also Internet of Things (IoT) Smart devices connect with (IoT) closely, Cloud computing supports services to IoT applications. Cloud computing can share and evaluate data to a network, it is sharing resources as shown in Figure (1)

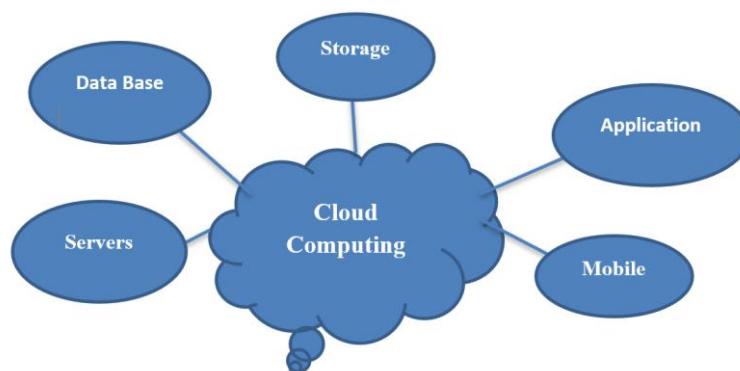


Figure (1) Shows cloud computing [4].

The combination of AI and Cloud Computing has successful potential in the different fields of industries, healthcare, finance, manufacturing, and transportation. In this review paper, we will explore the methodologies and implementation of using AI with Cloud Computing. Computer resources are centralized on a server, which can be accessed when needed. Internet data packets generated by (IoT) are easily transmitted through cloud computing. The hybrid of artificial intelligence with cloud computing provides more efficiency for end-users. In [5] discuss important role of AI in cloud computing and explain ability of AI in the minimization big data of data management to increase from security. Data stored in huge data-base needs management to be more performance and reliable. In [6], Mohammad Riyaz Belgaum et al applied combination AI and cloud that helps in automation method gives a reliability for analysis data and exchange. Artificial intelligence enables achievement computers networks in a smart technology. Intelligent behavior minimized big data and control in software-as-a-service (SaaS) providing accurate information. AI based on the tools of Machine Learning, Support Vector Machine and fuzzy systems, all of which can be used with computer networks. The cloud computing and AI provide better solutions for different solution in many influential common applications of computer networks, specially relays in data network security. B. Rajkumar, T.Gopikiran and S.Satyanarayana[7] used a hybrid neural network and cloud computing in the field of medical diagnosis. This paper developed a user interface design for cloud computing, the design increases efficiency and accuracy in the implementation and accuracy of medical cancer diagnosis. X. Wen and Y. Zheng [8] achieved validity of the reliability in the layer cloud service. This model can be adapted to other types of related models, the integration of AI provide power effectiveness and reliability to the new business model. Zhi Zhang et al [9] applied neural network in cloud computing, the platform of cloud computing is developed in the hardware and software function, hardware focuses in single-chip microcomputer design, the neural network removes the useful data store. The result of experiments gave improvement in data minimization and faster computation V. Prasath et al [10] applied fuzzy logic in clouding computing, the model worked in

specification field of Internet Service Provider(ISP). Fuzzy Inference System (FIS) provide ability to eliminate the ambiguities occurs in the cloud computing data. This idea is improved by clouding computing. Pooja Chopra and RPS\_Bedi [11] improved response time and accuracy of resources of public cloud by using fuzzy logic. The existing system has Gaussian membership function contain three input variables and one output variable. Artificial intelligence technology can provide more intelligent algorithms and service technologies, effectively solve various problems in computer networks, and develop tools that increase magnitude of the computer network operations aspect: Lower Costs [12], Automation and Data Management.

### Artificial Intelligence in Security of Network

Artificial intelligence is an important tool in the field of information and cyber security. AI has the ability to improve the security of systems and data and combat cyber-attacks. Cyber security prevent unauthorized access computer networks from cyber-attacks[13 ] In recent years the cyber-crimes has been increased in the world[14] , variant attacks effect to remote work environments .Statically common crime attacks[15] between 2020 to 2022 are shown in the figure(2) .

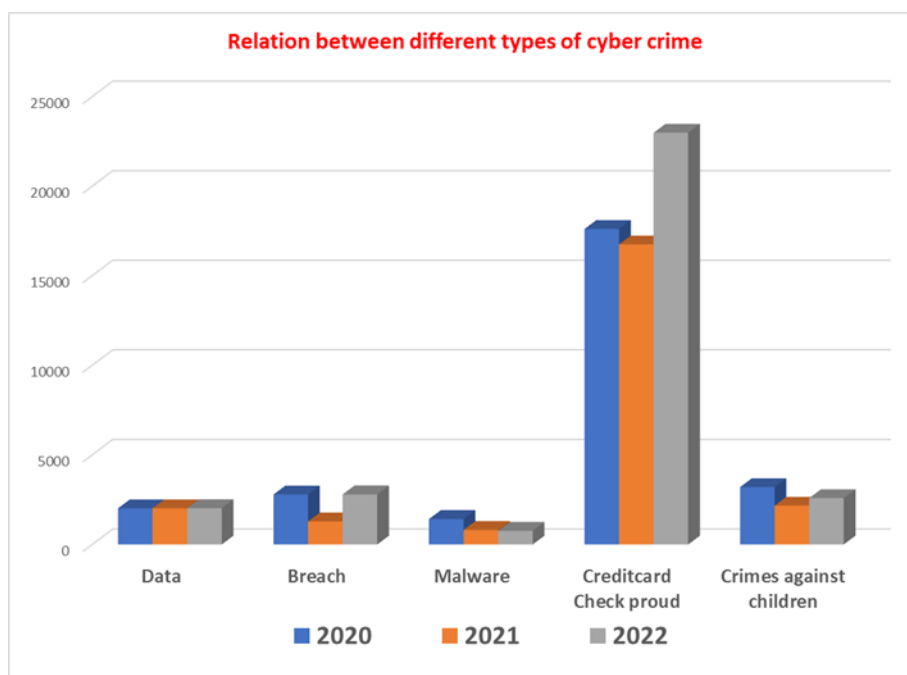


Figure (2) Shows Values of Cyber Attacks[15]

Artificial intelligence is considered a robust way to protect computer network from cyber-attack because to provide ability expect system. There are several ways in which artificial intelligence can contribute to enhance information security and recognize attacks, AI can learn from behavioral models of attacks and recognize abnormal patterns that indicate the presence of an attack or unwanted activity [16].



AI can predict potential attacks and warn information security teams before they happen. Artificial intelligence can improve detection systems that monitor various networks and systems, identifying threats and attacks more quickly than a human can improve biometric security. AI techniques can be used in biometric and facial authentication to verify the identity of users and ensure that only authorized people have access to sensitive information.

Artificial intelligence can analyze malware patterns and suspicious files to detect and prevent them. However, it should be noted that AI is not a complete solution and should be combined with other methods of information security such as two-factor verification, software updating, and security training for employees. Cybersecurity requires comprehensive efforts to prevent threats and protect sensitive information because cybersecurity not give suitable protection from attack [17]. The general AI tools can be applied in security system are: (ANNs, Robots, Deep Learning, Fuzzy and Data Mining). Dipankar et al[18] discussed Machine Learning (ML) works on cyber security, the fundamental of proposed ML focused on features extraction for reducing dimension and classification. ML application in cyber security have taken an important role in the cyber security ML system. ML works in the detection malware, which has ability to inform characteristics of the features detection of malware in advance [19]. The neural network (NN) has ability to recognize attack in cyber security .NN requires initial training and testing, it can recognize unknown attack .In [20] Artificial Neural Network recognized type of attack ,which it is achieve a higher accuracy in classification .It approximate 99% of known attacks types and accuracy 87% types unknown of attacks .Halenaar Igor et al improved the security of control systems communication ,it can classify data packet successfully, experiment selected 5000 sets, it is used 2000 set in the learning neural network also group of 1000, 2000 and 3000 set for testing[ 21].

In general, Artificial intelligence techniques are used in network security at several levels, including:

- 1- Intrusion detection: Artificial intelligence techniques can be used to detect bad intrusion attempts and identify unusual patterns of malicious activity within the network.
- 2- Attack prevention: Artificial intelligence can be used to analyze and monitor suspicious activities and identify them before they reach weak points in the system.
- 3- Immediate response: Artificial intelligence can be used to react immediately after discovering attacks and dealing with them before any damage occurs.
- 4-Predictive analysis: Artificial intelligence techniques can be used to analyze data and trends and predict any malicious activities that may occur in the future.

### Artificial Intelligence with Internet of Things

Artificial Intelligence (AI) and the Internet of Things (IoT) are both deal with independently; AI is considered in itself a revolution occurs in the world of technology. As for the technology of Internet of Things, it is progress and development when we combine them, we generate the



artificial intelligence system for things. In short, we can generate digital mind. For Artificial Intelligence learn from data in a method more intelligent. When artificial intelligence is combined to the Internet of Things due to devices works with intelligence facilities like data analyzing, make decisions, and generalized data without intervention by any help from user. In the recent year AIoT a topic for researchers to improve facilities in many applications. Combination of Artificial Intelligence and Internet of Things are used in the farming for getting smart sustainable agriculture [22]. Development of hybrid of AI and Internet of Things increased in different application in [23]. Design smart healthcare system has ability to diagnosis disease, it is achieving accuracy approximate 97.26 percent in the diabetes disease. The relationship between the Internet of Things and artificial intelligence is strong, because the Internet of Things will generate a large amount of data, and artificial intelligence will analyze this huge data to extract useful data. The concept of AIoT is still relatively new, and there are many possibilities to improve industry sectors such as the enterprise sector, industrial and consumer products and services, by using Internet of Things data to automate tasks in the workplace. Big data stream due to a huge of data related in cloud patient's information therefore need intelligent way for processing information [24]. Machine Learning applied real-time processing and distributed data resources between different disease [25]. Use the deep learning method in the Internet of Things (IoT) to be able to identify and assign a special layer to each device with a suggested name A IoT and prove the success of the system in terms of responding to the assignment of computing tasks reasonably. Ravi Teja discusses effective using AI with IoT in society life [26]. The future of artificial intelligence and the challenges facing the world of technology The Internet of Things (IoT) and Artificial Intelligence (AI) are the two most important interests in the current business companies. It is expected shortly future that many applications will include the two most important areas in the world of technology

### Acknowledgments:

### Conflict of interests.

There are non-conflicts of interest

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## الخلاصة

حفزت الثورة الرقمية التواصل في العالم عن طريق شبكات الكمبيوتر. إن الجمع بين الذكاء الاصطناعي ونظام الشبكات يزيد من كفاءة وأداء الشبكات. تحتاج الحياة الروتينية اليوم إلى كميات هائلة من نقل البيانات والتطبيقات المشتركة بين الأشخاص مما يؤدي إلى زيادة الضغط على الشبكات، وبالتالي فإن شبكات الذكاء الاصطناعي لها قدرات في التحكم وتجنب واستكشاف الأخطاء وإصلاحها، كما يحسن الذكاء الاصطناعي من الأمان وإدارة قاعدة البيانات. شبكات الذكاء الاصطناعي ذات الكفاءة العالية يمكن أن تعمل على تشغيل الشبكات في نظام التشغيل الآلي. وهي واحدة من أكثر شبكات الكمبيوتر الواعدة في المستقبل. إن تطوير الذكاء الاصطناعي في شبكة الكمبيوتر يعد ذو أهمية عالية لزيادة أمن التطبيقات والحوسبة السحابية.

## الاستنتاجات

في السنوات الأخيرة، حدث تطور كبير في الذكاء الاصطناعي وغالبية شبكات الكمبيوتر مما أدى إلى استخدام قدرات الذكاء الاصطناعي في تطبيقات تقنيات الشبكات. في هذه الورقة نستعرض دور الدمج بين الذكاء الاصطناعي وشبكات الحاسوب. تم مناقشة موضوعين حول دمج الذكاء الاصطناعي في شبكات الكمبيوتر (الحوسبة السحابية والأمن). يزداد الذكاء الاصطناعي في الحوسبة السحابية من الكفاءة والشبكات المهمة. بالإضافة إلى ذلك، تم تقليل التكلفة وتقليل قاعدة بيانات التعتيم. يتحكم الذكاء الاصطناعي في كمية هائلة من قاعدة البيانات في السحابة لتجنب المشاكل في شبكات المرور الكثيفة. يعد الذكاء الاصطناعي حلاً جيداً في الهجمات السيبرانية، كما أنه يحل معظم المشكلات الأمنية. نحتاج اليوم إلى تفاعل أكثر ذكاءً مع شبكة الكمبيوتر. أتمتة الحل في المزيد من التطبيقات التي تطبق مجموعة بيانات التدريب والاختبار الناجحة. يساهم الذكاء الاصطناعي في جميع مجالات الحياة ويشجع على تطوير التقنيات والاستخدامات الجديدة. ومن المتوقع ظهور المزيد من الروبوتات وأتمتة البيانات والعديد من التطبيقات في إنترنت الأشياء.

**الكلمات المفتاحية:** الذكاء الاصطناعي، شبكات الكمبيوتر، أمنية البيانات، الحوسبة السحابية