AI and ChatGPT Innovations in Healthcare Cybersecurity, Computer Science, Poultry Science, and Food Production

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ABSTRACT

Artificial Intelligence (AI) and more-sophisticated language models such as ChatGPT are transforming a wide variety of fields, including health care cybersecurity, computer science, poultry science, and food production. This article examines their transformational uses, with an emphasis on predictions, automation, and decision making using AI. In healthcare, AI can improve data security, increase threat detection and operational efficiency, and ChatGPT can provide knowledge synthesis and intelligent support. In computer science, AI automates the software development and solving of problems. Artificial intelligence-fuelled surveillance, targeted management, and supply chains drive poultry science and food production to higher levels of productivity and sustainability. Some of the challenges that are faced by this technology include data quality, ethical, and environmental effects. Trans-domain tic integration is expected to be innovative, efficient and resilient.

INTRODUCTION

Artificial Intelligence (AI) has become one of the most revolutionary innovations of the 21 st century that changes various industries such as healthcare, computer science, farming, and food production. AI abbreviates artificial intelligence, and it is referred to as being a computer system that is able to

implement a task normally undertaken by a human being requiring human intelligence like learning, reasoning, problem solving, natural language understanding, etc [1]. In the realm of such capability, tools such as ChatGPT have emerged as quite powerful and with exceptional abilities in natural language processing, synthesis of knowledge, and decision aid. The introduction of AI and ChatGPT in various scientific and industrial fields has speeded up the research activities, increased efficiency, and allowed more accurate decision-making in different fields [2].

The power of AI is associated with its capacity to manage huge amounts of data quickly and far better than a human being. In medicine, such systems can be used to study patient charts, forecast epidemics, help diagnose, and design personalized plans. In the same manner, AIs in computer science automate laborious processes in computer development/application and develop intelligent probabilities in problematic calculations [3]. Applications such as ChatGPT supplement these tools by offering natural language access to code-writing, problem-solving, and the development of insights out of unstructured data, which enables more effective application of AI by both researchers and practitioners [4].

In addition to these spheres, AI also has shown great promise in the field of food production and farming. In poultry science, AI-based solutions can track the health of the animals, forecast disease outbreaks and optimized feeding patterns, and increased productivity. With such technologies, precision farming solutions are possible to not only increase efficiency but also guarantee animal welfare, and sustainability [5]. Generally, AI can be used in food production to optimize their supply chain, forecast their crop output, efficiently utilize resources, and ensure the safety standards of their food. Combining predictive analytics and real-time observation, AI helps deliver more sustainable and resiliency food systems [6].

This paper examines such applications in the light of the overlap of AI and ChatGPT with healthcare cybersecurity, computer science, poultry science, and food production. One of the major goals is to offer a cross-disciplinary take on the matter, to demonstrate how advances in one field can be used to elevate activities in another [7]. As an illustration, methods identified to enhance AI-based cybersecurity in healthcare can inform such work in food safety outbreak monitoring, and natural language processing strategies such as ChatGPT can be useful in knowledge synthesis and decision support efforts in any industry. Such cross-domain perspective highlights the multi-usefulness of AI and the increased significance of including these technologies in both research and industry [8].

AI adoption is not without challenges despite the potential it could bring with regard to transformation. Evolution of data privacy, bias of algorithms, moral, and compliance have all been considered as major issues especially on matters of data in regard to sensitive and delicate fields such

as healthcare, and food production. These challenges should be addressed so that the potential of AI could be fully achieved in a responsible and equitable way. In addition, the swiftness in AI development requires ongoing adjustment by scholars, policymakers and other members of the industry to make the best use of the emerging technologies and make them as safe as possible [9]. The application of AI and ChatGPT in healthcare cybersecurity, computer science, poultry science and food production will transform technological and industrial operations by introducing a paradigm shift. This introduction forms the background of an in-depth survey into the use and application of domain-related issues and problems and future perspectives that have been achieved by AI to create the present-day scientific and industrial scene [10].

ARTIFICIAL INTELLIGENCE IN HEALTHCARE CYBER SECURITY

Cybersecurity in healthcare has emerged as one of the most burning issues as the industry is in the process of digitalization. Hospitals, clinics and other medical facilities receive and generate enormous loads of sensitive data each day, such as electronic health records (EHRs), imaging data, prescriptions and personal IDs [11]. When this data is compromised, the results are drastic including identity theft, financial loss, privacy and in some cases even the safety of the patients. Conventional cybersecurity solutions can help but they are not always enough to reach the complexity, scale, and dynamic nature of healthcare-related cyber threats [12]. AI has proven to be an immensely useful tool to plug loopholes in cybersecurity, providing anticipatory monitoring of threats, immediate reactions and intelligent control of systems.

AI systems will use the capabilities of machine learning, deep learning, and analytics to examine networks, identify anomalies, and project the possible failures. An example of such learning is supervised learning to train the model using past attack data to find behavior indicative of malware, phishing attacks, or ransom ware [13]. An unsupervised method of learning, by contrast, is able to place abnormal behavior in real-time, despite when the system is facing new attack vectors that it has never seen before. The predictive ability enables healthcare institutions to take action before an attack goes into full swing, reducing sown time, and the volume of damage and injury caused to the patient and the facility [14].

Intrusion detection and prevention are one of the most promising areas in the healthcare cybersecurity application of AI. IDS detect intrusions and include components that use AI to identify potential bad actors and place emergent intrjections higher on the list that humans can examine. In contrast to conventional rule-based solutions, AI-based models will be adjusted to new threats and minimize false positives, thus, increasing their efficiency and accuracy [15]. Moreover, AI can supplement the endpoint security, since it can monitor health equipment (medical imaging machines), health trackers

(wearable devices), and mobile health applications. AI can help to track vulnerabilities or abnormal access patterns to make sure connected devices are not used by attackers as a backdoor [16].
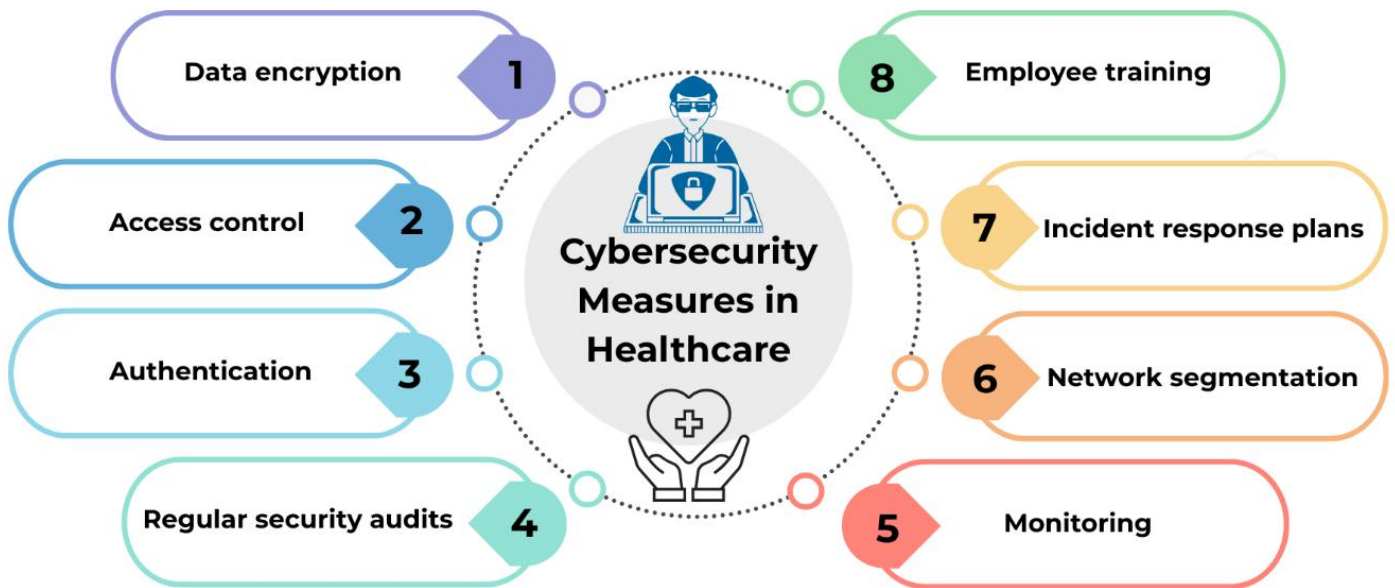

Figure: 1 showing cybersecurity measures in healthcare

The other application where AI has transformative skill is data encryption and safe data sharing. Advanced algorithmic technology can specify encryptions protocol dynamically according to the contextual risk evaluation and provide security with regard to serious medical data transmission and storage. Moreover, AI-driven analytics will be able to measure the adherence to the regulatory requirements (like HIPAA and GDPR), automatically alerting disclosures and enabling organizations to ensure they remain lawful and ethical [17].

The incorporation of ChatGPT and other like AI language models also boosts cybersecurity measures. ChatGPT can help in IT staffing by parsing logs, summarizing difficult security reports, and even writing scripts to automatically mitigate threats. Its natural language processing makes it possible to comprehend and make decisions within a very short period, which is quite important particularly in the healthcare industry where speedy interventions are of paramount importance [18]. Although AI in healthcare cybersecurity has benefits, it experiences drawbacks. High levels of data quality and availability are critical to training precise models and most firms have a disjointed or incomplete set of data. There are also concerns of ethics and privacy, over whether AI has accessibility to such sensitive patient data, which necessitates a sound governance structure. Also, highly advanced attackers can aim to attack AI systems, which might pose an adversarial threat that often requires monitoring and adaptation [19].

With its ability to improve healthcare security, IA can transform the healthcare industry by supplying

smart, dynamic, and preventative security against such a fast-growing and sophisticated threat environment. By means of intrusion detection, predictive analytics, safe data handling, and combinations with tools such as ChatGPT, AI can help healthcare facilities keep patient data secure and ensure its operational integrity [20]. In an ongoing digital transformation, AI-powered cybersecurity solutions will also be key to safeguarding the healthcare ecosystem and establishing trust, compliance, and patient safety.

CHAT GPT AND AI IN THE COMPUTER SCIENCE

Artificial Intelligence (AI) has emerged as a high-impact innovation in the realm of computers science that has been rewriting the rules of algorithm design, software development, and computational problem solving. Computer science, including programming, systems, data management, systems, and algorithm development has developed a growing interest in the use of AI because it can make systems faster, more accurate, and scale better [21]. Among the most considerable recent developments, there is the creation of large language models, including ChatGPT, that offer a natural language understanding, problem-solving assistance, and automated code generation. The marriage between AI and ChatGPT in computer science is propelling innovation in research and in practice [22].

Intelligent software development is among the major uses of AI in the field of computer science. Code optimization, bug detection, and improvement suggestions, can be made by using machine learning algorithms, so that developers can develop stronger, more efficient programs. Using AI to Integrated development environment (IDEs) may examine frequently occurring patterns in the code of the developer, suggest best practices, and allow automating repetitive operations in the given development environment, such as code formatting or documentation [23]. This saves development time as well as giving software engineers more time to devote to higher level design and innovation as opposed to menial programming tasks.

The ChatGPT, in particular, has influenced the behavior of computer sciences significantly. By learning and producing natural language, ChatGPT can support coding complex snippets and deciphering pseudo code into working programs; translating programs into natural language; and even explaining algorithms in human language [24]. Individuals as well as students find it useful in that it can be used as an interactive tutor and assistance with problem solving new programming languages, debugging errors or exploring algorithmic solutions more quickly. ChatGPT is also capable of technical writing, query automation and research paper summarization that is highly effective at streamlining productivity and knowledge management in computer science [25].
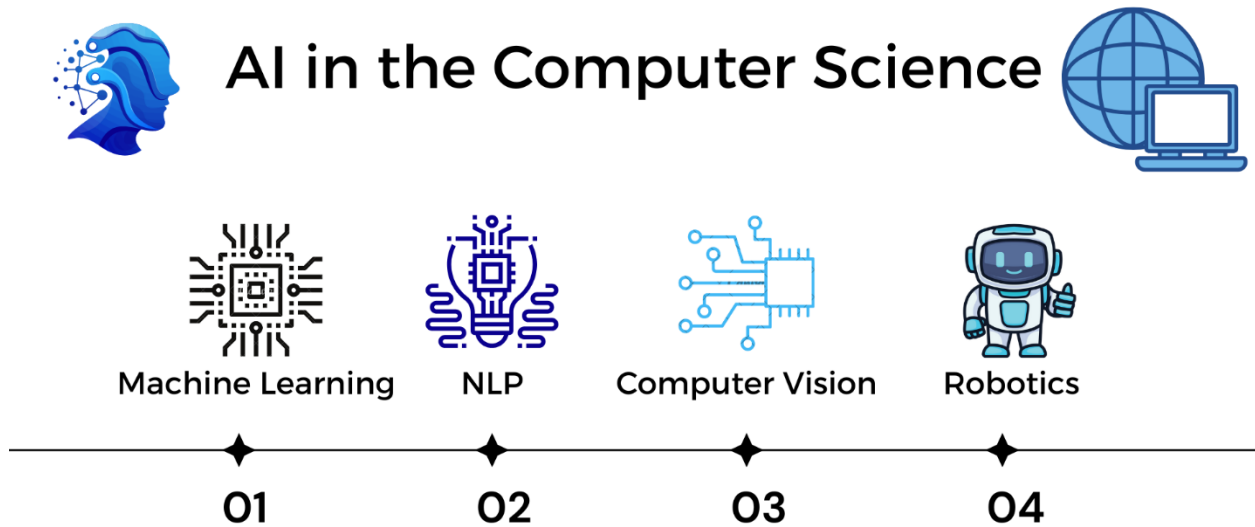
Figure: 2 showing AI in computer science

Optimization of computational systems and algorithms is also an important task that is done through the application of AI. Reinforcement learning, genetic, and neural networks can all be used to aid in solving more difficult optimization problems, including but not limited to scheduling and resource assignment, network design and data routing [26]. The approaches are able to accommodate dynamically changing circumstances, and outperform static traditional methods with regards to speed as well as effectiveness. Alongside that, AI-based systems help conduct sophisticated data analytics, where researchers can make useful findings out of huge data volumes and make better decisions in a computational experiment [27].

Other areas that AI and ChatGPT have impact are security and reliability. Intelligence monitoring solutions using AI identify and correct unusual behavior of applications, spot weaknesses, and counter hacking attacks on-the-fly. ChatGPT will be able to assist cybersecurity teams by understanding logs and summarizing the threat and providing them with corrective action in natural language, so they can respond to incidents quicker and more informed. In spite of the given benefits, the implementation of AI and ChatGPT in computer science is challenging [28]. The factors of high costs of computations, large amounts of datasets, the possibility of bias in the AI models, and the reliance on pre-designed systems are its main issues. Besides, there is a matter of moral implications when using the code produced by AI and the possibility of over-trusting the automation systems to the point where it could cause a decrease in human control over the decision process [29].

Combinations of computational intelligence and numerical methods Integration of computational intelligence and traditional numerical methods is increasingly being used in research in computational fluid dynamics; areas of interest include the Analysis of Key Parameters and Mesh Optimization in

Computational Fluid Dynamics Using Open FOAM [30]. The same can be said about the Design and Control of A Ball and Beam Balancing Mechanism Using MATLAB/Simulink, which is at the interface between intelligent computation and control theory, and uses machine learning and AI-based controllers to make the system more stable and adapting to certain challenges [31].

Analyses of Investigation of Elementary Vibrations: Derivation, Experimental Analysis, and Key Findings demonstrate how AI can establish the relationships between investigated alterations in vibrational data and outputs to computationally predict future relationships in dynamic response [32]. In environmental engineering, Mitigation of High BOD in Sewage Treatment Plants with Outfall Storage Solutions, the use of AI and computational models showed how it can be implemented to optimize real-time treatment processes in addition to predicting and making better decisions to help treat sewage with reduced BOD levels [33]. Simulation of A Two Link Planar Anthropomorphic Manipulator is used as an example to show how AI, robotics and computer sciences are united to allow intelligent motion planning, adaptive control, and simulations to be provided on complex mechanical systems to establish a bridge between theory-based models and real-life product automation tools [34].

AI and ChatGPT have the potential to change computer science as they can be used to develop intelligent software, signify sophisticated problem-solving, system optimization, and optimized cybersecurity. These technologies have reframed the discipline, relieving more time-efficient data input and knowledge compilation, encouraging learning and research, and providing creative solutions to challenging computational problems, as all set the stage forward to the next generation of smart computerized systems [35]. Their combination not only ensures an enhanced rate of efficiency and productivity but also new possibilities of innovation and interdisciplinary integration of technology.

ADVANCEMENTS IN POULTRY SCIENCE

Thousands of years ago, humans began to take some delicious fowl for a dinner, and since then, this process has never stopped. Advancements in Poultry Sciences Thousands of years ago, people started to use some nice fowl in order to have a good dinner, and since that time, this process did not stop [36]. Poultry science is a key specialization in animal agriculture and deals with the rearing, health and proliferation of domesticated birds like chicken, turkey and ducks. As the world demand of poultry products increases, efficiency in production, animal welfare, and wastage of resources became the main aims to be achieved. Artificial Intelligence (AI) is becoming a part of poultry science to overcome these problems and offer solutions that have been challenging or unavailable with conventional practices to date [37].

Animal health monitoring and disease control is one of the major usages of AI in poultry science. AI-powered systems can monitor birds through sensors, cameras, and environmental monitoring systems and track them by detecting bird behavior, signs of illness or stress and predict outbreaks of avian diseases like avian influenza or Newcastle disease [38]. Machine learning algorithms can extract trends in movement, feeding and vocalizations and detect early indicators of health issues so that the farmer can act on the problem early. This is not only better regarding welfare of birds but also decreases the risk of massive losses but also avoids antibiotics use to a greater extent making their farming more sustainable [39].

Its use is also changing nutrient and feeding management in poultry farming. AI-optimization systems can be used to assess the feeding composition and requirement depending on factors like age, weight, growth rate and environmental conditions thus called precision feeding systems. These systems also dispense feed in real time in managing who gets what nutrients whilst limiting wastage and feed costs. Also, AI models can forecast the trends of growth and performance, and the farmer can better plan the production plans and market strategies [40].

The environmental control and automation are also the spheres where AI shows great influence. The poultry houses are fitted with sensors and the Internet of Things that make measurements of temperature, humidity, lighting as well as air quality. This data is used by AI-driven systems to ensure the best possible conditions of birds and their productivity [41]. A case-in-point is climate control algorithms that regulate ventilation and heating in real time, so as to ensure that no environmental stressor is allowed to influence growth rates or immune response. Automated surveillance decreases the amount of labor and increases consistency and accuracy in farm management [42].

It aids in genetic selection and breeding programs in poultry science. The predictive models can be used to examine extensive data on phenotypic and genotypic traits to select birds with favorable traits including fast-growing, high egg production, resistant to disease or feed-efficient. AI helps to boost the rate of genetic gain and improve the flock metallic in general by means of supporting the breeding choice process with scientific data. Although there are benefits of using AI in poultry science, the adoption of AI in poultry science is still a challenge [43]. The high cost of implementation, large technical prowess, privacy and sensitivity of sensor networks and their reliability are Greek revenue claw back high points.
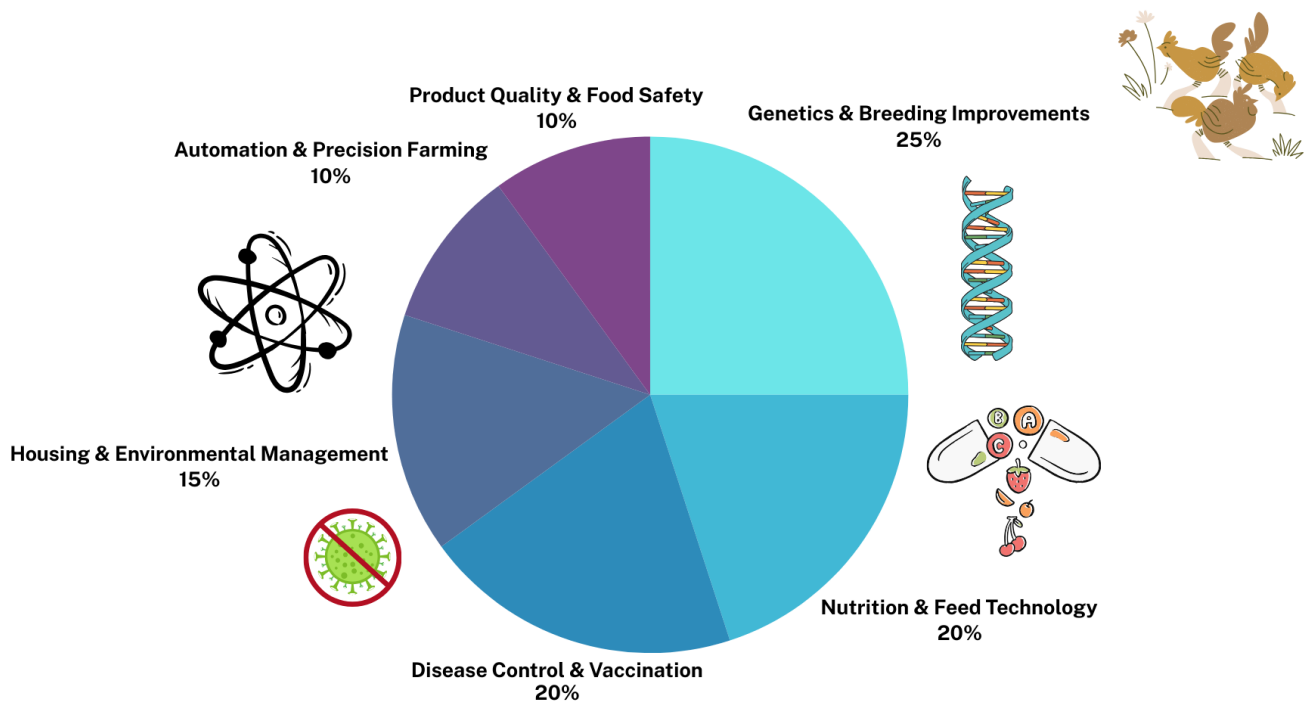
ADVANCEMENTS IN POULTRY SCIENCE

Figure: 3 showing advancements in poultry science

The effectiveness of the AI systems is conditional on the competency and amount of gathered data; faulty or inadequate data can decrease the performance of the model [44]. Its use is radically transforming poultry science through the provision of novel tools in health monitoring, nutrition/feeding, environmental control, and breeding selection. These technologies empower farmers to better their productivity, have better animal welfare, as well as make better decisions with more sustainability and efficiency [45]. With further change of AI, it is inevitably bound to be fused with the use of Internet of Things (IoT) devices, robotics, and predictive analytics, which is expected to bring about even greater improvements and thrust upon poultry science as a science that is rather technology-driven in the now-contemporary agriculture [46].

USE OF AI IN FOOD PRODUCTION

Food production is a multifaceted, resource intense process involving agriculture, herding, food chains and supply systems. As populations continue to grow in the world with food demand also on the increase, the world needs technology that support efficiency, sustainability, and food security as a matter of urgency. The application of Artificial Intelligence (AI) has become one of the revolutionary instruments in this industry, allowing to have predictive analytics, automation, and optimization at different points of food production [47]. The potential market benefits of AI integration in the production industry include the possibility to make data-based decisions, minimize

waste, enhance the quality of the product, and optimize the productivity, in general [48].

Precision agriculture is one of the main uses of AI in food manufacturing. AI-based solutions process data collection on the environment, soil, crop status, weather conditions, and satellite maps to make the most out of planting, irrigation, and fertilization. Machine-learning algorithms get the potential to forecast crop yields, show preferential signs of disease or pest attack, and prescribe specific responses [49]. These forecasting abilities enable farmers to optimize production using a minimum amount of water, fertilizers, and pesticides and thus attain more sustainable and cost-efficient agricultural activities. Even more, AI systems can be used to model various cultivation scenarios and assist the farmer in the development of strategic decision making to augment yield and quality [50].

The investigations on the tailored development of controlled release organogel containing nifedipine with the quality by design approach introduce the application of AI to optimize formulations and predict release behavior and production efficiency, which in the food domain, could be used to control nutrient release and preservation through food production [51]. Delivery of Anticancer Agents Using Phytochemicals in Cancer Therapy: Phytosomes A promising delivery system that demonstrates the promise of encapsulation and targeted delivery, where AI-design of food supplements can be done with an optimized bioavailability and health advantages [52].

Application to formulation and evaluation of oral supersaturable self-micro emulsifying drug delivery system itraconazole is parallel to the production of emulsified food where the predictive AI modeling foresee their stability, solubility, shelf-life, etc [53]. Controlled drug delivery system-oral organogel- a new strategy in minimal disruption organogel- addressed the issues of structuring techniques that can be used to guide AI-informed optimization in functional foods and nutrient gels [54]. Cubosomes Novel Generation Nanocarriers in Cancer Therapy and Other Applications, illustrates the use of nanoscale encapsulation approaches, where the AI can provide a model and optimise an equally effective approach towards food fortification, flavour encapsulation, and delivery of bioactive molecules in a more efficient pattern [55].

In the larger food production industry the role of AI in livestock management is also very fundamental. Poultry science is not the only area where AI can be used because the possibilities are limited to cattle and pig species and aquaculture. The IoT devices and sensors monitor feeding behavior, health conditions, weight gain, and behavior [56]. The population of animals is investigated by AI algorithms to reveal anomalies, forecast development and maximize the schedule of feeding, as well as guarantee animal welfare. This strategy can not only make the process more productive but also lowers its operation cost and increases the quality of the products produced making the food production more efficient and sustainable [57].

Another field that AI has been showing great influence is in supply chain optimization there are high chances that food production will require timely transportation, storage and distribution. With AI-driven analytics, the demand can be predicted, possible bottlenecks can be spotted, and logistics can be optimized to minimize spoilage and waste [58]. Having foreseen the changes in the consumer demand and market trends, thanks to AI, producers, distributors, and retailers have the opportunity to coordinate their mappings in a more competent way, so that food can reach the consumer in the most competent way, and at the same time minimizing the losses. Also, the concept of traceability can be improved by using AI, as it will enable different stakeholders to trace food along the farm-to-fork chain that will be vital in management of food safety, quality control and legislation [59].

USE OF AI IN FOOD PRODUCTION

01. CROP & LIVESTOCK MONITORING
02. PRECISION AGRICULTURE
03. FOOD PROCESSING & QUALITY CONTROL
04. SUPPLY CHAIN OPTIMIZATION
05. SMART PACKAGING & FOOD SAFETY
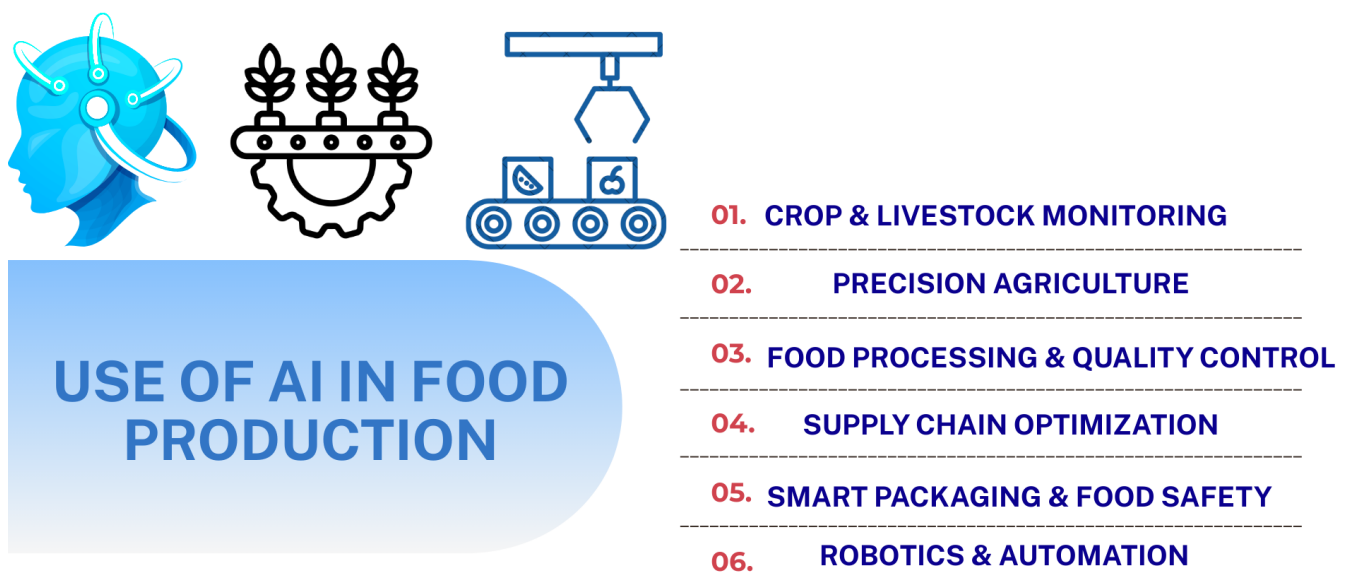06. ROBOTICS & AUTOMATION

Figure: 4 showing use of AI in food production

Other fields in which AI can be used are quality control and food safety. Computer vision systems, coupled with machine learning can be used to sort and find faults in fruits, vegetables, grains and processed foods. Predictive models determine possible risks and identify the divergence between products and the safety standards to guarantee that the consumer gets high-quality and safe goods. These technologies are particularly helpful in the case of operations involving large processing where it is not feasible to undertake the manual turnover [60]. Although these benefits exist, there are still difficulties in adopting AI in the production of food. There are high initial costs and technical skills may limit adoption in poorer areas as well as there being the need of suitable data infrastructure. Ethical and environmental requirements, like the possibility to overutilize the auto-management or the power consumption of algorithmic transformation, present a challenge which has to be handled. Also the introduction of AI into current farming could also require a change in culture and operations

by producers [61].

AI is transforming food production by bringing about precision agriculture, optimised livestock, efficient supply chain and better quality controls. AI can help producers make decisions-based on predictive analytics, automation, and real-time monitoring, to minimize waste and boost sustainability. With the technology further changing, bringing it in various areas of robotics, IoT, and advanced analytics is likely to change the food production sector in ways that will make the global food systems more robust, efficient, and able to scale up to meet the population surge [62].

INTRODUCING AI INTO THE FIELDS

Significance of interdisciplinary convergence of the Artificial Intelligence (AI) in the areas of healthcare, computer science, and poultry science and food production constitutes a strong model of innovation, productivity and problem-solving. All these fields are in themselves benefitting due to AI applications, but the intersection of all the issues, techniques and technologies has the potential of producing multiplied effects and so delivering transformational results that move across conventional boundaries [63]. Through replacing such areas, AI will bring about comprehensive solutions to complex problems in health, agriculture, computing and food systems.

In the field of healthcare and computer sciences, advanced cybersecurity solutions and data management strategies can be created with the help of integrating AI. Anomaly-detection I algorithms initially authored to identify anomalies in medical records or network security can be implemented to observe other critical infrastructures, such as food production systems or automated poultry farms [64]. Similarly, computer science computational models and optimization algorithms can be used to further improve AI-based predictive analytics in agriculture and management of livestock to make them more efficient, and allocate available resources more effectively. Language models, such as ChatGPT, can be used to work across domains, allowing to communicate naturally in a different domain and synthesize knowledge and provide automatic decision support [65]. As an example, they could interpret research data, prepare reports or produce actionable knowledge that can serve professionals in various fields of study to bridge intelligence gaps and speed up innovation.

Hybridization between AI in the poultry field and food production in general exemplifies the pragmatic value of combining the two. Analysis of predictive models designed to optimize poultry health, growth, and feeding can provide guidance in long-term management of livestock management in other food production lines, including cattle or aquaculture. Likewise, AI-driven surveillance (e.g., IoT devices and computer vision systems) can be homogenized among farms and production facilities to provide both real-time data capture and centralized reviews [66]. Through using AI to cross-reference data feeds in many sources, producers can gain a cohesive view of operations, facilitating

consideration of proactive measures and better management of resources [67].

The optimization of supply chains is another application where AI that is cross-domain is beneficial. Healthcare logistics in managing resources utilization such as medical supplies could be applied and modified to administer food products in the system to reduce the wastage of foods; enhance the supply of food products through the supply chain, and increase efficiency. Predictive analytics used in one industry can be exported to another, to help companies predict needs, ensure inventory optimization and minimize operating expenses [68]. The possibility to transfer knowledge and approaches between fields can prove the multifaceted areas of AI, its applicability to many areas and its ability to increase holistic decision-making.

In addition, interdisciplinary AI use in applications ensures sustainability and resilience. The AI-based diagnostics in healthcare minimizes unneeded interventions and resources use. In farming and food production, program generates minimal waste, economy of energy use and maximizes produce. When these technologies are combined, there is the possibility to develop eco-efficient systems by balancing productivity and environmental stewardship [69]. Also, ethical and regulatory frameworks that emerge in sensitive applications such as healthcare may also be used as agents to apply ethical AI adoption in the contexts of agriculture and food production, henceforth transparency, safety, and equity [70].

Although the potential is so huge, integrating AI in various areas is not an easy process. Different data, maintenance of privacy, and use of interoperable systems demand diligent strategy and administration. Stakeholders have to make sure that models trained in one sector will always work and be effective when they are applied in another sector, discuss ethical components and reduce biases [71]. Once cross-domain integration into AI has been achieved, collaboration between domain experts, data scientists and policymakers is essential in order to derive maximum benefits.

Concerted efforts to combine AI in the context of healthcare, computer science, poultry science, and food production are synergistic and increase efficiency, sustainability as well as innovativeness. Interdisciplinary AI applications also imply that informed decisions are made, resources are optimized, and improvements are implemented system-wide by using predictive analytics, natural language processing, IoT technologies, and advanced computational models. Such a systemic way of looking at AI gives it the potential to be one of the most powerful forces in the world, capable of handling the most sophisticated problems and supporting closer co-operation between traditionally disparate fields [72].

DIFFICULTIES AND ETHICAL QUESTIONS

The emergence of Artificial Intelligence (AI) in healthcare cybersecurity, computer science, poultry science, and food production are extremely promising, yet they pose a great number of issues and moral dilemmas. Although AI has the ability to streamline the operations, boost productivity, and offer innovative means of doing things, there may be a need to exercise utmost caution about the associated risks, implications to society, and governance [73]. Being aware of these challenges is imperative to developing a responsible and sustainable AI in many areas of application.

Data quality and availability can be considered as some of the main obstacles towards AI adoption. Other applications, such as AI systems, have to have a lot of precise and exemplary data to operate. Such incomplete or fragmented electronic health records in healthcare may lessen the quality and validity of predictive models and limit the safety of patients [74]. Equally in poultry science and food production, variance in sensor data or lack of sensors over time may reduce food safety, poor animal welfare or resource allocation, or crop management. The problem of lack of data or low quality of data sets may lead to biased results, which is why having sufficient data quality collection and curation and validation techniques are essential [75].

In healthcare and food systems, privacy and security issues are extremely important. Application of I systems may need access to highly confidential personal and or operational information, basic security risks may occur. The size of the healthcare cybersecurity market would require securing information on patients against unauthorized access, whereas AI in food production can require using proprietary information that can be utilized commercially [76]. Moreover, as AI systems become objects of cyber-attacks themselves, their robustness and resilience is a necessary requirement. Ethical codes have to put a heavy emphasis on confidentiality, transparency and accountability in data utilization [77].

Another ethical and practical problem is connected with the issue of algorithmic bias. The existing inequalities or errors can be found in historical data which will be learned by the AI models. In healthcare, discriminating algorithms might give unequal treatment recommendations or diagnosis to a given demographic. Bias in predictive models can have a disproportionate impact in agricultural and food production on smaller farms or in particular geographical areas. To mitigate these biases, it is necessary to actively keep track of them, gather and include a variety of data with transparent evaluation to confirm a fair and just approach [78].

The possible substitution of human labor is also a factor to consider. AI-powered automation will make the processes of computer science, poultry farming, and food production much faster to operate as they will not require manual work. Although this may increase efficiency, it has its socioeconomic

effects especially on workers who are conventionally in agriculture or technical support fields. A trade balance to mitigate these effects entails balancing automation with a workforce development and retraining programs and human oversight [79].

Ethical questions carry on the authority and the accountability of decision-making. In the case of the AI systems, the cause of faults made or poor performance outcomes becomes complicated as the system has become able to make suggestions or even perform actions without any human input. In healthcare, the wrong AI-driven diagnosis might prove potentially deadly to the patient, and incorrect analysis in food production or chain route optimization may result in spoilage or contamination [80]. Clear governance arrangements (regulatory), compliance, human-in-the-loop regulatory mechanisms are necessary propositions to ensure a level of accountability. The impact that the AI technologies have on the environment cannot be overlooked. Model training and deployment costs, particularly on large-scale language models such as ChatGPT, are computationally demanding and energy-intensive [81]. In the agrarian sector and food production, AI and the integrative connection with IoT devices and automation can also escalate energy usage. It is also important to facilitate sustainable AI practices, energy-efficient hardware and optimized algorithms so as to reduce environmental impacts [82].

The potential of Ihas is transformative across many industries and sectors, although its use has to consider the quality and privacy of data, safety/security needs, bias in algorithms, labour substitution, responsibility and concerns about the sustainability of its operations on the environment. Ethical considerations are paramount to the responsible AI implementation to make sure that technological changes will benefit the society in an equal and safe manner [83]. Through the use of strong governance frameworks, transparent processes, and cross-disciplinary cooperation, the stakeholders may ensure that they can maximize the benefits of AI whilst reducing the risk; and it may lead to a successful, ethical, and sustainable innovation in the field of healthcare, computer science, poultry science, and food production [84].

CONCLUSION

Artificial Intelligence (AI) and other sophisticated language models, such as ChatGPT, are becoming a growing factor in contemporary science and industry with use across healthcare, cyber security, computer science, poultry science, and food production. In this review, it can be noted that AI has a transformative potential in the following areas, where it will provide tools of predictive analytics, automation, optimization, and decision support. The cross-pollination of AI technologies across industries not only optimizes efficiency and levels of productivity but also opens up the possibility of collaboration of different-discipline practitioners, and the innovations that produce solutions to

complicated problems at both local and postponed levels.

In healthcare AI, one of its most prominent applications is protecting sensitive healthcare-related data, real-time detection of threats, and real-time addressable of risks caused by ever-growing cyber-attacks in healthcare. ML-based anomaly detection algorithms as well as AI-based data analytics can offer predictions that are ahead of conventional security solutions with AI-based data analytics also contributing to better decisions as well as efficiency. Moreover, language models such as ChatGPT help people to work more efficiently and have an effective assistant in IT professionals who can automatically provide all the necessary information, analyze and write reports fatly. Being the ultimate digitalization of healthcare systems, the use of AI and natural language processing will be invaluable when guarding privacy of patients, adherence to regulatory requirements, and integrity in medical processes.

AI and ChatGPT have disrupted the area of computer science by means of software development, problem-solving, and computational modeling. Smarter coding tools, predictive algorithms and optimization methods enhance speed and minimize programming errors as well as handle complicated analytical tasks. The ChatGPT on the one hand in particular fills the gap between the understanding of a human and machine learning model, such that developers are able to create code, resolve problems and gain access to knowledge through natural language questions. AI in computer science delivers cogent progress by simplifying workflows, enriching knowledge sharing, and building improved research society in the endeavor of more stable, effective, and scalable technologies.

The field of poultry science and the food production system in general has not been an exception when it comes to the transformation that has been instilled by AI. Forecasting tools, environmental sensor networks and precision feeding systems have the double benefit of enhancing animal welfare, maximizing production and minimizing resource waste. Equally, AI in crop management, animal tracking and optimizing supply chain allows producers to act using data, reduce losses and maintain food safety and quality. The ergonomics of AI in the agricultural and food system will enhance sustainability in how it lowers the environmental imprint, increases resource utilization, and resilience to climate variations and market fluctuations.

Nonetheless, though the benefits associated with the use of AI are manifold, there have been concerns with its implementation in various aspects. The questions referring to the data quality, algorithmic bias, privacy issues, jobs loss, and ethical considerations are still important. Sound governance infrastructures, transparent approaches and multidisciplinary teamwork are necessary to remedy these issues. Ethical deployment makes AI improve the existence of nations without extending efficacy on

the already unequal or compromising accountability, trust, and sustainability levels. Moreover, it is compulsory to mitigate the environmental impact of AI technologies to ensure that innovation is compatible with environmental stewardship, especially on large-scale models such as ChatGPT.

Going ahead, the future of AI in these converging fields is very positive. The capabilities of AI will also be expanded by new technologies including reinforcement learning, edge computing, robotics and integration with IoT. Interdisciplinary studies will facilitate transfer of knowledge to healthcare, computing, agriculture and food production sectors, which will result in more dynamic, proactive and resilient systems. As an example, food supply chain security approaches can be based on their counterparts in the field of healthcare, and predictive analytics used in agriculture can benefit the healthcare sector engagement in terms of resource allocation. In the future, ChatGPT and similar language models will support communication, research synthesis, and decision-making across many disciplines and improve human-AI collaboration.

AI and ChatGPT mark a paradigm shift in business operations, research, and solution to the challenges faced by industries. These technologies are revolutionizing the world of healthcare, computer science, and poultry science and food production because they are facilitating more intelligent decision-making, more efficient processes, more sustainability, and more cross-domain innovation. The successful integration that they have gone through, with propriety and responsibility as a guiding principle, however, is poised to revolutionize the global systems and as such it can be worked out to the betterment of the society, bringing resilience as well as sustainable growth even in the future.

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