UTILIZATION OF ARTIFICIAL INTELLIGENCE IN THE AGRICULTURE AND FOOD INDUSTRY

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Abstract

The world population is increasing day by day and it is expected that it will reach over 15 billion by upcoming 25 years. With the growth in population we require agricultural and food production by 75% to fit the need. It is a serious challenge for the country and agri-food industry. Artificial Intelligence is a technology which is developed for the motive of understanding the nature of machines. AI is used in machines and computers. Artificial intelligence and machine learning has a multiple predictive methods amalgamation to ameliorate the food and agriculture sector. It has some limitations that should be analyzed by contributor.

Keywords: *Artificial intelligence, machine learning.*

Introduction:

The sustainability of the agricultural sector is the key to ensuring food security and the eradication of hunger for the ever-growing population because it is estimated that the global food production must increase by 60–110 percent to feed 9–10 billion people by 2050. A well-documented traceability system has become a requirement for quality control in the food chain as a result of the emergence of several food safety scandals and incidents, such as akin to dioxin in poultry and bovine spongiform encephalopathy. In addition, weather and climate change conditions, as well as sustainable water management due to water scarcity, are crucial challenges in the coming years. For these reasons, urgently, the establishment of a well-documented traceability system is needed. Helping farmers and stakeholders improve their decision-making through the adoption of sustainable agriculture practices is a vital choice for anticipating effective solutions, especially the use of digital technologies like cloud computing, artificial intelligence (AI), and the Internet of Things (IoT) Also widely utilized are location intelligence technologies combined with the subgroups of AI (machine and deep learning algorithms). Our review's major objective is to outline the key uses of machine learning and artificial intelligence in the agri-food industry.

Artificial Intelligence and Machine Learning Approach:

Artificial intelligence (AI) is a tool for creativity that models how technology, primarily computer systems, robots, and digital equipment, comprehend human intelligence and ability. Artificial intelligence (AI) has several uses, including natural language processing (NLP) to understand spoken human language, computer vision to view analog-to-digital conversions

like video, and speech recognition and expert systems to imitate judgments. The three cognitive processes that go into AI encoding are learning, reasoning, and decision-making. Learning involves gathering data and then developing algorithms to turn it into usable information, and self-correction (constantly adjusting designed algorithms to ensure that they deliver the most accurate results). Artificial intelligence (AI) is a tool for creativity that replicates human intelligence and aptitude processes through technology, primarily computer systems, robots, and digital equipment [4]. For example Natural language processing (NLP) can comprehend spoken human language, while computer vision can observe an analog-to-digital conversion, such as a video, and voice recognition and expert systems can simulate judgment. The AI encoding is based on learning (acquiring data and then developing algorithms to transform it into actionable information), reasoning (selecting the appropriate algorithm to arrive at a desired result), and As three cognitive abilities, self-correction (constantly tweaking created algorithms to ensure they deliver the most accurate results).

Applications of Artificial Intelligence in Agriculture and the Food Industry:

The employment of ML algorithms in the primary four clusters of the agriculture supply chain (preproduction, production, processing, and distribution) is currently gaining importance [15]. In fact, ML technologies are applied throughout the preproduction stage, particularly for the forecasting of crop yield, soil characteristics, and irrigation needs. The ML could be utilized for illness identification and weather forecasting in the following step of the production phase. Utilizing ML techniques is used in the third cluster of the processing phase, particularly to predict the production planning to achieve a high and secure product quality. ML algorithms could be applied to the distribution cluster as well, particularly for consumer analysis, storage, and transportation. The first step is the preproduction cluster.

The first link in the supply chain for agricultural goods is the preproduction cluster. It primarily addresses crop yield forecasting, soil characteristics, and irrigation needs. For better plant management, many studies stress the significance of crop yield production. In fact, by incorporating input data (equipment needs, nutrients, and fertilizers) into effective models based on ML algorithms, these precision agriculture tools seek to encourage stakeholders and farmers to support the best decisions in crop yield forecasting and advance smart farming techniques. The Bayesian network, regression, decision tree, clustering, deep learning, and ANN are some of the recent ML techniques utilized for crop yield prediction. Multiple ML algorithms are applied in learning in accordance with the predicted soil management properties.

18 different table olive cultivars from around the world were examined by Ben Ayed et al. [16] using morphological, biological, and physicochemical criteria as well as the Bayesian method to examine the effects of these factors on tolerance, production, and oil content. They demonstrated that the crop's tolerance had a significant impact on oil content. The regulation of irrigation, which has a significant impact on the crops' quality and yield, is another critical factor in the preproduction cluster. In fact, researchers used soil moisture data, precipitation data, evaporation data, and weather forecasts as input data for simulation and optimization of predicted models based on ML appropriate algorithms to achieve a successful irrigation system (better timing, location, and irrigation volume decisions).The second stage of the

agricultural supply chain is the production cluster. Numerous variables have an impact on and are important in the phase of crop production. They include crop protection against biotic stress factors (weeds and diseases) and abiotic stress factors (nutrient and water deficit), crop quality management, and harvesting. The weather forecasts (sunlight, rainfall, humidity, etc.) are also included.

Limitations and Issues with Artificial Intelligence (AI) and Machine Learning (ML):

Nevertheless, despite all these benefits, there are also disadvantages to the AI technology that pose difficulties. First and foremost, the greatest social problem is potential unemployment. Since robots and intelligent machines could take over most monotonous jobs, there will be a significant decline in human involvement, which will have a negative impact on employment standards. Other technological issues, such the fact that machines can only perform the jobs for which they have been designed or programmed, and that if they are asked to perform anything else, they often fail or provide useless results, could be a significant hindrance.

The high cost of building and maintaining intelligent machines and computers could also be seen as a technological limitation of AI, especially given that AI is constantly evolving and that means that hardware and software must also be updated over time to keep up with the most recent demands. Machines require costly repairs and upkeep.

Due to the complexity of the devices, the creation needs significant costs. These applications' high cost, which could raise the cost of the goods, is another problem. In addition, there may be certain sustainability risks and concerns beyond the benefits provided by smart and computerized technology, such as the enormous energy consumption, the e-waste problem, market concentration, employment displacement, and even the ethical framework.

Conclusions

The food and agriculture sectors are among the most important to humanity. In order to get to the final user or customer, the first agricultural products are utilized as inputs in a number of multifactor distributed supply chains, including four clusters or phases (preproduction, production, processing, and distribution) of the agriculture supply chain It is urgent to use digital technologies at various stages of the agriculture supply chain, such as the automation of farm machinery, use of sensors and remote satellite data, artificial intelligence, machine learning for improved crop monitoring, and water, due to a number of challenges facing the agriculture and food sector in the future as well as various factors like climate change, population growth, technological advancement, and the state of natural resources (such as water).

References

1. A. Suprem, N. Mahalik, and K. Kim, "A review on application of technology systems, standards, and interfaces for agriculture and food sector," Computer Standards & Interfaces, vol. 35, no. 4, pp. 355-364, 2013, view at: Publisher Site | Google Scholar.

2. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning," MIT Press, Cambridge, MA, USA.