

Review Article

Modelling Techniques to Improve the Quality of Food Using Artificial Intelligence

Varsha Sahni ¹, Sandeep Srivastava ² and Rijwan Khan ³

¹Department of Computer Science and Engineering, CT Institute of Engineering, Management and Technology, Shahpur, Jalandhar 144020, Punjab, India

²MCA Department, GL Bajaj Institute of Technology & Management, Greater Noida 201306, India

³Department of Computer Science and Engineering, ABES Institute of Technology, Ghaziabad 201009, India

Correspondence should be addressed to Rijwan Khan; rijwankhan786@gmail.com

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Artificial intelligence (AI), or AI/machine vision, is assuming an overwhelming part in the realm of food handling and quality affirmation. As indicated by Mordor Intelligence, AI in the food and refreshments market is required to enlist a CAGR of 28.64%, during the conjecture time frame 2018–2023. Artificial intelligence makes it workable for PCs to gain as a matter of fact, investigate information from the two data sources and yields, and perform most human assignments with an improved level of accuracy and proficiency. Here is a concise gander at how AI is expanding sanitation and quality activities. This exploration has along these lines tried to furnish policymakers with a way to assess new and existing strategies, while likewise offering a reasonable premise through which food chains orders can be made stronger through the thought of the executive's practices and strategy choices. This survey centers on the AI applications according to four mainstays of food security that is food accessibility, food availability, food use, and strength.

1. Introduction

Quick development of populace, reducing characteristic assets, environmental change, contracting rural grounds, and unbalanced business sectors are making the worldwide food frameworks rather unreliable. In this manner, current farming and food frameworks ought to be more gainful regarding yield, effective in activity, tough to environmental change, and maintainable for the people in the future. Therefore, the need of an innovative change is more prominent than any time in recent memory. Being a new headway in computer sciences, artificial intelligence (AI) has the ability to address the difficulties of this new worldview. Subsequently, understanding the significance and relevance of AI in farming and food area could be essential in the excursion towards accomplishing worldwide food security [1]. The major goal of this study is to create artificial intelligence and methodology for assessing and optimizing food quality and safety initiatives in the food sector. The

cost-effectiveness of the approaches examined in this study is as follows:

- (a) Aspects of general technical and economic importance to consider when evaluating food quality and safety improvements
- (b) Quantification of the relative efficacy of various AI techniques for increasing food quality with growth focus on the farm stage
- (c) Optimal (lowest cost) AI techniques for enhancing food quality at various stages
- (d) The impact of farm scale on additional expenses associated with implementation of AI techniques to improve the food quality and their distribution throughout various stages of the supply chain

This audit centers around the AI applications corresponding to four mainstays of food security (food accessibility, food availability, food use, and strength) as

characterized by FAO, in detail. The AI innovations are being applied worldwide in every one of the four mainstays of food security despite the fact that it has been one of the more slow received advancements contrasted with the rest. On the other hand, it warrants investigating the abilities of AI and their present effect on the food frameworks. It is prominent that AI innovation has a critical task to carry out later on the cultivation area. The overall AI in cultivation market is required to arrive at USD 2,075 million by 2024. Present article uncovers how AI innovations could profit worldwide farming and food area and looks at the ways by which AI can address the noticeable. Quality affirmation is acquiring conspicuousness since quality ascribes are by and large more exceptionally esteemed by governments, buyers, and organizations. Some food handling ascribes incorporated the accompanying terms described in Table 1. This higher valuation is inciting more deliberate quality affirmation by food organizations and more guidelines by government. Simultaneously, guidelines are under nearer investigation both locally and universally [2]. As requests for administrative responsibility have expanded, governments are progressively needed to utilize hazard appraisal and advantage cost investigation to assess whether existing or proposed food guidelines improve public government assistance.

The first necessary dimension in order to achieve food security is availability, which indicates the presence of food in a country through all forms of domestic production, food stocks, imports, and food aid [4]. The availability and access to food alone is not adequate, as people need to have a “safe and nutritious food.” Sufficient energy should be there in order to engage the daily physical activities after consumption of foods. Adequate sanitary facilities to avoid the spread of diseases, safe drinking water, and the awareness of food preparation and food storage are also included. Utilization, which is the third dimension, therefore, covers the diverse aspects by combining consumers’ understanding on which food to select, how to prepare it, and store them [5]. Food stability must be present at all times to exist the availability, access, and utilization of the food security. This fourth dimension highlights the importance to reduce the possibility of adverse effects on the other three dimensions [6].

Being a huge field with numerous applications, AI is likewise perhaps the most confounded innovations to chip away at. Machines characteristically are not more brilliant; a great deal of registering force and information are needed to engage them to reproduce human reasoning. A bunch of innovative and logical advances have prompted the development in the utilization of AI in genuine applications in different fields because of the huge increment of information with high computational force and huge stockpiling to enable them to reproduce human reasoning [7]. It is conceivable that a machine gains from its experience by changing their reactions dependent on new data sources given, playing out the human-like undertakings. The machines can be prepared to deal with a lot of information and perceive an example in them. At long last, AI is a data processing framework or computational framework that

TABLE 1: Quality affirmation handling different attributes of food quality.

Foodborne microorganisms
Pesticide deposits
Food added substances
Naturally happening poisons
Veterinary deposits
Nutrition attributes
Fat
Calories
Value attributes
Purity
Compositional uprightness
Convenience of arrangements
Package attributes
Package materials
Other data
Process attributes
Animal government assistance
Worker well being
Pesticide use
Worker safety

Source: Hooker and Caswell [3].

accepts information as data sources and interacts with them to prompt an easy to understand yield [8].

2. Role of Artificial Intelligence Robotics in Food Safety

By using the technology of artificial intelligence robotics, the agriculture sector would need to increase its productivity by about 70%. To successfully achieve this, in Figure 1(a), a robotic technology will need to be a core unit to secure the quality of food in the food industry. AI has a vital role to play in future food production as shown in Figure 1(b). The robotics are also the part of artificial intelligence [9].

Food and refreshment organizations are moving quick utilizing innovation for activities and calculated efficiencies and onto how to meet user’s requirements [10]. The prominent players in the industry have embraced artificial intelligence to maintain strong empathy with their audience. Rarely, has a crisis pushed the adoption of a technology in the way that AI in the food business is doing right now. The business of cultivating and selling high-quality food to consumers is being disrupted to a degree that has not been seen since the last pandemic, which occurred over a century ago. It is becoming increasingly clear that our food system was not adequately prepared (“antifragile”) for the COVID-19-induced disaster. No germs and high-quality food has been prepared by this artificial intelligence robotics scheme, as shown in Figure 1(b).

The continuing deconstruction and automation of the food supply process demonstrates that we are entering a new normal and that returning to the old reality would be impossible. Robots, augmented reality, virtual reality, three-dimensional printing, sensors, machine vision, drones, blockchain, and the Internet of things are all altering the food industry, but they all have one thing in common:

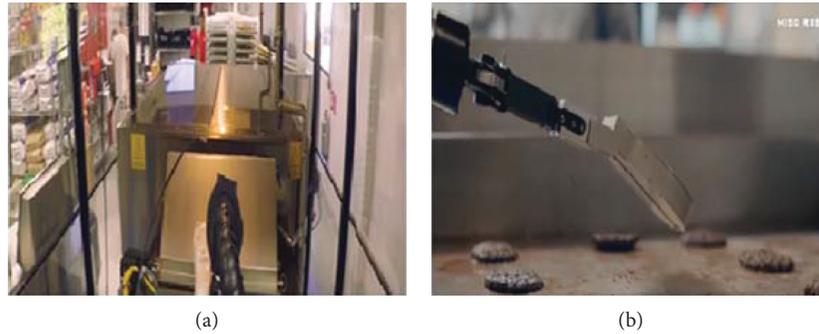


FIGURE 1: (a) A robotic workforce to secure the food quality. (b) AI role to bake cookie.

artificial intelligence is the secret code or sauce underlying them all. As the world develops post-COVID, the application of AI to increase food production is quickening, and demands of speed, efficiency, and sustainability are rising in tandem with the quickly growing population.

3. Applications of Artificial Intelligence with Its Drawbacks and Solution to These Challenges

Artificial intelligence is transforming several sectors, including government, medicine, advert, and finance to name a few that have adopted this technology. By learning the intricacies involved with big data analytics and AI, the food and beverage industry has begun utilizing the numerous predictive analysis applications offered by this technology. A fascinating certainty we found is that the worldwide AI market in food and drink organizations is assessed to develop yearly at an accumulate development pace of 42% before 2021. This has become evident by the increasing amount of food companies that are using artificial intelligence to generate more revenue and improve their productivity [11]. For the first time, the light of technology has dawned dramatically on the food industry and has been implemented without any hesitation. Artificial intelligence is now known to be impacting many aspects of the industry such as financial, production, distribution, marketing, consumption, packaging, and storage. To give a better explanation of the extensive usage of AI in food manufacturing, processing, and distribution, here are a few notable highlights [12].

4. Sorting

Sorting food requires extra attention that is paid to the specific details of the product, for example, size or colour. These factors help food companies to make well-guided decisions on the processing of various foods that will ultimately increase the purchase rate of consumers.

Figure 2 shows the companies in the food industry, such as TOMRA sorting food (tomatoes), are among the few that take the advantage of artificial intelligence to develop machines that significantly improve the sorting of food [13]. These technology-inclined systems are sensor based and use features such as cameras and near-infrared sensors to visualize food products with human perception.



FIGURE 2: AI-based robot sorting the quality of tomato.

5. Algorithm for AI-Based Robot Sorting the Quality of Tomato

- Step 1: capture image and capture the softness value
- Step 2: predict type of tomato using image processing AI technique
- Step 3: confirm prediction of AI with the softness value.
- Step 4: if confirmed, perform steps 5–7
- Step 5: if tomato is damaged, pick it and discard it
- Step 6: if tomato is not prepared, leave it
- Step 7: if tomato is prepared, pick it and store it

6. Execution of Individual Cleanliness Propensities by Workers

The significance of guaranteeing that workers in food and refreshment organizations take important individual cleanliness careful steps could not possibly be more significant. Computerized reasoning empowers organizations to rapidly identify any failures in this facet and kill them for improved food handling. In Figure 3, several CCTV cameras are installed in the restaurant; this is just the advanced feature of the artificial intelligence. With this feature of artificial intelligence, the use of special cameras equipped with facial recognition and object recognition feature to ascertain if workers are committed to keeping the laws of food safety [14, 15].

7. Reducing Equipment Repair and Maintenance Cost

Any professional in the food industry knows how much of their company's resources go into cleaning processing machines and also repairing them. Ongoing research



FIGURE 3: Investigation done via AI.

projects suggest that a system known as the self-optimizing-clear-in-place (SOCIP) which can improve cleaning time and drastically reduce resources used for cleaning including water [16]. In Figure 4, the artificial intelligence technology uses features such as ultrasonic sensing and optical fluorescence imaging to detect the tiniest amount of food leftover and microbial debris present in the equipment. This aids the optimization of the cleaning/maintenance process. Organizations can likewise use man-made brainpower in the part of machine fix and intermittent ideal working. It can rapidly identify any piece of hardware that is defective and separate them for instantaneous substitution of its corrupted apparatus. This will ultimately lead to improved employee efficiency and human resource management as there is a much better system in place to provide early detection of any fault [17].

8. Optimized Supply Chain Management

The food industry can use artificial intelligence to minimize delays and maximize profit margins by providing close monitoring of energy supply chain operation. This also helps companies to forecast for better management of pricing and stock products accurately. With growing concerns about transparency, artificial intelligence has also been utilized to track products from the farm to consumers to ensure transparency [18]. The flow of products will be cost-effective and streamlined in the best way possible with the adoption of this technique into food production and distribution.

9. Revolutionizing the Whole in Store Shopping Experience with New Products

Based on the available demographic data and statistics available, many food companies have been able to provide location-specific varieties of food flavour combinations that are targeted at a preferred group of consumers. By intently observing discussions via web-based media and utilizing man-made reasoning to break down burns through information and distinguish notions or conduct that are pivotal, in building positive encounters and in the turn of events and plan of new product offerings. This has proven to be an immense contribution to the food industry because companies can now offer unlimited forms of flavour combos, spices, and ingredients [18, 19].

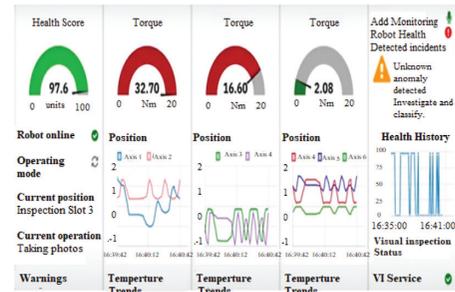


FIGURE 4: Application of artificial intelligence.

10. Personalized Customer Service

The consumer favour a more customized insight as they shop utilizing visit boxes or voice aide fuelled by characteristic language handling, and organizations can tap buyer shopping information and history to give a hypercustomized and computerized client assistance experience. Using these predictive analysis technology provided by artificial intelligence solution providers, food companies can monitor on what decisions customers do overtime and what food they always reorder [20]. This ensures that the consumers are provided with a personalized feed containing their preferred food option.

11. Better Farming Conditions

It would be every heart-warming that the farmer could cultivate better food under optimal growth factors. Companies have already begun to research how they can apply this feature of artificial intelligence technology to better suit the farmers [20]. One of company known as Sentiment aims to invent a system that can create growing conditions where the effects of factors such as light intensity, temperature, salinity, and water stress on basil can be carefully checked (Figure 5). As of yet, progress only being made in the lab is looking to come up with specific “ingredients” for making perfect foods. Modern applications of artificial intelligence in the food sector include achieving significant reductions in the downtime, reducing consumer friction at the point of sale, speed up of manual tasks, and improving worker-overtime ratio to name a few [21].

12. Challenges of Artificial Intelligence and Available Solution

So, with all the diverse ways listed above on how artificial intelligence is improving the food industry, it might hit you like a ton of bricks to hear that this amazing technology has also got its coins. While there are many benefits, there are just as many challenges. Companies have to decide whether to buy or build this technology, and ideally, food companies would develop their own unique in-house technology systems. However, to be pragmatic, a lot goes into acquiring these systems. A portion of the difficulties that join utilizing man-made consciousness in the food business include the following.



FIGURE 5: Farming done via AI.

12.1. Cost. Potential adapters face numerous difficulties with the price being the biggest among them and getting buy-in for these types of tech systems.

12.2. Integration Issues. It is never easy to integrate new technologies. This also works similar for the integration of artificial intelligence in food companies.

12.3. Proprietary Data. With the right proprietary data, food and beverage companies may not be talented to construct artificial erudition models that can execute. Given the above fundamental challenges, we will provide two solution ideas, especially for large companies with much capital that can be invested into adopting artificial intelligence technology. Food organizations that have effectively settled information investigation and a group of expert engineers can go on to securely fabricate their own man-made consciousness stage. You do not want to jump into making this decision if your company's team of developers lacks the required competency to match up with the in-house artificial intelligence system. They should be skilled enough to keep this system always updated to avoid any future troubles.

Various companies that lack such resources should find food and beverage solution providers that have already established artificial intelligence systems which will improve the front-end process and back-end process in your company. A few examples of these solution providers are SAP and bundled solutions built for food and beverage distribution. 75% of millennial in the US and UK would desire to utilize artificial intelligence innovation to get better help with arranging and preparing strong meals. Artificial intelligence is growing at a rapid pace and we have witnessed more companies within the food and beverage industry that are investing in artificial intelligence solutions for better performance. The predictive analysis provided by this cutting-edge tech is being used to resolve various critical problems in this industry. A lot of these companies have gone a step ahead to combine other areas of artificial intelligence with predictive quality analytics to create new opportunities to develop more potential products for the future [20, 21].

13. COVID-19 Pandemic and the Food Security in the Country

The recent COVID-19 pandemic has also reiterated the importance of food security particularly for developing nations. It

has brought the global economy to a precarious position where Sri Lanka also has been impacted considerably at all levels. Almost all industries were negatively affected, apart from some essential services, such as water, electricity, fuel, and those producing food (farming) and medical supplies. Continuation of food production as an essential service was a crucial decision taken by the authority in order to assure food availability and accessibility [22]. However, the food distribution took a longer time to return to normalcy. Under new normal situation, the working culture has now changed to the mode of "Work from Home." Hence, there is a need to redefine the agriculture profession, and technological needs to achieve food security based on the new needs. In such context, we firmly believe that AI applications together with recent advancement in technology have a bigger role to play. As the world develops post-COVID, the application of AI to increase food production is quickening, and demands of speed, efficiency, and sustainability are rising in tandem with the quickly growing population. Here are six instances of food sector players that have implemented AI and demonstrated how it has boosted their growth or even revolutionized the way they operate [23].

13.1. Processing. Food processing is a labour-intensive enterprise, but one where AI can increase production and minimize waste by replacing employees on the line whose sole job is to detect products that are not appropriate for processing. This form of fast decision-making necessitates the use of the senses of sight and scent, as well as the capacity to adjust to changing conditions. AI adds even more value to the table with augmented vision, which analyses data streams that are either accessible to human senses or where the volume of data is overwhelming.

13.2. Food Hygiene. AI can help to reduce the presence of diseases and identify poisons in food production.

13.3. Efficiency in the Supply Chain. While smart devices are being used to replace human labour, technology is also being used to replace human work. Food apps, drone and robot deliveries, and self-driving cars are all new methods to bring information and food to customers, and they all rely on AI.

13.4. Predicting Consumer Trends and Patterns Is a Difficult Task. AI enables businesses to stay competitive in the market by responding to diverse popular waves of diverse trends and creating market predictions.

Restaurants: following this year's COVID-19 epidemic, the future of eateries is in risk. The rise of online-based meal delivery services has shifted the focus away from the physical experience of dining establishments.

Creating more nutritious foods: for a long time, many people have believed that food equals health, but now, that we have a better understanding of human, plant, and animal genomes, it is becoming a reality. As the world progresses toward precision nutrition, changes in consumer tastes are providing potential for AI in food. One example is the increased desire for plant-based alternatives to animal protein. Creative AI

TABLE 2: A summary of AI applications in the four pillars of the food security.

Pillar	Application	Author	Technique	Remarks	Practical use of the application
Availability	Paddy land leveling system	Si et al. [1]	Fuzzy logic	Fuzzy system in the controller judges the land level	Land preparation
	Contaminated soil classificatory tool	Lopez et al. [2]	Fuzzy logic	Greater accuracy over typical computer-based models	Land and crop selection
	Stem water potential estimator	Valdes-Vela et al. [29]	Fuzzy logic	Greater approximation power compared to other models	Water management
	Soybean aphid control system	Peixoto et al. [6]	Fuzzy logic	Predict the timing and release of predators for the biological control	Pest management
	Image-based AI management system for wheat	Li et al. [7]	ANN (BPNN)	Uses pixel labelling algorithms for image strengthening	Fertilizer application time decision
	Soil moisture monitoring system	Athani et al. [8]	IoT-enabled Arduino sensors	Vastly decreases the manufacturing and maintenance costs	Reduction of COP
	System for detecting mature whiteflies on rose leaves	Boissard et al. [10]	ML	Reliable for rapid detection of whiteflies	Pest management
	AI-assisted weed identification system	Tobal and Mokthar [30]	ANN	Minimize the time of classification training and error	Weed control
	Weed identification system in paddy fields	Barrero et al. [11]	ANN	Based on areal image analysis	Weed control
	Novel weed management strategy	Pérez-Harguindeguy et al. [31]	ML	Combines UAVs, image processing, and ML	Weed control
	Field weed identification system	Ebenso et al. [32]	ANN	Improves crop/weed species discrimination	Weed control
	Expert system for diagnosis of potato diseases	Boyd and Sun [33]	Rule-based computer program	Can diagnose eleven pathogenic diseases and six nonpathogenic diseases	Disease management
	Expert system for diagnosing diseases in rice plant	Sarma et al. [34]	Rule-based computer program	Based on logic programming approach	Disease management
	Leaf image classification system	Sladojevic et al. [35]	ANN	Uses deep convolutional networks	Disease management
	System for diagnosing diseases of oilseed-crops	Chaudhary et al. [36]	Fuzzy logic	Much faster inference compared to earlier models	Disease management
	System for rice yield prediction	Ji et al. [37]	ANN	More accurate than linear regression models for the yield predictions	Yield prediction (decision making)
	System for cotton yield prediction	Zhang et al. [38]	ANN	More realistic trends versus input factors and predicted yields	Yield prediction (decision making)
	System for wheat yield pre	Ruß et al. [39]	ANN	Uses cheaply available in-season data.	Yield prediction (decision making)
	System for jute yield prediction	Rahman and Bala [40]	ANN	Could be used to predict production at different locations	Yield prediction (decision making)

TABLE 2: Continued.

Pillar	Application	Author	Technique	Remarks	Practical use of the application
Accessibility	Food desert identifier	Zhao [41]	Big data analytics and ML	Locates areas with low food access	Decision making
	Food desert identifier	Amin et al. [42]	ML	Detects food deserts and food swamps with a prediction accuracy of 72%	Decision making
	Decision tool to evaluate the performance of agriculture food value chain	Liu et al. [43]	Fuzzy logic	Integrates TFN, AHP, and TOPSIS	Decision making
	Forecasting of food production	Sharma and Patil [44]	Fuzzy logic	Forecast the production and consumption of rice	Decision making
	Forecasting of food production	Yan et al. [45]	ML	Uses ANN, SVM, GP, and GPR to forecast future milk yield	Decision making
	Supply chain optimization	Cheraghalipour et al. [46]	Evolutionary ML	Reduce held inventory and cost in supply chains	Efficient food distribution
	Supply chain optimization	Ketsripongsa et al. [47]	Evolutionary ML	Used for transportation scheduling of seafood and milk products	Efficient food distribution
Supply chain forecasting	Olan et al. [48]	ANN	Forecast the results of perishable food transportation	Decision making	
System for preparing and dispensing food	Sharma et al. [49]	Robotics	Extremely useful in pandemic situations like COVID-19	Efficient food distribution	
Utilization	Cassava roots storage system	Babawuro et al. [50]	Fuzzy logic	Uses an intelligent temperature control technique	Postharvest quality control
	Fruit storage system	Morimoto et al. [51]	Fuzzy logic and ANN	RH inside the storage house is controlled	Postharvest quality control
	Potato storage system	Gottschalk [52]	Fuzzy logic	Highly energy efficient	Postharvest quality control
	Mechanical damage detection of fruits	Vélez Rivera et al. [53]	Hyperspectral images and ML	Used as a tool for the automatic inspection and monitoring of internal defects of fruits and vegetables in postharvest quality control laboratories	Postharvest quality control
	Assorting of fruits and vegetables	Valdez [54]	Computer vision and deep learning	Fast, reliable, and labor inexpensive methods	Reduce labor requirement
Stability	Water resource management	Sadeghfam et al. [55]		Minimize the ground water overexploitation and groundwater remediation through pump-treat-inject technology	Increasing water availability
		Zahm et al. [56]	ANN		
		Zahm et al. [56]	ANN	Identify the reasons for spring flow decrease	Increasing water availability
	Supply chain quality data integration method	Wang [18]	AI integration method of block chain technology	Supply chain of agriculture products	Increasing water availability

AI, artificial intelligence; ANN, artificial neural networks; BPNN, back-propagation neural network; IoT, Internet of things; ML, machine learning.

applications have risen in response to challenges such as establishing consumer-acceptable flavour and texture features.

14. Synthesis and Way Forward

The synthesis and way forward towards the artificial intelligence plays the vital role in the examination. To achieve the high quality in food is the major agenda nowadays. The powerful techniques have to be applied. As discussed in this

study, achieving food security is the ultimate objective of future agricultural and allied sectors. A thorough review on the applications of AI in food security indicates promising signs in this regard. Within the food sector, AI could uplift existing practices and strategies in order to achieve productivity and sustainability goals efficiently and effectively [24].

As FAO [25] clearly states, achieving food security relies on top of four key pillars. This article primarily focused on the applications of AI in these four vital areas of the food

sector. There are many benefits of AI, which has been applied in the form of different tools and techniques that are user friendly and providing optimum results. These techniques are combined with other technological advancements and being applied into agricultural practices along the food value chain. Many different AI technologies have been adopted over a wide range of applications in the agriculture sector in many countries. Among those, as expected, fuzzy logic systems, ANN, and ML could be identified as the most frequently used technologies while being the pioneer concepts of this innovative branch of computer science. With the anticipated changes in trends in AI technology, we could expect differences in its complexion in applications in the future. As indicated in Table 1, many applications can be identified on the use of AI in the area of food availability. This is directly related with the objective of improving food production. As it provides direct benefits to all the stakeholders, most of the AI technology developers seem to have concentrated their efforts in this direction [26]. It would provide both short-term and long-term benefits. However, achievement of future food security does not depend solely on ensuring food availability. One of the key findings of this review is the lack of AI applications in other three pillars of food security. Nevertheless, many recent developments indicate the use of AI applications towards other three pillars of food security as well. If this promising trend continues, there is an expectation on the achievement national level food security [27]. The AI and agriculture seem two vastly different sciences. However, the evidence provided in this article suggests that the marriage between these two fields of study could yield huge positive impacts in meeting the global goal of food security [9, 28]. Table 2 presents the four pillars of the food security based on artificial intelligence applications.

From Table 2, showing the most appropriate researchers ideas about the plant tracking system is being developed using a particular AI methodology. To construct a plant surveillance system for sensing and managing a plant development parameter, namely, relative humidity, a specific AI approach is being used. The system's performance is extremely predictable and accurate, according to the data collected. Plant humidity sensors are used to monitor changes in moisture and to adjust irrigation methods. These simple adjustments in irrigation procedures increase productivity while saving water. Effective irrigation management with plant water sensors requires focused monitoring of the sensors to get the water level when the data received is within the set range for the specific growing conditions. We can utilize neural networks to anticipate seasonal fluctuations and rainfall in a region, which will aid farmers in planning their future yield.

Asymmetric sensor node deployment, gathering of insufficiently useable information and data for food deserts, and a gap between the right dataset (of which blocks are true food deserts) [42] and surveyed data based on limited/inaccurate real-world data making decisions without AI is a difficult task.

The use of computer vision and deep learning technology in agriculture seeks to improve the quality of harvests and

farmers' production. Assorting fruits and vegetables has an impact on the export market and quality evaluation at postharvest. TOMRA industry sorts the good quality tomatoes from defected tomatoes during harvesting or/and during the postharvesting phase, as shown in Figure 2. The goal of this article is to assist farmers with postharvest processing by determining whether modern AI approaches may assist in distinguishing healthy tomatoes from tomatoes with flaws [57–60].

15. Conclusion

The artificial intelligence approach provides efficient solution that helps to increase the lifetime of farming activities. Therefore, in farming, the concept of artificial intelligence is implemented which makes the task so effective and simple. One benefit of these computerized frameworks is that they offer consistent data across a scope of timescales, from hours to months, accordingly working with the advancement of models of cycles which might be explicit to a specific time span. Besides, these frameworks can promptly be utilized in business nurseries, so the inferred intelligent models are moderately simple to convey to a business setting where they can consequently be improved over the long moment.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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