Possible transformation of agriculture using artificial intelligence: business opportunities

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Abstract. Artificial intelligence is one of the promising technologies of the decade. Its capabilities are exponentially increasing and similarly its applications in different fields and areas. One of its main advantages is that it can automate any sector or industry with reduction of workforce and any unwanted aspects. It also increases the quality and the production, which is valuable in the world of overpopulation. The following article will look into the use of artificial intelligence in the sector of agriculture. The present state of the use of the technology in the agricultural sector will also be covered in details. The future possible application of the technology will be presented at the end of the work.

1 Introduction

One of the great accomplishments in algorithmic science is the creation of neural networks. This innovative approach with clever structure can change the future to the point where all processes are automated. All fields and different areas are on the verge of drastic transformation. These changes will be for some inevitable reformation in a short period of time, and for other a gradual integration. In both way, neural networks will take over with its present tendency.

The main repulsion of this approach or technology is related to uncertainty of its future reveal. Combined with other progressive technology, its capabilities rise to unimaginable level. Its possibilities to automate any system are limitless. The tendency of technology improvement is exponential. However, the technology can be used for both good and bad ways. Its integration and, hence, automation in industries mean workforce displacement or complete replacement. Its capability to maximize the production rate from one angle seems beneficial, but for the environment is catastrophic. The other issue related to the technology is dependence, as most of the routine work is carried out by the technologies powered with the neural networks. Nonetheless, these changes are already in process and will be more severe as the future gets close.

Similar to any other emergence of evolutionary technology, the masses are divided where to implement it in its full capacity or keep it stagnant with clear regulations. If judge the

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present use of the technology, one can see that it is fully engaged in different systems for maximum outcomes. Different industries are adopting every new version of the technology. Its compatibility in manufacturing attracts most of the eyes. Agricultural sector is a great example of this technology adaption. This sector is a most important part in our society as food sustainability in the world with overpopulation plays a major role. Therefore, this work will be briefly outlining the possible evolvement of neural networks in agricultural sector [1, 2, 3].

2 Present application of AI in agriculture

To understand how dramatic will be changes in the future, one must examine the current state of the sector with neural networks or in more appealing name artificial intelligence. As it was aforementioned in this paper, agricultural sector adoption of the technology is vast. it went through several changes that allowed to secure the symbioses of the sector and the technology for the near future. This paragraph will be devoted to the application of artificial intelligence in agricultural sector. This paragraph also will cover the use of Artificial intelligence from the initial stage of cultivation to the stage where the product is delivered to the hands of consumers [4, 5].

2.1 Land preparation

The initial process for the outsider observers could be the preparation of land for cultivation. It is clear that most of the properties of the product (crops) depends on the quality and from the compatibility of the land. Careful approach is needed when dealing with the soil for cultivation. For example, due to various events, global warming and overpopulation are pushing the limits of the soil to such an extent that it begins to degrade. Deterioration starts to occur over the time due to the chemical treatments and nutrients deficiency. Here come AI powered tools that help farmers to analyses large amount data from different sources (satellite, drones, sensors, etc.) to evaluate the soil health and to determine optimal planting patterns. Some areas can be isolated from planting as it would speed up the recovery of the land. Some areas are introduced to diversified planting scheme, which will enrich the soil with the necessary minerals and nutrients while providing some yields as well. All these calculations and planning can be done by the help of Artificial intelligence [6].

2.2 Monitoring and management

As farms get larger and demands increases for food security, it is hard to apply the same old approaches to ensure the predicted yield. Combination of new technologies allows farmers to adopt tools that are highly efficient in analyzing the large amount of data and providing the necessary outcomes. Artificial intelligence is used with other technology to monitor crops. With the captured data using drones, one can easily utilize tools, powered with artificial intelligence, to identify signs of diseases, pests, or nutrient deficiencies. This early revelation of issues in crops helps farmers to solve it before it gets out of hands. It is also true that technology is capable of making recommendations for each designated area, regardless of whether there are problems or routine maintenance required [7, 8].

2.3 Growth

Artificial intelligence is also used for the healthy growth of crops. Smart systems powered by Artificial intelligence are used for delivering different nutrients, including irrigation. Due

to the precise farming practices, all the processes use only required amount of provision and, hence, eliminating the waste, over or insufficient dosage. The smart systems also take account of natural rainfall and other natural events. It calculates the necessary amount, depending on the soil moisture level and other information from different sensors, to eliminate excess use of resources. Also, machine learning models are utilized to predict potential crop diseases, to allow the large industry to act before it spreads and destroys all the yield [9].

2.4 Yield

The one major part in agriculture is harvesting the crops. The right methods and approaches play vital role in the end products quality and quantity as well. This stage can also be transformed by using new technologies, including artificial intelligence. Machinery powered by Artificial intelligence can work autonomously and utilizing other technologies such as satellite maps, sensors, cameras, drones, or GPS navigation for most efficient and precise harvesting. Computer vision is also used to sort out or separate those that are not suitable for the future use. It can also classify and sort crops based on size, color or quality parameters [10].

2.5 Supply chain and product package

Once harvesting is done, it is important to create a map of the path of next stages. In this process artificial intelligence is used to analyses massive data (data from sensors, satellites, drones, previous years, stations, etc.) to predict the crops yields that will ensure the early plannings for farmers and distributors to plan their logistics. IoT technology is also applied in this stage, combined with artificial intelligence, where the quality of crops is monitored by different devises during transformation to ensure that the harvested crop reach the destination in the most optimal condition. Packaging process involves different stages in which artificial intelligence can be used. It can be used for quality check to inspect defects before packing and shipping to the consumer. Use of sensors and complex algorithms can identify any issues related to product for its classification and further separation [11].

2.6 In general

It might seem that the technology is used almost in any stage of the crop's cultivation. In some larger industries it might be true. However, not all the farms or industries are penetrated by the algorithmic advancement. In some the old approaches are still in favor, and in other partial changes. Due to the global warming and other similar issues, new regulations are introduced in agricultural sector. These regulations are forcing some farmers to adapt to new realities, in which some of them are left out. New regulation is not forcing the use of new technologies, but to utilize more eco-friendly approaches. In this case, this technology can introduce some advantages in some processes and hence be more positive to environment.

3 Future tendencies of AI in agricultural sector

Artificial intelligence is exponentially improving in every aspect that will transform the future to the unrecognizable point. There are many possibilities that the technology can provide. Possibilities depends on different characteristics and events, therefore it is hard to predict correctly the usefulness and its overall effect of the technology. This paragraph will outline the possible transformation that will be introduced due to the use of artificial intelligence. Three different outcomes will be suggested, where each will suggest variation

and likeliness of occurrence. In the first scenario, the most obvious outcomes will be discussed. The second suggestion will go through the possibilities that are likely to occur, but there is a possibility that they will not be pursued. The third one will illustrate the most unrealistic outcomes that have a chance of emergence.

3.1 Obvious outcomes

To predict the most obvious outcomes of the technology in the agricultural field, one can look through its tendency. The implementation of artificial intelligence in the following field is only increasing. Which means that more areas will be under the control of the technology. The first thing that will occur is the automatization of dominance. Fewer people will interact with hard work and more with robotics. With the improvement of different technology and artificial intelligence, precision of any task will be refined. Further precision will reduce the overall cost of production and related waste. Fewer errors and human interaction. Higher quality will be reached through generative tools. With the strong Artificial intelligence, the analytical tools will be capable of predicting different data for better management and control. If summing up all the obvious outcomes that can be integrated by artificial inelegance to the agricultural sector, one can foresee that all beforementioned application will be leveled up [12, 13].

3.2 Possible and unrealistic changes

In the nearest future, agricultural sector will undergo through drastic changes. These changes will be introduced due to the occurrence of new methods and approaches. The inevitable forced regulations could occur. This will transform the sector in most unexpectable way. The possible scenario is that the human activities will be reduced or eliminated in some of the processes completely. Dynamic robots will be hoovering around as substitute of humans. Different robots of all shapes will perform all the tasks, where each move will be controlled by artificial intelligence. New forms of agricultural methods will emerge from new technologies. These methods will be unconventional to the traditional methods. Another revolution might occur. As it was mentioned earlier, it is hard to specify the possible changes in agriculture, and it is far more complicated with the fast-changing technology. Unrealistic events might include the downgrade in the agricultural sector. This might occur due to the several factors such as: diseases, climate instability, catastrophes and similar events [14].

4 Conclusion

To conclude, the following work was done to illustrate the changes in the agricultural sector due to the utilization of new technologies. The technology that was covered and the one that has influence to the following sector is artificial intelligence. This technology is well suited for almost any area and field. It drastically transforms any industry to an unimaginable form. Therefore, to illustrate the changes it brought to agriculture, the following work was done. In depth, the present state of the agriculture with the use of artificial intelligence was covered. The future perspectives and the directions of the technology in the agricultural sector were also discussed.

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