

ARTIFICIAL INTELLIGENCE AND COMMUNICATION IN AGRICULTURE

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Abstract: Agriculture is an industry that relies on the visual assessment of some parameters to make decisions. At every stage of the food value chain, farmers working in the industry with varying levels of education, experience and age perform thousands of tasks and make decisions, mostly based on visual inspection. Industry experience has shown that this huge focus on communication and artificial intelligence is the way forward, not only for sourcing and marketing agricultural products, but also by adding value in a competitive market.. Digital agriculture events are related to important digital technologies in agriculture that transform food production to reduce world poverty and hunger.

Digital agriculture is moving towards self-sufficiency and knowledge sharing for a global food problem. There is a lack of knowledge and development of how to use digital technologies, and therefore we want in this paper to expose a clearer view of this current topic in the agricultural sector.

Key words: communication, agriculture, artificial intelligence

INTRODUCTION

The agricultural industry is undergoing a revolution. Following the adoption of artificial intelligence (AI), precision agriculture is becoming more productive and efficient [4].

Precision agriculture is a form of agriculture that uses new technologies to improve yields and reduce costs [1]. AI technology enables farmers to collect and analyze data to optimize production and crop management [5]. The technology can be used to help farmers accurately monitor soil conditions, crop growth and pest and weed control, as well as analyze the data to make informed decisions about their crops [9, 10].

AI-based automation is also being used to improve agricultural practices. Automated tractors, for example, can be programmed to plow, plant and harvest crops with minimal human intervention. Automatic irrigation systems can be used to optimize the amount of water used for each crop.

In addition, AI can be used to process images from drones and satellites to help spot problems on the ground that are normally invisible to the human eye [7]. This technology can be used to identify diseases, pests and weeds, as well as to monitor crop growth and yield [13].

The combination of artificial intelligence, precision agriculture and communication is revolutionizing the way farmers manage their crops. As technology continues to evolve, farmers will be able to make more informed decisions about their crops and maximize their yields. In the near future, precision agriculture based on artificial intelligence could become the standard for farmers around the world [14].

MATERIALS AND METHODS

In order to carry out the present research, we used the bibliographic analysis that was extracted from the specialty literature in all the fields of interest for the study, through the grouped analysis of the keywords that appear simultaneously at the aggregate level. It reveals interconnected areas of literature with varying impact. And we used the SWOT analysis to design an overall vision.

RESEARCH RESULTS

Without a doubt, communication is the key to success in farming these days. In the work Communication skills, Allan and Barbara Pease [12] highlight the idea that many things can be improved if you have the ability to communicate effectively. In today's world, everything communicates in an organization, not only advertisements or public relations campaigns, but any gesture of the organization. Starting with products or services and ending with the professional conduct of employees [6], any manifestation or expression says a lot about an organization. It is the reason why all these aspects must be carefully monitored and carefully planned, so as to ensure their coherence with the set of messages distributed on other communication channels [3]. This means that any manifestation of the organization, either of a communicative or behavioral nature, can be considered an element of information for the public. It is the reason why the communication of the organization with its audiences ceases to be a simple conveyance of messages, incorporating a new element: the very behavior of the organization [16,11]. Against this background, the use of artificial intelligence by agricultural organizations has visible effects on the communication behavior of all stakeholders involved [6].

The potential benefits of precision agriculture and artificial intelligence are vast. Precision agriculture, also known as smart agriculture (Figure 1.), uses technology and data to maximize crop yields while reducing environmental impact. Artificial intelligence (AI) is used to analyze large amounts of data to help farmers make decisions about their crops, soil and irrigation [15].

The use of precision agriculture and artificial intelligence can help improve crop yields, reduce water use and improve soil health. Through sensors and drones, farmers can monitor soil, weather and crop conditions in real time, giving them the ability to adapt their farming practices as needed. AI can also be used to detect pests, diseases and weeds, helping farmers make faster and more informed decisions about their crops.

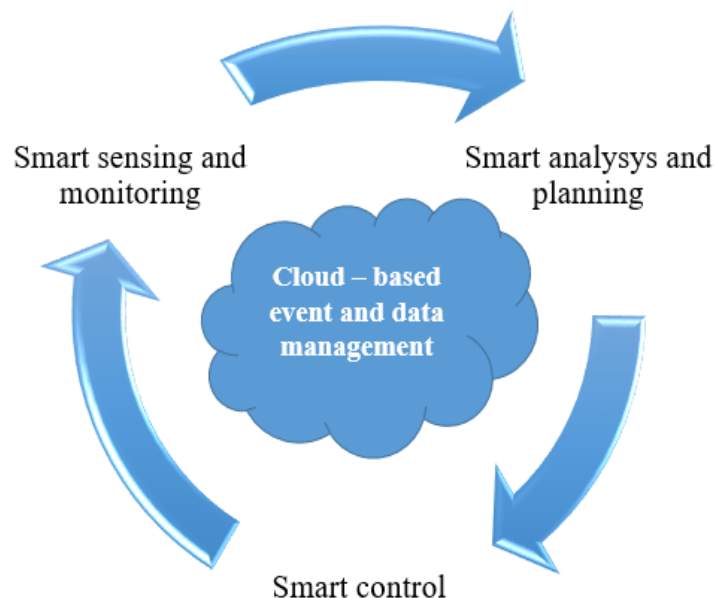


Figure 1. The functioning of artificial intelligence

Source: [15]

The use of precision agriculture and artificial intelligence can also help farmers save money. By using sensor data and AI-enabled analytics, farmers can identify areas

where they are wasting resources, such as water and fertilizer, and make adjustments accordingly. This can help reduce costs while still achieving high crop yields [14].

In addition to economic benefits, precision agriculture and artificial intelligence can also help reduce environmental impact. Using data-driven decisions, farmers can minimize water use and reduce the amount of chemicals used on their crops. This can help conserve natural resources and protect the environment.

Overall, the potential benefits of using precision agriculture and AI to improve crop yields, save money and reduce environmental impact are substantial. As technology continues to evolve, these benefits are likely to become even more pronounced.[3].

The impact of artificial intelligence (AI) on precision agriculture yields is revolutionizing the way farmers produce crops [4]. Precision agriculture is a technology-based approach to agriculture that uses a combination of satellite imagery, sensors and data analytics to maximize yields, reduce costs and increase sustainability [15]. By leveraging artificial intelligence and machine learning, farmers are able to optimize their crop production and make farming more efficient.

AI-powered precision farming crops have had a positive impact on the agriculture industry as a whole. AI helps farmers determine optimal planting, fertilization and irrigation strategies. AI allows farmers to identify areas that need more attention, such as weeds or pests, and take action before the problem becomes unmanageable. As a result, AI-powered precision agriculture crops have improved crop yields, reduced operating costs and improved sustainability [2].

AI-powered precision agriculture crops have also enabled farmers to more accurately measure and predict weather patterns, soil conditions and other environmental factors that can affect crop yields. This allowed farmers to better prepare for extreme weather conditions such as drought or floods. AI-powered precision farming crops have also enabled farmers to better manage inputs and outputs, allowing them to maximize their resources and produce more with less [2].

Overall, AI-powered precision farming yields have had a positive impact on the agriculture industry. Artificial intelligence has helped farmers maximize their yields, reduce costs and increase sustainability[13]. As technology continues to advance, the benefits of AI-powered precision agriculture will only become more powerful, giving farmers the tools they need to produce higher yields with fewer resources.

In the ever-growing agricultural industry, the use of artificial intelligence (AI) is becoming increasingly important. AI is revolutionizing the way farmers monitor their fields and manage their crops, enabling greater precision in farming and higher yields.

Precision agriculture is a farming method that uses modern technology to optimize yields and minimize inputs. AI technology such as computer vision, machine learning and robotics play a key role in precision agriculture. Computer vision algorithms can be used to identify plants affected by disease, while machine learning algorithms can be used to predict crop yields and recommend the best decisions for growers. Robotics can automate tedious tasks like weeding and planting, saving farmers time and labor [14].

The use of AI in precision agriculture has numerous advantages over traditional farming methods. For example, AI-based systems can help increase crop yields by up to 20%, reduce the amount of fertilizer and water needed, and optimize pest and disease management [13]. AI-based systems can also provide detailed data on crop health, allowing farmers to make more informed decisions about their crops.

In addition, AI-based systems can help farmers reduce their environmental impact. By using AI to more precisely manage their fields and crops, farmers can reduce their use of fertilizers and pesticides and minimize their carbon footprint [2].

AI is transforming the way farmers operate, making precision agriculture more efficient and profitable. As AI continues to evolve and become widely adopted, the agricultural industry will continue to benefit from its many advantages.

The potential of machine learning in developing intelligent solutions for precision agriculture is vast. Precision agriculture is the practice of using technology to improve the efficiency and sustainability of agricultural operations [8] by optimizing inputs such as fertilizers, water, and labor. Machine learning algorithms can be used to analyze large amounts of data to identify patterns, detect anomalies, and make predictions about crop yields and environmental conditions.

Machine learning solutions are used in precision agriculture in a variety of ways. For example, soil moisture sensors can be used to monitor water levels and adjust irrigation schedules accordingly [4]. Machine learning algorithms can be used to process data collected by these sensors and provide insights into soil moisture patterns. This information can then be used to determine optimal irrigation schedules and identify areas on the farm that need more attention [8].

In addition, machine learning can be used to analyze data from drones or satellites to identify problems such as weeds or waterlogging. This data can then be used to generate crop maps and implement targeted treatments in specific areas of the farm.

Machine learning can also be used to predict crop yields and help farmers optimize their operations. By analyzing historical crop data and environmental conditions, machine learning algorithms can make predictions about future crops and help farmers plan for optimal growing conditions.

Using machine learning in precision agriculture helps increase farm efficiency, reduce costs and improve sustainability. By using this technology, farmers can make more informed decisions and operate their farms more efficiently. As technology continues to develop, the potential of machine learning in precision agriculture is expected to grow

Precision agriculture involves strategies based on concrete examinations of environmental conditions with the help of intelligent tools and technologies. Building an agricultural management plan that addresses precision agriculture can help Romanian agriculture make considerable progress. Thus, a SWOT analysis of the use of artificial intelligence was undertaken.

The strengths of using artificial intelligence in agriculture refer to the concept of precision agriculture started with GPS-equipped machinery technologies. GPS coordinates allow farmers to locate a specific point in the field. Associating coordinates with ground sensors allows productivity maps to be obtained. These maps identify areas that require special attention to be corrected. Also, accelerating agricultural development, improving product quality, increasing productivity and reducing environmental impact are some of the main reasons to adopt a new and competitive agriculture model.

The weaknesses are mainly due to the fact that it is new to the market and rather, they depend on the responsiveness of the parties involved, especially the farmers. The technologies used to make agricultural work easier and more efficient can in some cases represent a significant budget (like any other new product that enters the market), and this means high costs, at the beginning. Even if the investment pays off over time, it is not within everyone's reach to purchase new machinery and train staff to get all the systems up and running.

The opportunities that farmers can enjoy, practicing precision agriculture, are primarily related to making the best decisions, depending on the available conditions, reducing the risk of crop problems. In this way, the quality of the harvest is ensured and farmers can estimate their production from the end of the season. On the other hand, farmers can make use of different systems like big data analytics and software to make

data-driven decisions that can boost business-related outcomes. The benefits of using these systems include more marketing methods, new income opportunities, customer customization and improved operational efficiency. Consumer data can aid farms' marketing attempts, which can act on trends to grow customer satisfaction. Also farmers may go for pricing models that utilise and model data from a variety of data sources to boost revenues.

After all data is collected from different sources (from the field, internet clickstream data, web server logs, text from customer emails and survey responses, social media posts, different cloud applications) in the data warehouse or data lake, they are ready to be processed. Of course that exists many different types of tools and technologies that farms can use: predictive analytics, stream analytics, a data lake, a data warehouse.

The main threat focuses on automation, which through artificial intelligence, can lead to job losses and increased unemployment rates, especially in sectors where repetitive tasks can be easily automated, such as the agricultural sector. This can have significant economic and social consequences, such as increasing inequality.

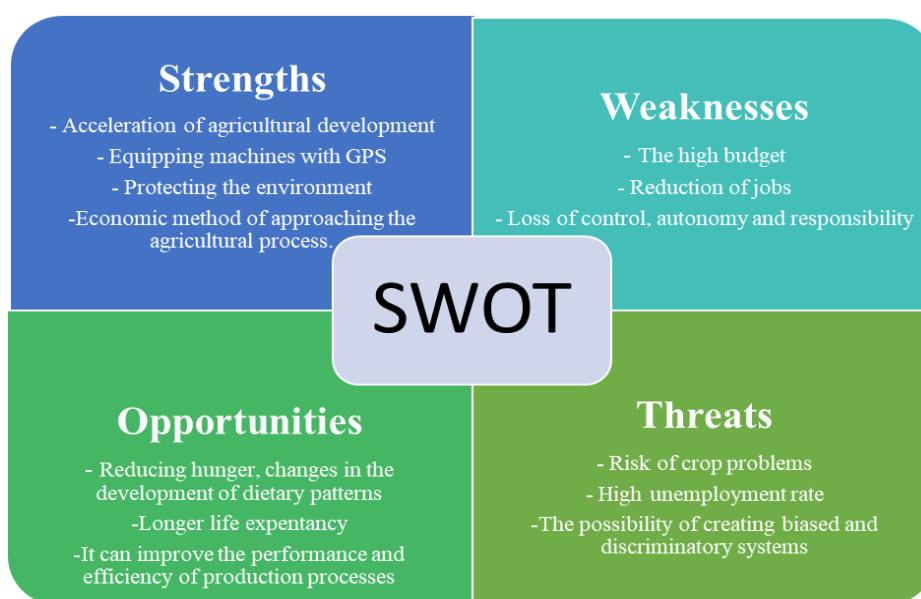


Figure 2. SWOT analysis of using AI

CONCLUSIONS

Agriculture is one of the key segments that can benefit from AI. Artificial intelligence is used to create an intelligent system that adjusts parameters based on weather conditions, water use, temperature and crop/soil conditions. Sensor data is analyzed to make optimal decisions regarding crop selection, fertilization, irrigation and pest control. Artificial intelligence helps farmers improve their yields, make seasonal forecasts and weather forecasts for crop planning, and use resources in the most optimal way. AI computer vision is used to monitor crops and large farmlands to identify problem areas and generate alerts when needed. It is imperative that farmers and agricultural companies also consider the negative side of using this technology, so that they emphasize effective communication both internally with employees and externally with suppliers, customers and partners. As automation advances, fewer and fewer unskilled workers will be needed in either industry, and the question of where they will be relocated still remains.

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