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RESEARCH PAPER

Artificial intelligence and smart agriculture in the light of COVID-19

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Abstract: Significant up gradation of agriculture sector is vital to meet the growing needs of food and other agricultural produce by the rapidly increasing population. Artificial Intelligence with various applications in several fields is making innovative inroads in to farming sector to improve productivity, identify diseases with 98% accuracy, and recognize pest damage. It gives growers a weapon against cereal-hungry bugs. Sensors monitor the fruit ripening, adjusting the light to speed up or slow down the pace of maturation. Farmers can monitor the well-being of their crops or the movement of their animals from their home farm, it can make agriculture less labor intensive, and more efficient. Companies are using high-resolution imagery from drones, planes and satellites to diagnose problems of pests, diseases, moisture stress and nutrient deficiencies in the field. BEEWISE uses artificial intelligence to automate beehive maintenance; and ARMENTA is working on new therapies to treat sick dairy cows. Other firms are targeting trendy sectors like pharmaceutical crops and alternative proteins. This kind of farming requires considerable processing power and is expensive. Artificial Intelligence has to be deployed with discretion by the natural wisdom of users. Machine Learning can just do the repetitive jobs taught and lacks creativity and doesn't get better with experience. The point that use of AI can lead to unemployment is debatable in the face of shortage or non-availability of laborers. This paper attempts to discuss the promises AI holds for farming, problems of its application/implementation, current concerns briefly touching uponthe future prospects and Sustainable Agri-Food System Business Models in the COVID-19 Scenario.

Key words: Artificial Intelligence, Machine learning, Satellites

Introduction

The agriculture sector is undergoing transformation driven by innovative technologies, which seems very promising as it will enable this primary sector to move to the next level of farm productivity and profitability.Precision Agriculture, which consists of applying inputs precisely when and where needed, has become the third wave of the modern agriculture revolution after mechanization and the green revolution with its genetic modificationand nowadays, it is being enhanced with an increase of farm knowledge systems due to the availability of larger amounts of data.

Considering the environment, new technologies are increasingly being applied in the farms to maintain the sustainability of farm production. However, the adoption of these technologies involves uncertainty and trade-offs. According to a market analysis, the factors that would facilitate the adoption of sustainable farming technologies include better education and training of farmers, sharing of information, easy availability of financial resources, and increasing consumer demand for organic food.

Farms that decide to be technology-driven in some way, show valuable advantages, such us saving money and work, having an increased production or a reduction of costs with minimal effort, and producing quality food with more environmentally friendly practices. Smart agriculture has taken up USD 26.76 billion of global market size by 2020 and Asia hold 40% of the global market share.

AI and Agri- food systems

Over the past two decades, scholars and practitioners have shown deeper interest in AI technologies. Several of them have attempted to provide a more comprehensive definition for AI.

Some authors identify the ability of a "machine" to understand in a "clever" way the inputs provided by the environment, or better decipher the external variables by a flexible configuration. AI represents a new way to create and manage the information in a business model properly rethought including the link between innovation and sustainability. In a more elaborate manner, the innovation appears as the power for business. Indeed, the adoption of innovative technologies can allow adopting business models addressing the UN 2030 Agenda. However, these models have to include three key dimensions, namely, economic, environmental and social, all interdependent. The interface between human and technical resources, as well as the natural systems, influence the achievement of sustainable development goals (SDGs) included in the UN 2030 Agenda. AI is an innovative technology that can support the businesses struggling through the COVID-19 pandemic, especially in the agri-food industry. AI is identified as a technology tool against the effects of the pandemic. It allows managing the pandemic by enforcing social distancing measures.

It is a reality that is shaping the global market as an ecosystem in which the public sector and the private sector coexist, involving new players, such as farmers, processors,

distributors, and investors who propose business models that have to be included with sustainability and responsibility issues. The adoption of AI in the fertilizers, pesticides, and systemized irrigation processes allows achieving the reduction of environmental effects. AI technology has advantages in terms of productivity and efficiency, as well as of profitability by the reduction of costs. AI technology applications change the operation modules and their management for farms. Consequently, business models have to be rethought and redesigned including the effects of the COVID-19 pandemic. It is important to emphasize that everything previously discussed must necessarily be considered in the new and difficult scenario created by the COVID-19 pandemic. With the rapid spread of the new pandemic, the attitude of food consumers has also changed rapidly. Many of the current changes are destined to remain in purchasing attitudes, even at a later stage. In order to contain the pandemic, markets have had to deal with a sharp change in population needs. AI can truly represents an important aid at all levels, both for agriculture and thefood industry and for large-scale distribution.

Future perspectives

One of the biggest problems facing us is that we'll need to produce twice as much food by 2050. We need a paradigm shift-a new system to make crop production more efficient and good for the environment and society. In the UK, up to 80 per cent of weeds have become herbicide-resistant and up to 90 per cent of the energy going into cultivation is being used on repairing soil damaged by heavy machinery.

Farms will have mini robots moving up and down the fields, inspecting plants, recognizing and lasering weeds, and administering dots of chemicals and fertilizer where needed. Crops will be monitored by aerial and ground vehicles using sensors and hyperspectral vision.This will bring huge improvements: without soil-compacting tractors, there will be no need for ploughing (reducing CO2 emissions), soil will stay absorbent longer and less fertilizer means healthier waterways.

The overall AI in agriculture market is projected to grow from an estimated USD 1.0 billion in 2020 to USD 4.0 billion by 2026, at a compound annual growth rate (CAGR) of 25.5 percent. This growth is propelled by the increasing implementation of data generation through sensors and aerial images for crops, increasing crop productivity through deep-learning technology and government support for the adoption of modern agricultural techniques. Machine Learning (ML) enabled solutions are being significantly adopted by agricultural organizations and farmers worldwide to enhance their farm productivity and gain a competitive edge in business operations. In future, the application of ML in various agricultural practices is expected to rise exponentially.

The market for the software segment is mainly driven by the integration of mobile technologies with farming techniques, the growing use of AI software to improve farm efficiency, and the rising demand for real-time data management systems. In March 2020, Farmers Edge and Nufarm Brasil, a leading crop protection company, announced an exclusive, three-year partnership to digitize at least three million acres of farmland in Brazil by 2023. Leveraging the strengths of both companies.The two companies provide improved crop protection, and the modern tools growers need for making better-informed agronomic decisions to maximize profitability.

In January 2020, IBM and Yara International (Norway), a global leader in crop nutrition and digital farming solutions, invited farmer associations, industry players, academia, and NGOs from the food and agriculture industry to join a movement to develop an open data exchange that facilitates collaboration around farm and field data, with the aim of improving the efficiency, transparency, and sustainability of global food production. The power of AI technology goes beyond solving average problems and shortcomings of farming, instead, it has the possibility of transforming the entire module of the sector assisting farmers in smart decision making. Some of the key advantages of smart agriculture are:

- Precision farming
- Smart greenhouses
- Better livestock management
- Involvement of agriculture drones for GIS mapping
- Farm management systems with insightful data

Use of digital technology and advanced devices is considered to be complicated by most farmers. The gap between their understanding of the industry and the available technologies is the prominent hurdle for Indian farmers to adopt newer technologies.

Therefore, to leverage the benefits from smart agriculture, Indian farmers need to be digitally literate along with the help of solution providers, who need to understand the limitations of our farmers and create solutions personalized to them. This can lead us towards ATMA NIRBHAR Bharat.