

Artificial Intelligence and Paradigm shift in Indian Agricultural Sector

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Abstract- Artificial intelligence (A.I.) is a multidisciplinary ground aimed at mechanising works that Presently required human intelligence. Despite its deficiency of general awareness, artificial Intelligence (AI) is taking care each and every aspect of today's life. This article aims to educate About AI and inspire us to utilize various AI Applications in Indian Agricultural Sector.

Keywords: machine learning, deep learning, neural networks, Natural Language Processing, Knowledge base System, Chabot.

I. INTRODUCTION

Artificial intelligence (AI) is defined as the capability of an artificial thing to solve complicated using its own intelligence. Computer science and functioning are combined in Artificial Intelligence. In layman's terms, intelligence is the computational module of one's capacity to achieve goals in the actual world. Intelligence is defined as the ability to think, imagine, memorize, and understand, see patterns, make decisions, adjust to change, and learn from knowledge. Artificial intelligence is focused with making computers perform more human-like and in a section of the time it takes a one to do it. As a result, it is famous as Artificial Intelligence.

II. Working of Artificial Intelligence

AI is frequently misdirected on an island with machines and self-driving cars, according to general belief. This method, however, manage some of artificial intelligence's most important practical uses. Analysing the huge volumes of data made every day. AI systems execute refined searches through the mountains of data created by people, Computer systems that can hold the meaning of

human language, learn from knowledge, and make predictions.

- **Machine Learning (Learning from experience)**

Machine learning, or ML, is an AI application that agrees computers to automatically learn and produce from their experiences short of having to be openly programmed. The goal of machine learning is to make algorithms that can analyse data and generate predictions. Machine learning is being applied in the healthcare, pharma, and life sciences parts to improve infection detection, medical image interpretation, and medicine acceleration, in addition to guessing what Netflix pictures you would like.

- **Deep Learning (Self-educating machines)**

Artificial neural networks that learning by analysing the records are used in deep learning, which is a subgroup of machine learning. Several layers of artificial neural networks cooperate to produce a single output from a big number of inputs. The machines learn by getting positive and negative reinforcement for the jobs they perform, which necessitates current processing and reinforcement in order for them to progress.

- **Cognitive computing (implications from context)**
- **Computer Vision (Understanding images)**

III. ARTIFICIAL INTELLIGENCE TYPES

Cognitive computing is extra essential section of AI. Its purpose is to copy and improve interaction among humans and machines. Cognitive computing look for to recreate the human believed process in a computer model, in this case, by compliant human language and the meaning of movies. Together, cognitive computing and artificial intelligence attempt to award machines with human-like behaviours and information treating abilities.

Computer vision is a method of interpreting image material, such as graphs, tables, and photos within PDF documents, as well as other copy and video, using deep learning and pattern recognition. Computer vision is a modern of artificial intelligence to recognize, analyse, and identify complete input. This technology's applications have now begun to alter areas such as research and development and healthcare. Computer Vision and machine learning are being used to analyse patients' x-ray pictures in order to diagnose patients sooner.

- **Advantages of Artificial Intelligence**
- **Eliminates human error and risk**

The first major advantage of applying AI is that it decreases human mistake, as well as risk to humans. Everyone makes errors on occasion. That's not always a bad thing, but when it comes to producing reliable results, it certainly can be. Using AI to whole tasks, particularly repetitive ones, can prevent human error from fouling an otherwise perfectly useful product or service. Similarly, using AI to thorough particularly difficult or unsafe tasks can help prevent the risk of damage or harm to humans. An example of AI taking dangers in place of humans would be robots being used in parts with high radiation. Persons can get really sick or die from drive, but the machines would be natural.

- **Available 24x7**

Without breaks, an average social will labour for 4–6 hours every day. Humans are made in such a manner that they can take time off to reload themselves and prepare for a fresh day at work, and they even have daily off days to keep their specialised and home lives isolated. But, unlike humans, we can use AI to make robots work 24 hours a day, seven days a week with no pauses, and they don't grow tired. For Example: Educational institutions and helpline centres get a big number of requests and difficulties that AI can positively address.

- **Unbiased decision making**

Humans disagree and allow their prejudices to leak through in their decisions all the time. All humans have preferences, and even if we try and solve for them, they at times manage to sneak through the crashes. Though if the AI was created using biased datasets or training data it can make partial choices that aren't caught because people assume the decisions are unbiased. That's why quality checks are important on the exercise data, as well as the results that a definite AI program produces to confirm that bias issues aren't ignored.

- **Repetitive jobs**

Even the most motivating job in the world has its share of ordinary or repetitive work. This could be things like incoming and analysing data, making reports, verifying information, and the like. Using an AI program can except people from the interest of repetitive works, and save their drive for effort that needs more creative energy.

- **Cost reduction**

Disadvantages of Artificial Intelligence

1. High Cost of Execution
2. Lack of emotion and creativity

As we addressed above, AI can effort around the clock, creating more value in the same day as a human hand. And since AI can help to take over physical and tedious tasks, it frees up workers for higher-skilled tasks. That, to close, produces other value for the end-user. Setting up AI-based machines, computers, etc. involves huge costs given the complexity of engineering that goes into structure one. Further, the astronomical expense

doesn't stop there as healing and maintenance also run into thousands of dollars. AI is that it needs the human ability to use feeling and creativity in decisions. The absence of creativity means AI can't produce new answers to complications or excel in any overly artistic field when creation sensitive decisions, humans naturally consider the emotional results. AI doesn't have that skill, making only the most optimal decision based on the parameters with which it has been providing, regardless of the emotional effect. Even AI that has been automatic to speak and recognise human sense falls short.

3. No improvement with experience

Similarly to the point above, AI can't logically learn from its own skill and mistakes. Humans do this by nature, trying not to duplication the same errors over and over again. However, creating an AI that can study on its own is both extremely tough and quite expensive. But deprived of the programming to education on its own, AI will need human envelopment to help it improve over period.

4. Reduced jobs for humans

This is yet another disadvantage many people see immediately.

IV. INDIA AI MISSION IN AGRICULTURAL SECTOR

The Indian government is actively promoting AI development through the India AI mission, focusing on areas like compute capacity, foundational models, datasets, application development, future skills, start up financing, and safe AI.

AgriHub, a Centre of excellence for sustainable agriculture co-funded by the MeitY and the Government of Madhya Pradesh, was opened by IIT Indore on January 27, 2025. It will use AI, machine learning, and deep learning to revolutionize the agricultural industry. By using big data analytics and genomic research to support data-driven agriculture, it will enable research in precision agriculture, xerophyte, and AI-driven disease diagnostics.

Farmers in Fazilka have embraced AI-powered weather sensors created by IIT Ropar. It provides

real-time information on atmospheric conditions by utilizing data gathered from satellites, weather balloons and a network of weather stations on the ground. Parameters like temperature, humidity, precipitation, and lux are used with data from the India Meteorological Department to forecast rainfall.[136]

AI is being used by the Ministry of Agriculture and Farmers' Welfare to assist farmers. An AI-powered chatbot called Kisan e-Mitra was built to help farmers with their questions on Pradhan Mantri Kisan Samman Nidhi scheme in multiple Indian languages. The National Pest Surveillance System uses AI and ML to identify pest infestation, allowing for prompt action for healthier crops and addressing the loss of produce brought on by climate change. AI-based analytics that use field photos to monitor and evaluate crop health utilizing weather, soil moisture, and satellite data for wheat and rice cultivation.[137]

The use of AI in Khutbav village by the Agriculture Development Trust and Microsoft in 2025 led to a 40% increase in yield and a 50% reduction in production costs due to water and pesticide usage. Through a smartphone application Agripilot.ai developed by Click2Cloud, the AI notify farmers of possible pest attacks, soil conditions, air speed, and weather conditions to determine when to apply pesticides and how much water the crop requires. Utilizing a variety of data sources, including satellite imagery, weather forecasts, soil sensors, and inputs unique to each farm, the AI generate personalized suggestions for farmers. Microsoft's Azure Data Manager for Agriculture (formerly Microsoft Farm Beats), is used to process this data.

In 100 villages, the Assam government will support the establishment of AI-powered agri-hubs, where drones and AI would assist farmers in making data-driven decisions, increasing yields, and promoting sustainability, according to the state budget for 2025–2026.

One of the most successful implementations of the AI4AI initiative is the 'Saagu Baagu' pilot, developed in partnership with Telangana state government, in

its Khammam district, supported by the Bill and Melinda Gates Foundation and implemented by Digital Green. The project has substantially improved the chili value chain for more than 7,000 farmers. The state government of Telangana has played a key role in this transformation by creating enabling infrastructure and policies including India's first agriculture data exchange and agri data management framework.

Saagu Baagu has demonstrated remarkable results in its first phase of implementation. Farmers participating in the programme saw a 21% increase in chili yields per acre, a 9% reduction in pesticide use, a 5% decrease in fertilizer usage, and an 8% improvement in unit prices due to quality enhancements. As a consequence of these improvements, farmers have seen their incomes soar by more than INR 66,000 (around 800 USD) per acre per crop cycle, effectively doubling their earnings. These figures not only highlight the effectiveness of Saagu Baagu but also its contribution to sustainable and efficient agricultural practices.

Building on these successes, in October 2023, the Telangana Government expanded Saagu Baagu's scope. The project now aims to impact 500,000 farmers, encompassing five different crops across ten districts. This expansion is a strategic move to maximize the benefits of innovative agricultural technologies, potentially transforming the agricultural landscape of the region.

V. Conclusion

It's not only use and application of Information technology in Manufacturing or Service Industry but Application of Artificial Intelligence [AI] has a huge role in our Indian Agricultural Sector which is the most important sector of Indian economy as it accounts for 18 percent of India's gross domestic product (GDP) and it provides employment of the 50 per cent of country youth.

REFERENCES

1. Gupta, A., & Verma, P. (2023). AI-driven Supply Chain Optimization for Sustainability. *International Journal of Sustainable Development*, 12(1), 22-37.
2. Kamath, R. (2020). Food Traceability on Blockchain: Walmart's Pork and Mango Pilots with IBM. *Journal of the British Blockchain Association*, 1(1), 3712.
3. Kogan, D., & Lee, H. (2022). Reducing Waste with AI in Supply Chains. *Green Logistics Journal*, 5(2), 110-125.
4. Kumar, V., Rajan, B., Gupta, S., & Dutta, A. (2021). Customer Experience Management in Business Markets: AI Applications and Research Directions. *Journal of Business*
5. Davenport, T., Guha, A., Grewal, D., & Bressgott, T. (2020). How artificial intelligence will change the future of marketing. *Journal of the Academy of Marketing Science*, 48(1), 24-42. <https://doi.org/10.1007/s11747-019-00735-9>
6. Ivanov, S., & Webster, C. (2017). The Impact of Automation on Employment: Just the Usual Structural Change? *Sustainable Marketing*.
7. Jian, J., Dong, X., & Li, H. (2021). AI in marketing: A literature review and agenda for future research. *Journal of Business Research*, 123, 450-462. <https://doi.org/10.1016/j.jbusres.2020.09.054>
8. Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), 15-25. <https://doi.org/10.1016/j.bushor.2018.08.004>
9. Murphy, R., Gretzel, U., & Pesonen, J. (2021). Marketing AI: What AI and marketing researchers need to learn from each other. *Journal of Marketing Management*, 37(12), 17-39. <https://doi.org/10.1080/0267257X.2020.1840225>
10. Ottman, J. (2011). *The New Rules of Green Marketing: Strategies, Tools, and Inspiration for Sustainable Branding*. Greenleaf Publishing.
11. Peattie, K. (1995). *Environmental Marketing Management: Meeting the Green Challenge*. Financial Times Management.

12. Brown, L. (2021). Blockchain and AI: Enhancing Transparency in Green Marketing. *Technology and Sustainability*, 9(3), 78-89.
13. Chaffey, D., & Ellis-Chadwick, F. (2019). *Digital Marketing: Strategy, Implementation and Practice*. Pearson. Research, 125, 577-590. <https://doi.org/10.1016/j.jbusres.2020.07.045>
14. Ramesh, R., & Kumar, P. (2022). AI in Customer Segmentation: A Sustainable Approach. *Journal of Marketing Analytics*, 10(3), 201-215.