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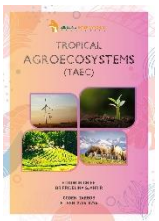
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REVIEW ARTICLE

APPLICATIONS OF AI BOTS IN SUPPORTING AND PUBLISHING AGRICULTURAL RESEARCH: A CASE STUDY OF CHATGPT AND DEEPSEEK

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ABSTRACT

In light of the rapid growth of artificial intelligence (AI) bots, such as ChatGPT and DeepSeek, solutions have been created to support scientific research, such as agricultural research. The aim of this review is to investigate the possibility for these bots to advance agricultural research by enhancing the quality of the scientific output, optimizing the processing of data, and enabling evidence-based decision-making. The review recognizes that these technologies play a significant role in the analysis of complex agricultural data and facilitation of research output for farmers to understand, with the possibility to transfer knowledge linguistically and culturally. However, the successful adoption of these bots is undermined by technical challenges related to data accuracy and flexibility in local contexts, and ethical challenges related to transparency and accountability. The review examines possibilities for innovation in sector-specific agricultural solutions, enhancing compatibility with agricultural infrastructure and intelligent technologies, and creating working and ethical guidelines that optimize the application of such bots. Investment in this field is really an opportunity to take a quantum step toward agricultural production with environmental sustainability, provided that this is done within an overall vision that reconciles technological potentialities, farm needs, and ethical controls.

KEYWORDS

Agricultural productivity, Agricultural research, ChatGPT, Data analysis, DeepSeek

1. INTRODUCTION

Scientific writing is among the foundations of scientific education and research since it relies on a methodical way of presenting concepts and the accurate analysis of findings in all disciplines (Khalifa and Albadawy, 2024). There are many challenges to academic writing, including the need to manage a lot of complex information and concepts, and break them down for the reader without compromising accuracy and methodology (Birjali et al., 2021). This style of writing also requires mastery of formal tone and technical jargon, and adherence to scholarly integrity through proper citation of sources (Morris, 2018; Gupta et al., 2022). These are equaled by top pressures that come with academia, including pressure to publish on a continuous basis, which poses a challenge to researchers to be in a state of being able to uphold their time management skills while being capable of upholding text consistency and coming up with new ideas within shorter time frames (Wieczorek and Mitręga, 2017). Additionally, academic writing involves several drafts depending on peer and supervisor feedback, and the challenge is increased while writing interdisciplinar research because of the diversity of vocabulary and methods (Huisman et al., 2018).

Amidst such challenges, artificial intelligence (AI) bots have emerged as essential tools for maximizing the quality and productivity of academic writing and scientific research. The bots provide linguistic editing, structuring of organization, documentation, and adherence to technical specifications, which results in quality evaluations of the research (Golan et al., 2023; Jee, 2023). The bots also assist in increasing productivity and simplifying the writing process, as well as supporting knowledge creation and active participation in academic dialogue (Dwivedi et al., 2023). AI bots accelerate research procedures through searching of enormous databases at high speed, identifying relevant results, and assisting in the formulation of new hypotheses, and such saving of time serves to researchers' advantage (Merz et al., 2023). As a solution to the increasing demand for effective retrieval of information, the bots are now being integrated into academic search engines such as Elsevier's Scopus AI with the aim of providing a brief abstract and relevant citations for new areas of study so as to enhance literature review and discovery (Van, 2023). They enable experimental design, drug discovery, and materials science through the prediction of molecular interactions, suggesting new compounds, and designing codes for simulations (Chakraborty et al., 2023; Merz et al., 2023). Among the bots, AI bots such as ChatGPT and DeepSeek are increasingly proving valuable to support scientists. ChatGPT helps in composing research papers logically and clearly, generates perfect abstracts, and provides precise references, which makes publication simpler. In comparison to DeepSeek, it has better searching of agricultural scientific databases, which are able to obtain the latest related studies and papers rapidly and help in building research on solid scientific principles. This bot duo is a strong team that accelerates and streamlines the dissemination of scientific knowledge, bridging the gap between information density and actionable conclusions serving farmers and scientists. ChatGPT is better suited to conversational language processing and interactive response, while DeepSeek is better aligned with technical, multimodal research queries and code generation, and particularly valuable in agriculture and other sciences (Kotsis, 2025; Jin et al., 2025; Singh et al., 2025). Open-source DeepSeek provides cost-effective, domain-specific accuracy, complementing chatGPT's general linguistic agility and multi-functionality (Jin et al., 2025; Singh et al., 2025). Together, they comprise a complementary pair that revolutionizes

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research through the synergy of conversational support and in-depth, specialist data search and analysis (Awasthi et al., 2025; Kotsis, 2025).

The application of bots in farming extends to their ability to analyze and process huge amounts of data from diverse sources such as farming sensors, satellite images, drones, and climatic models. They provide actionable information in critical domains such as crop condition monitoring, pest management, irrigation optimization, and yield prediction by highlighting the status of the fields that require extra attention (Kamilaris et al., 2017; Liakos et al., 2018). Further, bots assist plant researchers in summarizing recent scientific advances, recommending experimental designs, and enabling inter-disciplinary collaborations, especially in managing plant diseases (Mogili and Deepak, 2018). They also allow farmers and researchers to make decisions in real time by interpreting elaborate crop and environmental data and offering human-specific advice on the best time to plant and harvest, treat pests and diseases, and irrigate (Wolfert et al., 2017; Kamilaris and Prenafeta-Boldú, 2018). The use of such AI-based bots leads to enhanced productivity and sustainability, decreased expenses through efficient use of resources, and better decision-making at both the farm and research levels (Shamshiri et al., 2018). In effect, bots use AI-based data analysis and natural language processing techniques to bridge the knowledge gap between advanced agricultural data and usable knowledge, and hence enable scientific research and practical agricultural activity. This review aims to explore how AI bots, i.e., ChatGPT and DeepSeek, can enhance and disseminate agricultural research through improved quality of writing, availability of information at a quicker pace, and availability of research data coupled with application in practice in the agricultural field.

2. AI BOTS (CHATGPT AND DEEPSEEK)

ChatGPT, developed by OpenAI, is a state-of-the-art GPT-architectured language model. It is pre-trained on massive text data and fine-tuned to perform some specific tasks, such as text generation, translation, and summarization (Mohamadi et al., 2023). GPT architecture is based on the Transformer model, in which self-attention mechanisms are employed in input text processing to output text. ChatGPT has been widely deployed as well due to its ability to generate coherent and contextually informative text and hence can be applied to a wide range of applications, including customer service, content creation, and education (Mohamadi et al., 2023; Leiter et al., 2024).

DeepSeek is a smart chatbot developed by Chinese AI company DeepSeek. It uses AI to have natural, human-like real-time conversations. DeepSeek bot is as good as the world's leading dialogue models, e.g., ChatGPT, but at a lower cost. It provides the reason for its answer before responding and uses advanced natural language processing. Available to users through mobile apps and web browsers, it is utilized to respond to questions, lead users through processes, and enhance sage interaction in a flowing, interactive manner (Liu et al., 2024).

2.1 ChatGPT and DeepSeek Structure

ChatGPT is a dense transformer-based model, in which all of the model's parameters are engaged in every stage of processing. The model employs a self-attention mechanism in its contextualization of word-to-word relationships in text. The model is developed in two general stages: a pre-training stage on a large, diverse web dataset, and a reinforcement learning from human feedback (RLHF) fine-tuning stage to further target the model to user intent and response quality. Direct preference optimization (DPO) and other such techniques are also employed to maintain content integrity (Dandage, 2025; Wu et al., 2025). This composition is shown in Figure 1, displaying the recurrent transformer layers, self-attention mechanism, and training stages.

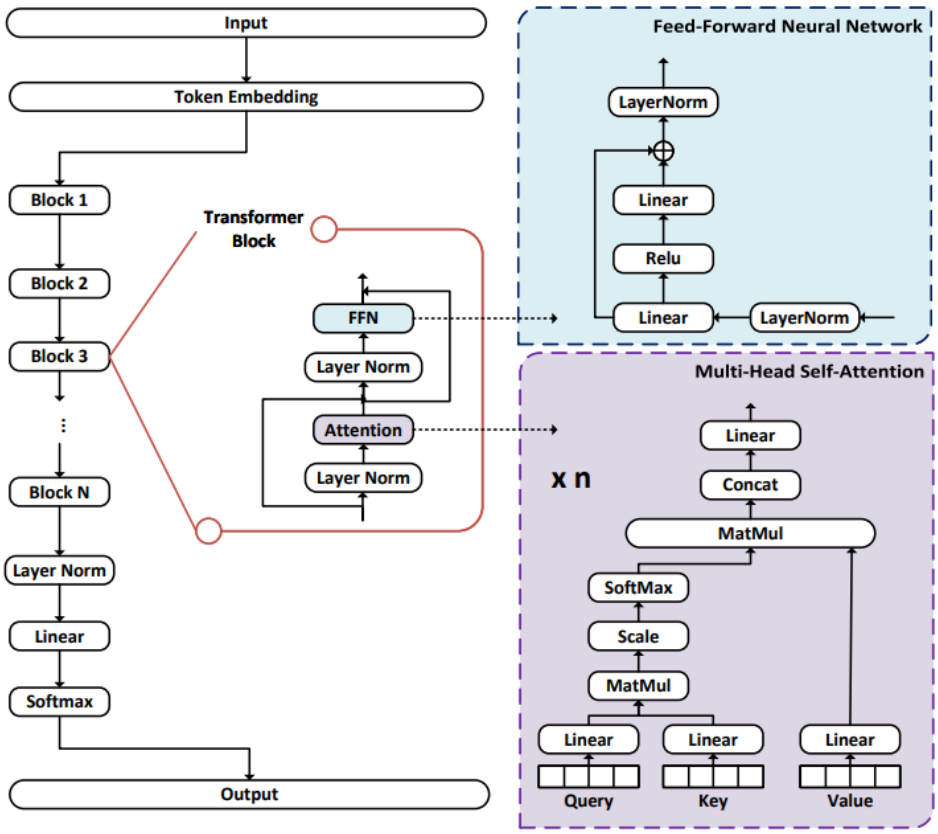


Figure 1: An overview of ChatGPT's architecture (Wu et al., 2025).

ChatGPT is very versatile and adaptive for any type of conversational use, and it can generate smooth, natural-flowing, and human-like responses, so it can be used in applications that require flexible high-quality language exchange (Awasthi et al., 2025). ChatGPT can also script code, and functions can be scripted depending on the requirement. It provides step-by-step, detailed, and broken-down explanations of tricky parts. It solves mathematical problems step by step numerically. It is written in different styles. ChatGPT is capable of "answering follow-up questions, acknowledging errors, challenging erroneous assumptions, and refusing inappropriate requests." ChatGPT, a conversational chatbot, is available in dialogue form (Alawida et al., 2024).

DeepSeek is a large language model based on Sparse Mixture-of-Experts (MoE). DeepSeek uses an MoE model structure that activates just a portion of neural network "experts" (top-k experts) for each text prompt via a gating function, rather than activating all model parameters like GPT. This architecture improves resource efficiency and allows for processing longer contexts using less memory with mechanisms such as Multi-Head Latent Attention (MLA) and Multi-Token Prediction (MTP) during training. This architecture, however, renders DeepSeek more vulnerable to certain attacks by deviating adversarial requests to less-tuned experts (Wu et al., 2025). This architecture is illustrated in Figure 2, indicating the splitting of the model into several experts with the gating mechanism routing the text tokens, as well as the latent attention modules and other supporting methods.

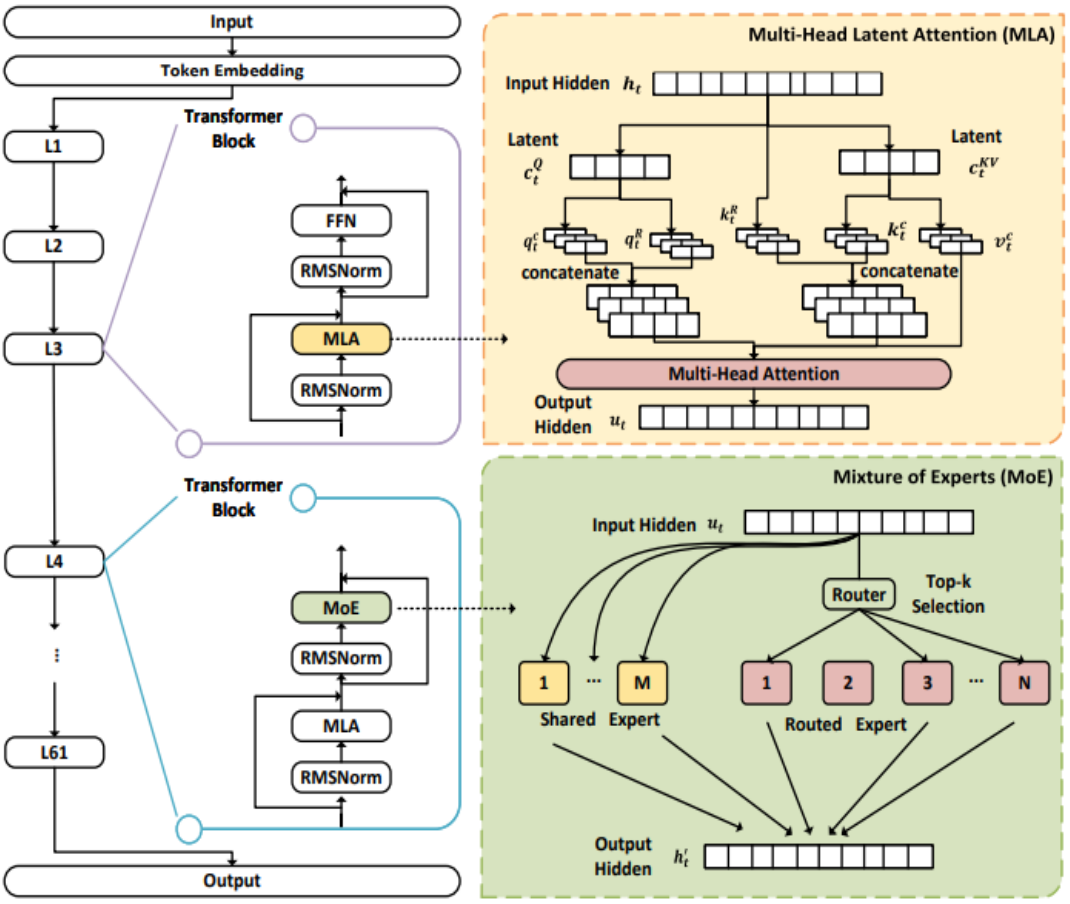


Figure 2: An overview of DeepSeek's architecture (Wu et al., 2025).

DeepSeek is also characterized by its ability to integrate and process different types of data, including text, images, and sound files, and also instant retrieval for outside data, allowing it to provide up-to-date and accurate replies in real time. DeepSeek excels in operations that require instantaneous access to information, multi-modal processing, and high accuracy in the output information, hence being applicable for technical and non-technical applications that require processing of complex and dynamic data (Awasthi et al., 2025).

2.2 Key Differences Between ChatGPT and DeepSeek

Although they both aim to improve text interaction and content generation, they differ in their architecture and functional technologies, influencing their performance and optimal use. Table 1 summarizes the key differences between ChatGPT and DeepSeek in architecture, performance, customization, and other functional and technical considerations, allowing users to choose the most appropriate bot based on their needs and purpose of use.

Table 1: Key differences between ChatGPT and DeepSeek (Dandage, 2025).

Aspect	ChatGPT	DeepSeek
Architecture	Mixture-of-Experts (MoE) approach, activating subsets of 671B parameters per task for efficiency	Dense Transformer model with 1.8T parameters running all parameters on each task
Performance on Technical Tasks	Excels in technical tasks like mathematics (up to 90% accuracy) and SQL queries	Strong general understanding and flexibility across broad topics
Cost	Much lower training and inference costs (less than 1/10th of ChatGPT)	Higher costs, with a freemium pricing model including subscriptions
Usage Flexibility	Well-suited for specialized and technical tasks, open-source and customizable	Designed for general use, supporting a wide variety of topics with a natural conversation style
Response Speed and Efficiency	Faster on specialized technical queries by activating fewer parameters	Consistent and stable performance, but less resource-efficient
Output Accuracy	Highly accurate and well-structured outputs on rule-based tasks	More creative and natural responses, strong in conversational generation
Multimodal Data Support	Advanced support for multiple data types (text, images, audio) in certain versions	Mainly text-based with limited image support in newer releases
Specialized Chat Models	DeepSeek-V2 Chat and others support focused task-oriented dialogs	Variants like ChatGPT-4 optimize for natural and interactive dialogues
Ideal Use Cases	Technical applications, research requiring precision and customization	General applications like education, creativity, and customer service
Availability and Modifiability	Open source and community-driven, flexible for modification	Closed source with API access and paid subscription tiers

3. The Role of AI Bots in Designing Experiments and Analyzing Agricultural Data

AI bots are transforming research by enabling effectiveness, precision, and scalability in key phases: experimental design selection, field trial planning, statistical analysis, and test approaches. The below provides an overview of how AI bots contribute to each of these domains.

3.1 Selecting Experimental Designs

AI bots possess a great deal of transformational potential in agricultural research as they assist researchers in obtaining the optimal possible experimental designs given specific study objectives, available resources, and conditions. The systems can sift vast amounts of past and current agricultural data with the aid of machine learning algorithms in a way that reproduces different experimental conditions and identifies designs that lead to maximum statistical power while maintaining costs and resource use to a bare minimum. Through the automation of this selection process, AI reduces the application of tested trial-and-error methods by researchers and weakens experimental results. Supervised and reinforcement learning methods, for instance, enable AI instruments to recommend the most suitable randomization strategy, replication level, and blocking design that can handle crop heterogeneity and environmental heterogeneity. This procedure not only enhances the efficacy of experimental design but also assists in excluding biases and likely confounding variables that would weaken evidence power (Elbasi et al., 2024; Nolte and Tomforde, 2025).

3.2 Field Trial Design

In field trial design, AI bots employ advanced algorithms to generate and iterate over designs considering the spatial variability in soil properties, water, temperature, and topography within a field. Incorporating geospatial data with environmental data as well as previous experimental findings, AI systems provide complex designs for the arrangement of trial plots to remove environmental confounding biases and improve the accuracy of comparison between treatments. These bots generate uniform field test layouts like treatment randomization, plot size, and replication plans responsive to scientific requirements and workable constraints like labor, equipment utilization, and regional agriculture regimes. Also, AI platforms enable dynamic real-time field trial adjustment and observation from remote sensing data and IoT sensors, making it simple to identify anomalies early and adhere to experimental procedures. Therefore, field trial design becomes more effective, replicable, and sensitive to variation in environmental conditions (Kovačević et al., 2025).

3.3 Statistical Analysis

AI bots highly automate the statistical analysis phase of crop tests by automatically conducting data preprocessing, exploratory data analysis, model fitting, and validation. They handle big and complicated data sets obtained from high-throughput phenotyping, sensor networks, and multi-environmental tests by automatically detecting outliers, handling missing values, and carrying out appropriate transformations. By applying deep learning and machine learning techniques, AI apps recommend and apply the most suitable predictive and statistical models based on data characteristics, e.g., linear mixed models to allocate variance or ensemble methods to predict yields. In reducing human intervention, these bots accelerate valuable insight generation and increase reproducibility and transparency of data analysis. Apart from that, visualization modules in AI systems also help researchers comprehend complex findings in easy-to-understand graphs and abstracts, allowing for better decision-making and hypothesis enhancement (Elbasi et al., 2024).

4. The Role of AI Bots in The Agricultural Field

AI is a new trend that has transformed numerous industries, such as agriculture (Păvăloaia and Necula, 2023; Al-Sammarraie et al., 2025). AI has proved to transform the agricultural activity process, enhance overall performance, and mitigate major issues such as resource limitation and climate change (Ahmad et al., 2024; Al-Sammarraie et al., 2025). There has been tremendous potential shown by AI technology in agricultural applications, with the potential to boost the yield of crops, utilization of resources, and decision-making efficiency by a tremendous amount (Kolides et al., 2023; Li et al., 2024). There is limited empirical evidence for the impact of the bots on the agriculture of the world (Bertomeu et al., 2023). The global agricultural industry is faced with increasing most challenging issues of dealing with heightened food demand due to population rises, resource constraints, and impacts of climate change (Hanjra and Qureshi, 2010; Hertel, 2015; Gierz et al., 2024). At the same time, an increasing worry surrounds the need to move towards more sustainable and resilient agri-food systems with lower environmental pressures and greater social and economic well-being (Koohafkan et al., 2012; Rockström et al., 2017; Knickel et al., 2018; Al-sammarraie and Ilbas, 2024). AI technology is one of the probable solutions for these, and it has the potential to make farm operations error-free, ensure overall efficiency, and achieve maximum environmental sustainability (Fui-Hoon et al., 2023; Rane, 2023).

AI bots in agriculture have been employed to design smart decision-support systems that provide farmers with real-time information and advice on crop management, watering, and pest control (Aithal and Aithal, 2023; Elbasi et al., 2023). The bots are capable of reducing the use of resources, increasing the yield of crops, and improving decision-making ability, hence enhancing the sustainability and resilience of the agricultural sector (Rathore, 2023). But the impact of the bots on agriculture is not properly studied (Janowicz, 2023). The important functions carried out by the bots in agriculture (Biswas, 2023):

1. Crop forecasting: Analysis of historical crop and weather trends to predict future crop yield, identify possible risks (pests, disease, and weather events), and generate new predictions by incorporating current sensor and weather station data. It can help in planting, fertilizing, and harvesting decision-making, and in market analysis.

2. Soil Analysis: Tests soil pH, nutrient content, and moisture levels to identify weaknesses or deficiencies (such as acidity) and recommend fixes. It can also assess actual sensor readings to enable appropriate fertilization and watering.

3. Crop Analysis: Examines crop yield, quality (e.g., protein and sugar content), and susceptibility to disease, and provides forecasts and management recommendations. It also assists in market analysis by predicting yields and quality.

4. Detection of Pests and Diseases: AI bots may be trained on pest and disease details (disease causes, symptoms, and treatments) to identify problems at early stages, suggest measures for prevention or cure, and even use picture recognition software for diagnosis. Monitoring in real-time enables early intervention.

5. Precision Farming and Farm Management: AI bots can produce reports, alerts, and recommendations to optimize resources, supply chain, logistics, and inventory management. It also facilitates real-time monitoring and decision-making and improves efficiency and sustainability.

The various bots of AI in agriculture emphasize the way such technologies have the potential to overhaul productivity in a revolutionary manner, enhance sustainability, and manage resources more accurately and effectively. As agricultural data becomes increasingly complex, multi-language, and multi-source, the need for cutting-edge technologies that can understand and analyze this data in a deeper and broader sense arises. Zhao et al. (2023) explored the ChatAgri model as a state-of-the-art example of utilizing large-scale linguistic AI to annotate agricultural texts in numerous languages, making researchers and farmers access agricultural information more accurately and adaptively. ChatAgri model introduces an innovative approach utilizing ChatGPT capabilities to label multilingual agricultural texts, thus overcoming some of the challenges associated with traditional approaches in this field, such as the scarcity of structured agricultural data as well as the inability to transfer models across domains and languages. ChatAgri, right from the start, gives emphasis to the importance of AI to enable agricultural knowledge management, especially considering the staggering amount of unstructured agricultural texts available on the internet that demands effective classification and indexing techniques to assist in driving the digitalization process of the agricultural sector.

Most traditional methods rely on pre-trained language models (PLMs) that require domain-specific agricultural fine-tuning, which is resource-intensive and demands high human and technical efforts. In contrast to this, ChatAgri exploits the capability of ChatGPT without additional training. Expert methodologies for developing prompts and assessing responses have been developed to exploit the semantic expertise of ChatGPT for interpreting agricultural texts. For example, Figure 3 illustrates how ChatGPT can offer actionable suggestions for supporting farmers and decision-makers, for example, weather forecasting, pest recognition, and agricultural market insights, through direct response based on tangible user queries. This dialogue reflects ChatGPT's ability to generate useful knowledge in multiple farming contexts.

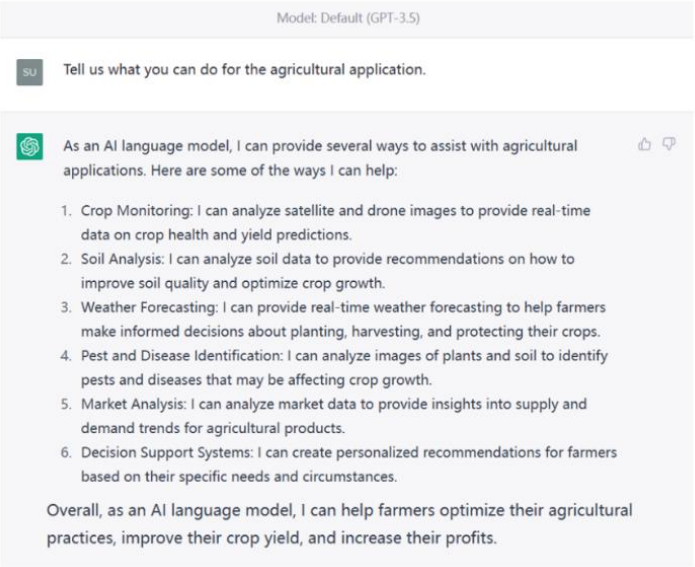


Figure 3: Valuable suggestions provided by ChatGPT to help farmers and market organizers better manage agricultural affairs (Zhao et al., 2023).

Comparing ChatAgri with traditional approaches, Figure 4 shows a comparison of the workflow of ChatAgri's ChatGPT-based approach with the prompt-tuning approach used in traditional models. Figure 4 illustrates an example of agrifood comment sentiment analysis, wherein part (b) of the figure outlines the process using ChatGPT, from query construction to model inference, to matching the response with end classifications. Part (c) of the figure, however, depicts classical fine-tuning models' functioning, with bespoke templates and additional training. Experimental evidence reveals that ChatAgri is competitive, and in certain cases even superior, specifically when in the mode of zero-shot learning. It also reveals promising knowledge transferability across languages and agricultural fields.

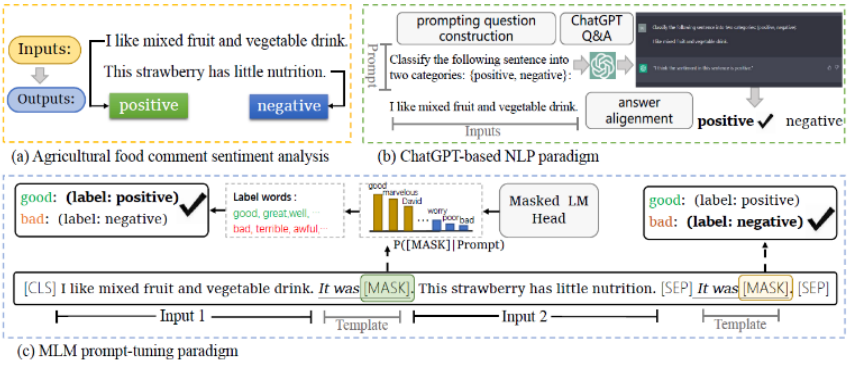


Figure 4: The paradigm comparison of the ChatGPT-based NLP solutions and the existing prompt learning paradigm using an agricultural sentiment analysis example. Part (a) denotes the task prototype of the agricultural sentiment analysis, Part (b) denotes the standard workflow of ChatGPT-based approaches, and Part (c) denotes the standard workflow of Masked LM prompt-tuning methods (Zhao et al., 2023).

Figure 5 also indicates detailed experimental results demonstrating the performance of the model of ChatAgri in classifying multilingual agricultural text. Figure 5 indicates a comparison of ChatAgri and baseline fine-tuning-based models. The figure indicates ChatAgri to be better in many cases, particularly in zero-shot learning, and its ability to cope with language diversity and varied agricultural topics. These results confirm that ChatAgri is a cost-effective and adaptive alternative compared to traditional approaches requiring vast training sets and high computing power. This benefits ChatAgri even more in increasing agricultural knowledge management and decision-making support in the sector, making it a very promising digital transformation tool for agriculture.

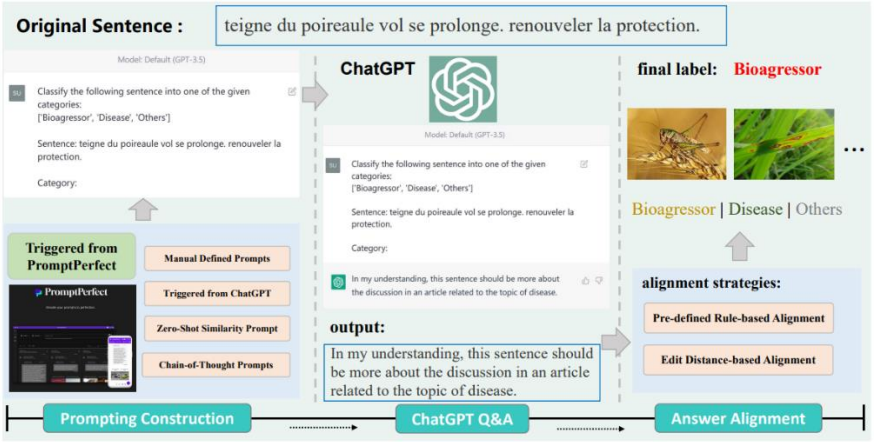


Figure 5: The framework of ChatAgri, which is illustrated by a typical example in the agricultural natural disaster dataset, the French Plant Health Bulletin. First (left), several prompting construction strategies were applied to generate prompts, and the ChatGPT question is constituted by integrating these prompts with the original sentence; Second (center), ChatGPT provides a response based on the inputs; Finally (right), the answer alignment strategies were devised to classify the intermediate answer to pre-defined categories (Zhao et al., 2023).

The above study attests that ChatAgri is a leap in terms of building general and efficient AI systems for agricultural text processing, with a universal architecture that can be generalized to broader applications in smart agriculture. The research paper also recommends further studies on the development of query construction and answer analysis methods for optimal use of large language models like ChatGPT in facilitating agricultural decision-making and improving knowledge management in the industry.

5. Technical and Ethical Challenges in Using ChatGPT and DeepSeek in Agricultural Research

Use of AI bots ChatGPT and DeepSeek in agriculture research is confronted with technical and ethical challenges. While AI bots may have promising benefits in helping researchers arrange materials, draft manuscripts, and proofread, their utilization in agricultural guidance is also risky (Abd-Elsalam and Abdel-Momen, 2023).

5.1 Technical Challenges (Biswas 2023; Kpodo and Nejadhashemi, 2025; Zhao et al., 2023)

- Inaccuracy and Ambiguity: Researchers have found that AI bots provide inaccurate or ambiguous answers to agricultural questions, leading to the possibility of making inadequate management decisions, crop losses, and even food shortages.
- Data Limitations: Language students are trained on large datasets, but the quality and relevance of such data in specific agricultural situations, especially in developing nations, could be an issue. Categorized and standardized agricultural datasets do not exist, and models could be difficult to apply. Current models are biased towards text data.
- AI bots are not context-dependent and cannot fully take into account diverse agricultural practices, environmental conditions, and local nuances, which are critical for providing effective agricultural advisory. The complexity of agricultural data and the multilingual nature of sources also contribute to the difficulty in developing effective AI solutions.
- Deployment and portability across domains include limited agricultural training data due to costly annotation, low portability across domains (especially cross-lingual capability), and complexity and cost of deployment for large models.

5.2 Ethical Challenges (Tzachor et al., 2023)

- Lack of Safeguards: Among the most prominent ethical concerns is the lack of safeguards against extensive and uncontrollable uses of AI bots in a sensitive sector like agriculture, where imperfect recommendations can have degrading impacts on food security and livelihood.
- Accountability and Responsibility: There should be clear accountability for erroneous advice provided by AI bots and responsibility for the consequences of their recommendations. Without oversight, AI bots may provide erroneous advice to Farmers that, if adopted, may have negative consequences.
- Food Security Risks: Unregulated application of AI bots for farming advice, especially by small and medium-sized farms in developing countries, would aggravate food insecurity if the advice proves to be erroneous.
- Replacement of Human Expertise: While AI can enhance agricultural extension services, excessive reliance on AI can undermine the vital role of human extension agents in providing accurate, location-specific, and reliable advice based on rich experience.
- Bias and Fairness: If the data on which such models are trained is neither representative nor diverse, generated advice can be biased, leading to harm to certain communities or farming systems.
- They refer to the need for careful monitoring, testing, and a more comprehensive development process of AI bots for farming before their widespread adoption.

6. Enhancing Integration between ChatGPT, DeepSeek, and the Agricultural Science Community

Facilitating the collaboration of bots such as ChatGPT and DeepSeek with the agric-scientific community is an important move towards enhancing agri-research and greater sustainability in agriculture. For their effective interconnection with each other and with the scientific community, interactive platforms that are easy to use and accessible in various languages and input formats, including text and voice, need to be created (Potamitis, 2023). These sites must be connected to large-scale agriculture databases and sources of information to facilitate interdisciplinarity research and knowledge sharing among researchers across the world using DeepSeek's ability to process and classify text across different languages (Zhao et al., 2023). Further, integration requires constant updating of the bots so that they can learn from home and foreign agriculture information, the bots being tailored to meet the needs of different agricultural climatic types so that the recommendations become more specific and actionable. This growth will be supplemented by creating well-defined transparency and accountability guidelines to be followed in ensuring the information that they supply to remain accurate and ethical and legal responsibility for how they utilize these types of bots in significant farm choices (Jin et al., 2025). Also, the interaction of ChatGPT with DeepSeek will drive innovation in every aspect of interest, such as precise greenhouse climate control, pest and disease control, and advanced hydroponics to make production efficient and sustainable. Agricultural innovation can be accelerated through them, resulting in bots that allow researchers to make data-driven decisions using trustable data and all-around analysis, driving food security and sustainable development.

Finally, but not least, this article highlights the growing role of AI bots such as ChatGPT and DeepSeek in facilitating the progress of the dissemination of agricultural research and access to expert scientific information. By reviewing their operating processes and technologies used, as well as their fundamental differences, it can be understood that each offers strengths in a manner that will improve the quality and effectiveness of research, whether text categorization, multi-media data analysis, or support for agricultural decision-making. Although with challenges and limitations of using these bots in the agricultural sector, they offer broad prospects of accelerating and expanding the range of scientific investigation, elevating the scope of researchers' expertise to address sustainable agriculture and environmental issues. More refinement and adjustment of these bots to the characteristics of the agricultural sector is still required to guarantee maximum positive impacts in the future.

7. Conclusions

This review confirms the key role of AI bots such as ChatGPT and DeepSeek in changing the practice of agricultural research at its very core. The bots have proven to simplify the handling of complex data, provide easy research data, and guide decision-making towards improved choices. The review showed the potential of the bots in bridging the gap that is present between theoretical research and practical usage through the provision of customized solutions that are acceptable for both researchers and farmers. However, their real application continues to be met with fundamental issues like the validity of data, adaptability to changing local contexts, and ethics with respect to transparency and accountability. This overview offers a vision for the future that centers on the need to design proprietary AI bots for agriculture to more effectively marry new technologies and agricultural infrastructure together with specified controls and institutions to achieve optimal use of such bots. It also emphasizes the imperative to invest in digital infrastructure, along with professional human resources, to ensure success in the process of digitalization in the agriculture sector. Ultimately, the cautious and systematic application of such bots, taking into account the specificities of localities, as well as values and ethics, can be an actual paradigm change towards ensuring sustainable food security and more efficient and productive farming.

Author Contributions

All authors contributed to the review's conception and design. The review has been written and finalized by the authors.

Declarations

Data Availability

No data available in the review.

Conflict of Interest

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