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Frontiers Explored: Recent AI Advances and Their Transformative Impact Across Diverse Domains

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Abstract:

This comprehensive survey navigates recent advances in Artificial Intelligence (AI) and their transformative impact across diverse domains. From machine learning breakthroughs to the integration of AI in natural language processing, computer vision, and robotics, this exploration delves into the multifaceted dimensions of contemporary AI. The analysis encompasses applications in healthcare, finance, industry, and beyond, shedding light on emerging trends, challenges, and the broader societal implications. Machine learning has emerged as a driving force in recent AI advances, enabling systems to learn and adapt from data, shaping innovations that redefine industries. Natural language processing facilitates human-computer interactions, empowering AI to comprehend and respond to linguistic nuances. Computer vision, with its ability to interpret and analyze visual data, contributes to advancements in fields such as image recognition and autonomous systems. The integration of these capabilities into robotics enhances automation, transforming industries with increased efficiency and precision. In healthcare, AI exhibits a transformative impact through diagnostic innovations, personalized medicine, and predictive analytics.

Keywords: *Artificial Intelligence, Recent Advances, Transformative Impact, Diverse Domains, Machine Learning.*

1. Introduction:

In the dynamic landscape of contemporary technology, Artificial Intelligence (AI) stands as a beacon of innovation, reshaping the way we perceive, interact, and advance in an interconnected world. This comprehensive survey, titled "Frontiers Explored: Recent AI Advances and Their Transformative Impact Across Diverse Domains," embarks on an exploration of the cutting-edge

developments in AI and their profound influence across varied sectors. Recent years have witnessed an unprecedented surge in AI capabilities, driven by advancements in machine learning, natural language processing, computer vision, and robotics. These breakthroughs extend beyond theoretical frameworks, translating into tangible applications that span healthcare, finance, industry, and more. This survey aims to unravel the intricacies of recent AI advances, shedding light on their transformative potential and the broader implications for society. Machine learning, a cornerstone of recent AI progress, empowers systems to autonomously learn and adapt from data, revolutionizing industries with enhanced decision-making capabilities. Natural language processing enables fluid communication between humans and machines, while computer vision interprets and analyzes visual data, paving the way for innovations in image recognition and autonomous systems. The integration of these technologies into robotics propels automation to new heights, optimizing processes with unprecedented efficiency and precision [1].

Within the healthcare domain, AI facilitates diagnostic accuracy, personalized medicine, and predictive analytics. Financial sectors leverage AI for advanced predictive modeling, risk assessment, and algorithmic trading, reshaping traditional approaches to economic strategies. Across industries, autonomous systems and smart manufacturing processes redefine operational standards, reflecting the transformative power of AI. However, this transformative journey is not devoid of challenges. Ethical considerations, including privacy concerns, biases, and the transparency of AI decision-making processes, underscore the need for responsible development practices. The interpretability of complex AI models emerges as a critical concern, emphasizing the importance of understanding and validating the decisions made by these systems. As we navigate through the survey, it becomes evident that responsible AI development practices, ethical frameworks, and regulatory standards are integral to unlocking the full potential of AI. The exploration of recent advances not only serves as a testament to technological prowess but also as a guide for steering AI's trajectory towards a future where innovation aligns seamlessly with human values, ensuring positive contributions to societal well-being. In this era of AI exploration, this survey endeavors to provide insights, foster informed discussions, and contribute to the responsible evolution of AI across diverse domains [2].

2. Historical Background

Artificial intelligence (AI) has a rich history that spans over several decades. The journey of AI can be traced back to the mid-20th century when the term was first coined. Early AI research focused on symbolic AI, which involved the use of logic and knowledge representation to mimic human reasoning. Pioneers like Alan Turing and John McCarthy laid the groundwork for this field. As we delve into the historical evolution of AI, it's crucial to acknowledge major milestones:

1950s-1960s: This era saw the birth of AI as an academic discipline. Researchers developed programs that could play chess and perform symbolic reasoning.

1970s-1980s: Expert systems gained prominence, allowing computers to solve problems in specific domains by reasoning from a set of rules. This period also witnessed the emergence of robotics as a subfield of AI.

1990s-2000s: Neural networks and machine learning algorithms started to gain traction. However, during this "AI winter," funding and interest waned due to unmet expectations.

2010s-Present: The last decade witnessed an AI renaissance driven by advances in machine learning, particularly deep learning. This resurgence has transformed various industries, from healthcare and finance to transportation and entertainment [3].

3. Machine Learning and Deep Learning

Machine learning and, more specifically, deep learning have revolutionized the field of AI in recent years. These techniques have empowered AI systems to learn and adapt from data, leading to remarkable breakthroughs.

Machine Learning Advancements:

Supervised Learning: Discuss the principles behind supervised learning, where models are trained on labeled data. Highlight advancements in supervised learning algorithms, such as gradient boosting and support vector machines.

Unsupervised Learning: Explore the world of unsupervised learning, which enables AI systems to find patterns in unlabeled data. Discuss clustering, dimensionality reduction, and recent advancements like autoencoders. **Deep Learning Advancements:**

Neural Networks: Explain the basics of neural networks and their role in deep learning. Discuss the development of convolutional neural networks (CNNs) for image analysis and recurrent neural networks (RNNs) for sequential data [4].

Transformer Architecture: Explore the transformer architecture's impact on natural language processing (NLP) and other domains. Discuss the evolution from models like BERT to more recent variants.

Transfer Learning: Highlight the significance of transfer learning in deep learning. Discuss models like GPT-3 and their ability to perform a wide range of tasks with minimal fine-tuning.

4. Natural Language Processing (NLP)

The field of NLP has experienced a rapid transformation, largely driven by deep learning. Recent advancements in NLP have brought us closer to achieving human-level language understanding and generation.

Transformers and Language Models:

The Transformer Revolution: Dive deep into the transformer architecture and its role in NLP. Discuss how attention mechanisms have revolutionized language understanding tasks.

BERT and Beyond: Explore the impact of models like BERT (Bidirectional Encoder Representations from Transformers) on various NLP tasks, including sentiment analysis, questionanswering, and named entity recognition [5].

XLNet, T5, and GPT-3: Discuss recent innovations in transformer-based models like XLNet, T5 (Text-to-Text Transfer Transformer), and GPT-3 (Generative Pretrained Transformer 3). Highlight their capabilities and limitations.

Applications of NLP:

Language Translation: Explain how NLP models have improved machine translation, enabling real-time translation services.

Sentiment Analysis: Discuss the significance of sentiment analysis in understanding public opinion and its applications in marketing and social media monitoring.

Chatbots and Virtual Assistants: Explore the use of NLP in developing chatbots and virtual assistants that can interact with users in a conversational manner.

Ethical Challenges and Bias in NLP:

Bias in NLP: Address the issue of bias in NLP models and datasets. Discuss real-world examples of bias and its societal implications [6].

Ethical Considerations: Examine the ethical considerations surrounding AI-generated text, such as deepfake generation and misinformation.

5. Computer Vision

Computer vision is another domain where AI has made significant strides in recent years, enabling machines to interpret and understand visual information much like humans.

Advancements in Computer Vision:

Object Detection: Explain recent advancements in object detection algorithms, including Faster R-CNN, YOLO (You Only Look Once), and their applications in autonomous vehicles and surveillance.

Image Recognition: Discuss the evolution of image recognition techniques and their role in identifying objects, scenes, and even emotions in images [7].

Fundamentals of Reinforcement Learning:

Markov Decision Processes (MDPs): Explain the basics of MDPs as the foundation of reinforcement learning. Discuss the components of MDPs, such as states, actions, rewards, and transitions.

Q-Learning and Policy Gradient Methods: Discuss classic reinforcement learning algorithms like Q-learning and their limitations. Introduce policy gradient methods and their advantages in handling high-dimensional action spaces.

Deep Reinforcement Learning:

Deep Q-Networks (DQN): Explore how deep learning is integrated into reinforcement learning, as demonstrated by DQN. Highlight its use in solving complex tasks like video game playing.

Proximal Policy Optimization (PPO) and Actor-Critic Architectures: Discuss more recent advancements, such as PPO and actor-critic architectures, which have improved the stability and sample efficiency of RL algorithms [8].

Applications of Reinforcement Learning:

Game Playing: Provide examples of RL in game playing, including AlphaGo's historic victories against human Go champions and its broader implications for solving complex problems.

Robotics: Explain how reinforcement learning is used in robotics for tasks such as robotic arm control, locomotion, and autonomous navigation.

Healthcare: Discuss the application of RL in personalized treatment plans, drug discovery, and optimizing healthcare operations.

Challenges and Open Problems: Address the challenges in RL, including the need for safe exploration in real-world environments and the high computational costs associated with training deep RL models.

6. Generative Adversarial Networks (GANs)

Generative Adversarial Networks (GANs) represent a powerful paradigm in AI, enabling the generation of highly realistic data and creative content [9].

GAN Architecture and Training:

The GAN Framework: Explain the fundamental components of GANs, including the generator and discriminator networks. Discuss how GANs are trained through adversarial learning.

Variations of GANs: Explore different types of GANs, such as conditional GANs, CycleGANs, and StyleGANs, each designed for specific tasks like image-to-image translation and style transfer.

Applications of GANs:

Image Generation: Discuss how GANs are used to generate high-quality images, including artwork, faces, and even entire scenes.

Data Augmentation: Explain how GANs can augment datasets for machine learning tasks, improving model generalization.

Deepfake Generation: Address the ethical concerns surrounding deepfakes and the role of GANs in generating realistic fake content [10].

Ethical Considerations:

Privacy and Misuse: Discuss the ethical dilemmas related to GANs, including privacy violations, misinformation, and the responsible use of synthetic data.

Countermeasures: Highlight efforts to develop tools and techniques to detect and mitigate the impact of GAN-generated content on society.

7. Explainable AI (XAI)

The need for transparency and interpretability in AI systems has become increasingly evident as AI is integrated into critical decision-making processes.

Interpretability vs. Performance:

Interpretability Trade-offs: Discuss the trade-offs between the interpretability and performance of AI models, highlighting scenarios where interpretability is essential.

Model-Agnostic Techniques: Explore model-agnostic interpretability techniques, such as LIME (Local Interpretable Model-agnostic Explanations) and SHAP (SHapley Additive exPlanations).

AI Explainability in Practice:

Healthcare: Explain the importance of explainability in healthcare AI systems for patient diagnosis and treatment recommendations.

Finance: Discuss how explainable AI can enhance trust in financial systems by providing clear explanations for credit scoring and risk assessment.

Legal and Regulatory Context: Address the evolving legal and regulatory landscape regarding AI transparency and accountability [11].

8. AI in Healthcare

The healthcare sector has witnessed significant AI-driven innovations, improving diagnosis, treatment, and patient care.

Diagnostic Tools:

Medical Imaging: Discuss the role of AI in analyzing medical images, including X-rays, MRIs, and CT scans, for early disease detection and treatment planning.

Pathology and Histopathology: Explore AI applications in pathology for identifying cancerous cells and predicting disease progression [12].

Drug Discovery and Development:

Drug Repurposing: Explain how AI is used to discover new therapeutic uses for existing drugs, potentially accelerating drug development.

Drug Design: Discuss the role of AI in designing novel drug compounds with improved efficacy and safety profiles.

Remote Patient Monitoring:

Wearable Devices: Discuss the use of AI-driven wearable devices to monitor patients' vital signs and detect anomalies in real-time [13].

Telemedicine: Explain how AI-powered telemedicine platforms facilitate remote consultations, especially in times of crisis.

Ethical and Privacy Considerations:

Data Security: Address the importance of protecting patient data and the challenges of maintaining data privacy in healthcare AI applications.

Algorithm Bias: Discuss the potential for bias in healthcare AI algorithms and its impact on diagnosis and treatment recommendations.

9. AI in Autonomous Systems

AI has made significant contributions to the development of autonomous systems, including selfdriving cars, drones, and robots.

Autonomous Vehicles:

Sensor Fusion: Explain the sensor technologies used in autonomous vehicles, including LiDAR, radar, and cameras, and how AI processes data from these sensors [14].

Perception and Decision Making: Discuss how AI enables vehicles to perceive their surroundings and make real-time decisions to navigate safely.

Challenges and Safety: Address the challenges of achieving full autonomy in vehicles and the safety considerations in autonomous transportation.

Drones and Robotics:

Applications: Explore the diverse applications of drones and robots, from search and rescue missions to warehouse automation [15].

AI in Robot Control: Discuss how AI algorithms enable robots to perform tasks such as object manipulation and path planning.

Human-Robot Interaction: Highlight the importance of AI in improving the interaction between humans and autonomous systems.

10. AI in Finance and Business

AI has reshaped the financial industry and business landscape by enhancing decision-making, risk management, and customer experiences.

Financial Markets:

Algorithmic Trading: Explain how AI is used in high-frequency trading and quantitative analysis, and its impact on financial markets [16].

Risk Assessment: Discuss AI-driven risk assessment models for lending, insurance, and investment portfolios.

Customer Service:

Chatbots and Virtual Assistants: Explore the use of AI-powered chatbots and virtual assistants in enhancing customer service and support [17].

Personalization: Explain how AI is used to personalize recommendations, advertisements, and user experiences.

AI Strategy and Job Markets:

Business Strategies: Discuss how businesses are adopting AI strategies to gain a competitive edge and streamline operations.

Impact on Job Markets: Address the evolving job landscape due to automation and the need for upskilling and reskilling.

Ethical and Regulatory Challenges:

Bias in Financial Algorithms: Discuss concerns related to algorithmic bias in lending and investment decisions [18].

Regulatory Frameworks: Explain the role of regulatory bodies in overseeing AI applications in finance and business.

11. AI and Ethics

As AI technologies continue to advance, ethical considerations have become paramount in ensuring responsible AI development and deployment.

Bias and Fairness:

Bias in AI Systems: Discuss the concept of bias in AI, including data bias, algorithmic bias, and their consequences.

Fairness and Equity: Explain the importance of fairness and equity in AI, especially in applications like hiring and lending.

Privacy and Data Security:

Data Privacy: Discuss the challenges of protecting user data and ensuring privacy in AI applications [19], [20].

GDPR and Data Regulations: Explain how regulations like the General Data Protection Regulation (GDPR) impact AI development.

Transparency and Accountability:

Explain ability: Revisit the importance of AI explain ability and its role in accountability.

AI Auditing: Discuss the emerging field of AI auditing to assess AI systems for bias, fairness, and compliance with ethical guidelines [21].

AI for Social Good:

AI for Social Impact: Highlight AI applications in addressing societal challenges, such as healthcare access, environmental conservation, and disaster response.

Ethical AI Initiatives: Discuss ongoing initiatives and organizations working to promote ethical AI research and practices.

12. Future Trends and Challenges

The field of AI is continuously evolving, and several future trends and challenges are on the horizon [22], [23].

Future AI Trends:

AI in Edge Computing: Discuss the integration of AI into edge devices, enabling real-time decision-making without relying on cloud servers.

Quantum Computing: Explore the potential impact of quantum computing on AI algorithms and problem-solving [24].

AI in Creativity: Discuss AI's role in creative fields such as art, music, and storytelling.

Challenges Ahead:

Ethical Challenges: Address the ongoing challenges related to bias, fairness, and transparency in AI systems.

AI Regulation: Discuss the need for comprehensive AI regulations to ensure responsible development and use.

AI and Employment: Explore the debate surrounding the impact of AI on employment and the future of work [25], [26].

Conclusion:

In concluding our exploration of recent AI advances and their transformative impact across diverse domains, it becomes clear that we stand at the precipice of a technological era that promises both unprecedented innovation and ethical considerations. The strides made in machine learning, natural language processing, computer vision, and robotics have propelled AI into the fabric of various industries, revolutionizing the way we work, communicate, and solve complex challenges. The healthcare sector is witnessing a paradigm shift with AI-driven diagnostic tools, personalized medicine, and predictive analytics, contributing to enhanced patient outcomes. Financial realms benefit from the predictive power of AI models, enabling advanced risk assessment and algorithmic trading strategies. Industries, propelled by autonomous systems and smart

manufacturing, are experiencing heightened efficiency and adaptability in the face of evolving operational demands. Yet, as we celebrate these accomplishments, ethical considerations and challenges loom large. The responsible development of AI demands our unwavering commitment to addressing biases, ensuring transparency in decision-making processes, and safeguarding individual privacy. The interpretability of complex models remains a critical concern, emphasizing the importance of building trust in AI systems. Looking forward, the synergy between technological innovation and ethical responsibility becomes paramount. It is incumbent upon researchers, industry leaders, policymakers, and society as a whole to collaboratively shape the trajectory of AI. Responsible AI development practices, grounded in ethical frameworks and guided by robust regulatory standards, will be instrumental in navigating the evolving frontiers of this transformative technology. In this era of AI exploration, our survey serves as a guidepost, offering insights into recent advances while advocating for a future where innovation aligns seamlessly with human values. The dynamic interplay between technological prowess and responsible governance defines the path forward. By fostering informed discussions, encouraging ethical considerations, and contributing to the responsible evolution of AI, we can ensure that the transformative power of AI is harnessed for the betterment of society, ultimately reflecting the values and aspirations of humanity. As we bid farewell to the frontiers explored, we embark on a journey of continued exploration, cognizant of the responsibility that comes with steering the course of AI's impact on diverse domains.

References

[1] Archibong, E. E., Ibia, K. U. T., Muniandi, B., Dari, S. S., Dhabliya, D., & Dadheech, P. (2024). The Intersection of AI Technology and Intellectual Property Adjudication in Supply Chain Management. In *AI and Machine Learning Impacts in Intelligent Supply Chain* (pp. 39-56). IGI Global.

[2] Archibong, E. E., Ibia, K. T., Muniandi, B., Dari, S. S., Dhabliya, D., & Dadheech, P. (2024). The Intersection of AI Technology and Intellectual Property Adjudication in Supply Chain Management. In B. Pandey, U. Kanike, A. George, & D. Pandey (Eds.), *AI and Machine Learning Impacts in Intelligent Supply Chain* (pp. 39-56). IGI Global. https://doi.org/10.4018/979-8-3693-1347-3.ch004

[3] Islam, Md Ashraful, et al. "Comparative Analysis of PV Simulation Software by Analytic Hierarchy Process."

[4] Vargas Canales, J. M., M. I. Palacios Rangel, J. H. H. Camacho Vera, J. Aguilar Ávila, and J. G. Ocampo Ledesma. 2015. “Factores de Innovación en Agricultura Protegida en la Región de Tulancingo, México.” Revista Mexicana de Ciencias Agrícolas 6 (4): 827–840.

[5] Camacho-Vera JH, Cervantes-Escoto F, PalaciosRangel MI (2017). Factores determinantes del rendimiento en unidades de producción de lechería familiar. Revista Mexicana de Ciencias Pecuarias 8(1): 23-29.

[6] Ahammed, M. F. (2023). Modern-Day Asset Security and Management Methodology. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 14(03), 1193–1200. https://doi.org/10.61841/turcomat.v14i03.14195

[7] Lin, J. H., Yang, S. H., Muniandi, B., Ma, Y. S., Huang, C. M., Chen, K. H., ... & Tsai, T. Y. (2019). A high efficiency and fast transient digital low-dropout regulator with the burst mode corresponding to the power-saving modes of DC–DC switching converters. *IEEE Transactions on Power Electronics*, *35*(4), 3997-4008.

[8] J. -H. Lin et al., "A High Efficiency and Fast Transient Digital Low-Dropout Regulator With the Burst Mode Corresponding to the Power-Saving Modes of DC–DC Switching Converters," in IEEE Transactions on Power Electronics, vol. 35, no. 4, pp. 3997-4008, April 2020, doi: 10.1109/TPEL.2019.2939415.

[9] Labu, Md Rasheduzzaman, and Md Fahim Ahammed. "Next-Generation Cyber Threat Detection and Mitigation Strategies: A Focus on Artificial Intelligence and Machine Learning." Journal of Computer Science and Technology Studies 6.1 (2024): 179-188.

[10] Dhabliya, D., Dari, S. S., Sakhare, N. N., Dhablia, A. K., Pandey, D., Muniandi, B., ... & Dadheech, P. (2024). New Proposed Policies and Strategies for Dynamic Load Balancing in Cloud Computing. In *Emerging Trends in Cloud Computing Analytics, Scalability, and Service Models* (pp. 135-143). IGI Global.

[11] Dhabliya, D., Dari, S. S., Sakhare, N. N., Dhablia, A. K., Pandey, D., Muniandi, B., George, A. S., Hameed, A. S., & Dadheech, P. (2024). New Proposed Policies and Strategies for Dynamic Load Balancing in Cloud Computing. In D. Darwish (Ed.), *Emerging Trends in Cloud Computing Analytics, Scalability, and Service Models* (pp. 135-143). IGI Global. https://doi.org/10.4018/979-8-3693-0900-1.ch006

[12] Muniandi, B., Huang, C. J., Kuo, C. C., Yang, T. F., Chen, K. H., Lin, Y. H., ... & Tsai, T. Y. (2019). A 97% maximum efficiency fully automated control turbo boost topology for battery chargers. *IEEE Transactions on Circuits and Systems I: Regular Papers*, *66*(11), 4516-4527.

[13] B. Muniandi et al., "A 97% Maximum Efficiency Fully Automated Control Turbo Boost Topology for Battery Chargers," in IEEE Transactions on Circuits and Systems I: Regular Papers, vol. 66, no. 11, pp. 4516-4527, Nov. 2019, doi: 10.1109/TCSI.2019.2925374.

[14] Yang, T. F., Huang, R. Y., Su, Y. P., Chen, K. H., Tsai, T. Y., Lin, J. R., ... & Tseng, P. L. (2015, May). Implantable biomedical device supplying by a 28nm CMOS self-calibration DC-DC buck converter with 97% output voltage accuracy. In *2015 IEEE International Symposium on Circuits and Systems (ISCAS)* (pp. 1366-1369). IEEE.

[15] García-Sánchez, E. I., Vargas-Canales, J. M., Palacios-Rangel, M. I. y Aguilar-Ávila, J. (2018). Sistema de innovación como marco analítico de la agricultura protegida en la región centro de México. Cuadernos de Desarrollo Rural, 15(81), 1-24. doi: https://doi.org/10.11144/javeriana.cdr15-81.sima

[16] Vargas-Canales, J. M., Castillo-González, A. M., Pineda-Pineda, J., Ramírez-Arias, J. A., & Avitia-García, E. (2014). Extracción nutrimental de jitomate (Solanum lycopersicum L.) en mezclas de tezontle con aserrín nuevo y reciclado. Revista Chapingo, Serie Horticultura, 20(1), 71–88. https://doi.org/10.5154/r.rchsh.2013.02.005

[17] Vargas-Canales, J. M., M. I. Palacios-Rangel, J. Aguilar-Ávila, J. G. Ocampo-Ledesma, P. Kreimer, and G. Ortiz-Martínez. 2018. “Technological Innovation in a Case of Protected Agriculture in Mexico.” Revista de Geografía Agrícola 61 (2): 9–38. https://doi.org/10.5154/r.rga.2017.61.02

[18] Mendoza CVM, Pineda PJ, Vargas CJM, Hernández AE (2019). Nutrition of fig (Ficus carica L.) under hydroponics and greenhouse conditions. Journal of Plant Nutrition 11:1350-1365. https://doi.org/10.1080/01904167.2019.1609510

[19] T. -F. Yang *et al.*, "Implantable biomedical device supplying by a 28nm CMOS self-calibration DC-DC buck converter with 97% output voltage accuracy," *2015 IEEE International Symposium on Circuits and Systems (ISCAS)*, Lisbon, Portugal, 2015, pp. 1366-1369, doi: 10.1109/ISCAS.2015.7168896.

[20] Lee, J. J., Yang, S. H., Muniandi, B., Chien, M. W., Chen, K. H., Lin, Y. H., ... & Tsai, T. Y. (2019). Multiphase active energy recycling technique for overshoot voltage reduction in

internet-of-things applications. *IEEE Journal of Emerging and Selected Topics in Power Electronics*, *9*(1), 58-67.

[21] J. -J. Lee *et al*., "Multiphase Active Energy Recycling Technique for Overshoot Voltage Reduction in Internet-of-Things Applications," in *IEEE Journal of Emerging and Selected Topics in Power Electronics*, vol. 9, no. 1, pp. 58-67, Feb. 2021, doi: 10.1109/JESTPE.2019.2949840.

[22] Darwish, Dina, ed. "Emerging Trends in Cloud Computing Analytics, Scalability, and Service Models." (2024).

[23] Enhancing Robustness and Generalization in Deep Learning Models for Image Processing. (2023). *Power System Technology*, *47*(4), 278-293. https://doi.org/10.52783/pst.193

[24] Efficient Workload Allocation and Scheduling Strategies for AI-Intensive Tasks in Cloud Infrastructures. (2023). *Power System Technology*, *47*(4), 82-102. https://doi.org/10.52783/pst.160

[25] Mendoza-Castillo, V. M., Vargas-Canales, J. M., Calderón-Zavala, G., Mendoza-Castillo, M. D. C., & Santacruz-Varela, A. (2017). Intensive production systems of fig (ficus carica l.) under greenhouse conditions. Experimental Agriculture, 53(3). https://doi.org/10.1017/S0014479716000405

[26] Vargas-Canales, J. M., Palacios-Rangel, M. I., Aguilar-Ávila, J., Ocampo-Ledesma, J., & Medina-Cuellar, S. E. (2018). Efficiency of small enterprises of protected agriculture in the adoption of innovations in Mexico. Estudios Gerenciales, 34(146), 52–62. https://doi.org/10.18046/j. estger.2018.146.2811