

An Enterprise Agricultural Platform

RONALD TOMBE,
FUTURE AFRICA, UNIVERSITY OF PRETORIA, & KISII UNIVERSITY



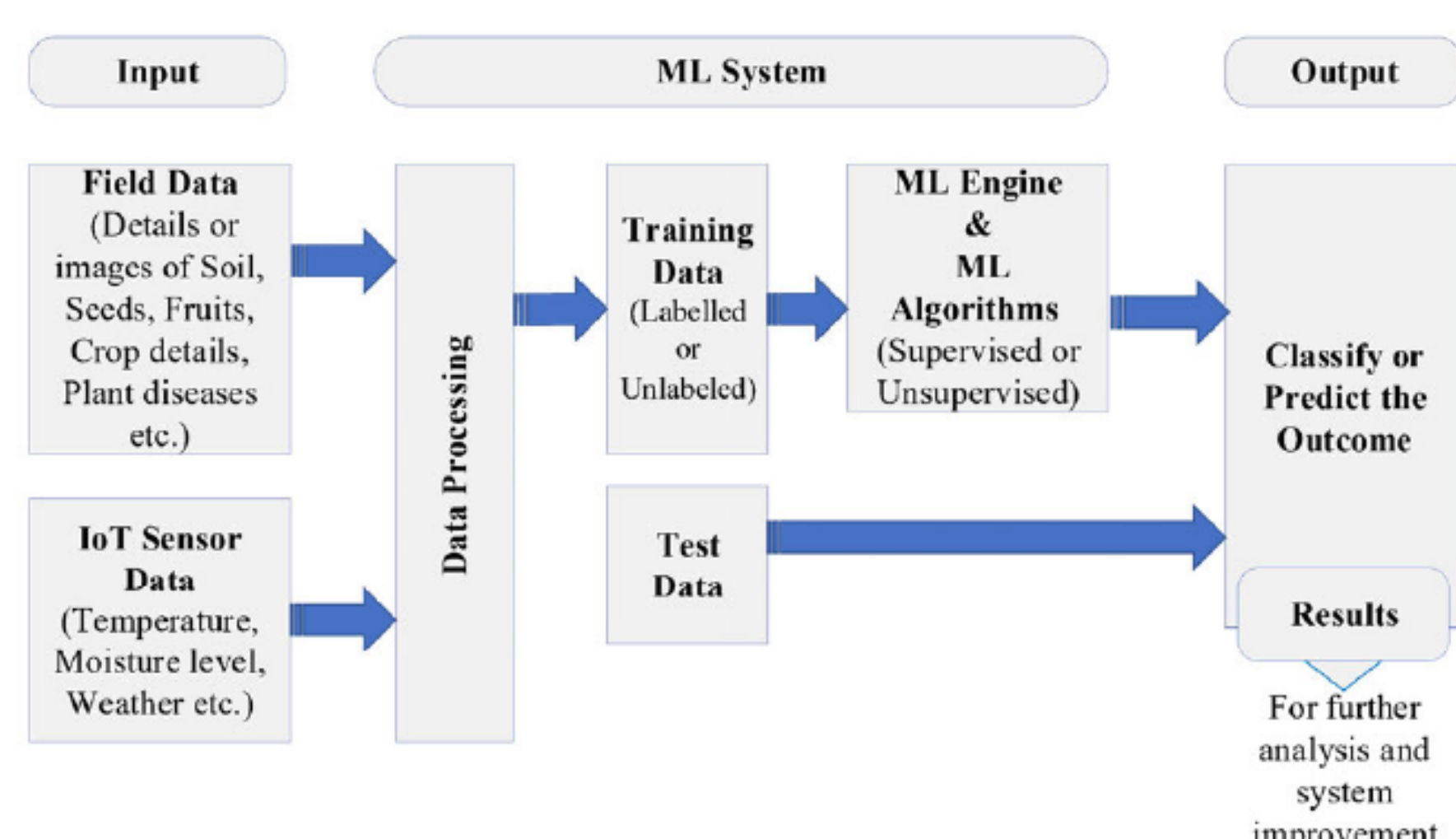
1. Introduction

- * Enterprise architectures provide a structured framework for designing and managing complex organizational systems..
- * The proposed Enterprise Agricultural Platform integrates Enterprise Applications, Service-Oriented Architecture (SOA), and AI, sets the stage for creating a more efficient, responsive, and intelligent agricultural digital ecosystem..
- * Agriculture involves various stakeholders, processes, and resources.
- * the objectives of this project include:
 1. Exploring AI's Role in Enhancing Complex Adaptive Systems within Agric-Food Chains Using Data Mining and Deep Learning
 2. Integrating AI with Data Mining and Deep Learning into Enterprise Architectures for Agric-Food Chains.
 3. Recommender Systems and Large Language Models:

2. Enterprise Architectures in Agric

- AgriVerse is a sophisticated cyber-physical-social system (CPSS) that efficiently processes information from both the natural and socio-economic environment[2] .
- Agriculture-related processes along the agri-food chains are conducted, encompassing planning, planting, processing, packaging, storage, distribution, resale, preparation, and consumption [3].
- Heterogeneity of agricultural circumstances necessitates a comprehensive, accurate, and timely information or knowledge.

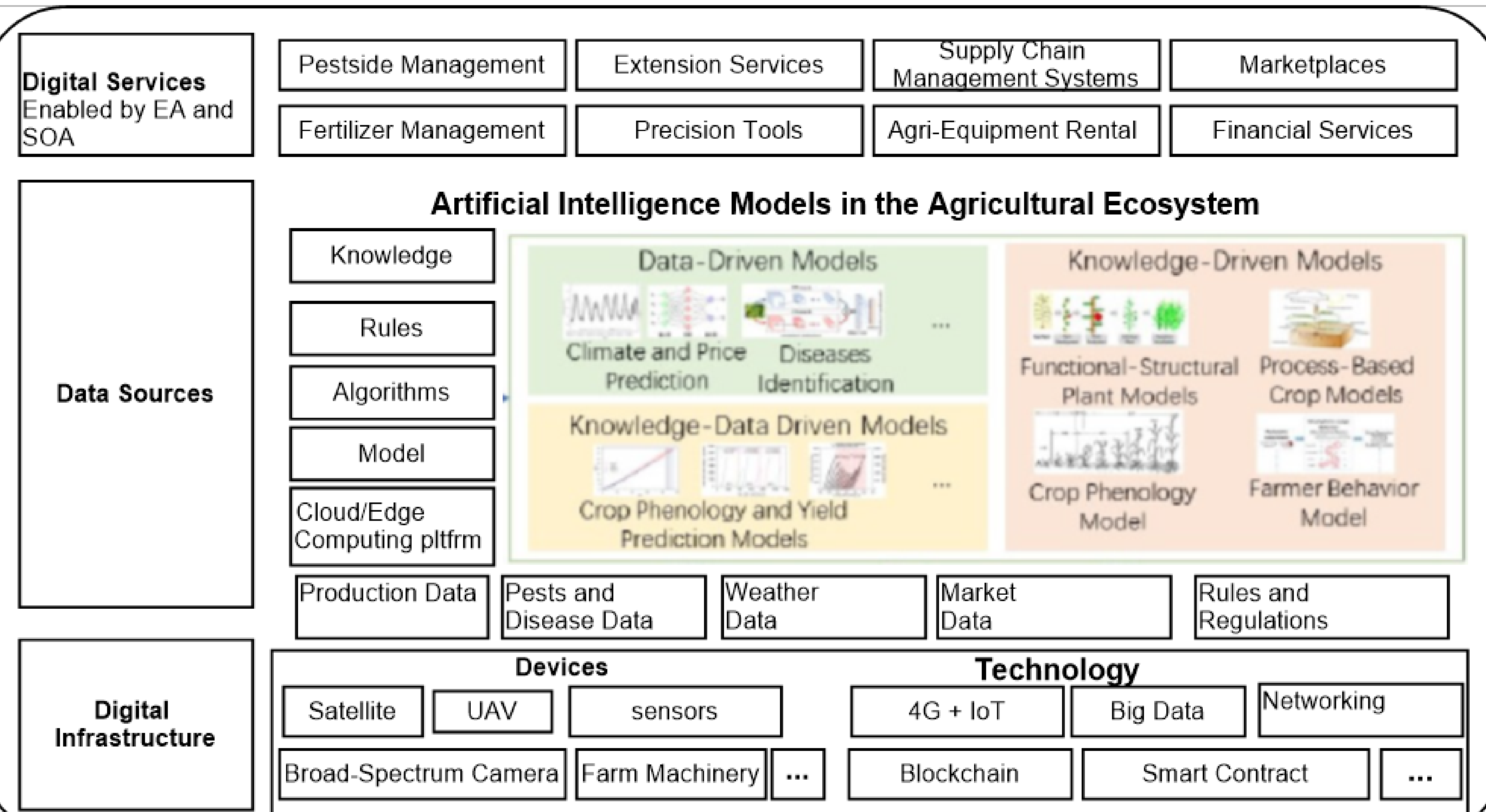
4. ML/DL Model for Agric Sector



7. References

- [1] Keith H Coble, Ashok K Mishra, Shannon Ferrell, and Terry Griffin. Big data in agriculture: A challenge for the future. *Applied Economic Perspectives and Policy*, 40(1):79–96, 2018.
- [2] Mengzhen Kang, Xiujian Wang, Haoyu Wang, Jing Hua, Philippe de Reffye, and Fei-Yue Wang. The development of agriverse: Past, present, and future. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 2023.
- [3] Xiujian Wang, Mengzhen Kang, Hequan Sun, Philippe de Reffye, and Fei-Yue Wang. Decasa in agriverse: Parallel agriculture for smart villages in metaverses. *IEEE/CAA Journal of Automatica Sinica*, 9(12):2055–2062, 2022.

3. An Enterprise Agricultural Platform



5. Recommender Systems, Application Use Case and Opportunities in Agric

- *Agricultural Recommender Systems with Large Language Models:* LLMs offer significant potential in enhancing recommender systems within agriculture by providing advanced natural language processing capabilities. To generate personalized farmer recommendations, they can analyze vast datasets, including research articles, farm reports, and real-time sensor data.
- *Demand Forecasting and Supply Chain Optimization:* AI can dramatically improve demand forecasting accuracy, leading to more precise inventory management and optimized supply chain operations. AI-driven systems can predict demand fluctuations with greater precision by analyzing historical data, market trends, and external factors such as weather patterns.
- *Risk Management and Resilience:* AI models can synthesize data from diverse sources, such as weather patterns, market trends, and historical records, to proactively assess risks and predict potential disruptions in agricultural food chains. By providing actionable insights, these models enable stakeholders to implement preventive measures, thereby enhancing the overall resilience and sustainability of the value chain.
- *Scalability and Interoperability:* Enterprise architectures provide a foundation for scalable and interoperable AI solutions within agricultural food chains. They can enable organizations to integrate AI technologies seamlessly across different systems, platforms, and stakeholders. Interoperability ensures efficient data sharing and collaboration among different participants within the food chain ecosystem.

6. Conclusions

- * Incorporate large language models (LLMs) into the agricultural sector. With their ability to process and generate human-like text, LLMs could enhance decision-making processes by analyzing vast amounts of unstructured data, such as research papers, weather reports, and market trends.
- * Integrating LLMs with AI-driven predictive analytics could optimize agricultural practices, leading to more innovative, data-driven strategies promoting sustainable and efficient agriculture.