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An Advanced Information System for Intelligent Agriculture

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Abstract

It is essential to increase the productivity of agricultural and farming processes to improve yields and cost-effectiveness with new technology such as the Internet of Things (IoT). In particular, IoT can make agricultural and farming industry processes more efficient by reducing human intervention through automation. In this study, we will study all existing technologies in this domain and then propose an Advanced Information System (AIS) for Smart Agriculture based on the Internet of Things (IoT), it takes predictive aspects and makes decisions, in particular to analyse the data (climatic, environmental and financial ...) and to draw critical information from it (diseases, water shortage, inappropriate climate..) to make the most appropriate decision (Agricultural Plan, Prevention, treatment, medicines, watering,....) in an intelligent environment. This system will provide real added value to smart agriculture. Finally, we will be able to ensure better crop quality and reduce all of our costs.

Keywords : Advanced Information System (AIS), Agricultural, Smart farming, Internet of Things (IoT), Predictive analytics, Decision System, Expert System.

Approach

To overcome the problems of agriculture, we will develop an initially advanced information system based on data extracted from object technologies. The proposed solution consists of two levels, the strategic level (state) to achieve the balance of food on all regions of the country and the executive level (farmers) to improve the product and reduce the cost of the farmer in each level consisting of three stages of the pre-agricultural stage and the stage during agriculture and the stage The latter (After) is the post-agriculture crop, which is produced, as at each stage, the expected events will be predicted, which can occur from the analysis of the data already in the database, data or extracted from sensors and decision-making.(fig1)

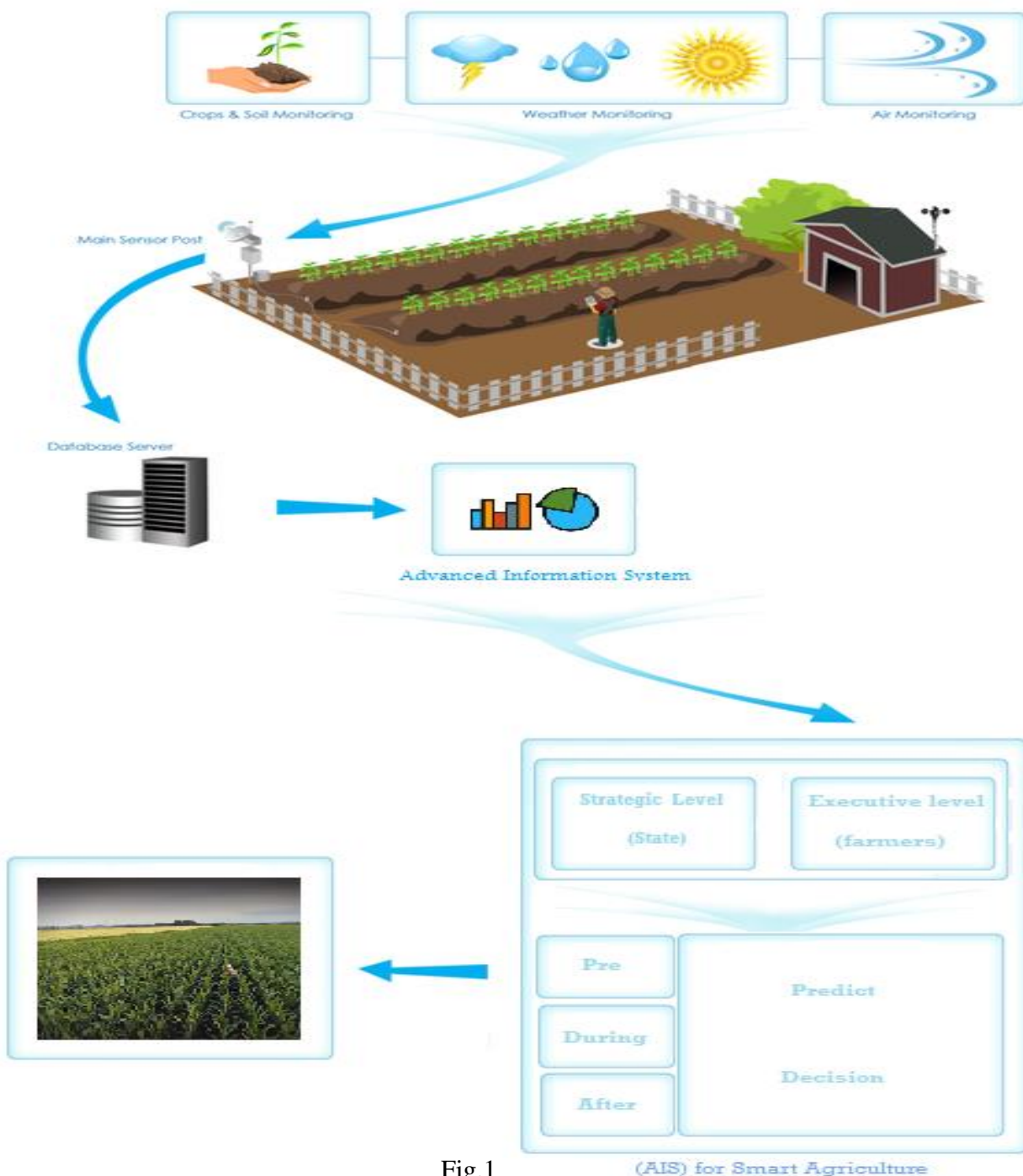


Fig.1

The thesis then details the four visions of the advanced information system:

- 1) Business vision which describes the processes or activities that the SIA must support for intelligent agriculture,
- 2) Functional vision which describes the functions of the SIA to support the processes of intelligent agriculture,
- 3) Application vision describing all the application elements of the SIA for intelligent agriculture,
- 4) Technical vision describing the technical architecture (hardware, basic software and technologies used) supporting the integration of infrastructures and IT tools for smart agriculture.

Thesis work plan

- Study of the concepts of the Internet of Things (Iot) and smart farming.
- Study of the concepts of: AIS, ADB, predictive analysis, Decision and Expert system.
- Study of existing work in this area.
- Summary of work.
- Proposal for an advanced information system for intelligent agriculture.
- Validation of the proposal

Related Work

Title of the thesis	author	The method used
Architecture design approach for IoT-based farm management information systems	Omer Koksak, Bedir Tekinerdogan	The case studies include the development of IoT-based FMIS
An infrastructure for the development of distributed service-oriented information systems for precision agriculture.	Murakami et al. 2007	a distributed service-oriented reference architecture is proposed for the development of information systems for precision agriculture. This web-based approach is focused on communication between software on a service bus
Semantic and Rule Based Event-driven Services-Oriented Agricultural Recommendation System	Z.Laliwala, V.Sorathia, S.Chaudhary	this study used a semantic and rule based event-driven Services-Oriented Architecture to facilitate the seamless and meaningful information integration and interoperation of distributed and heterogeneous web hosted AIS services to deliver personalized recommendation driven by real-time events and user preferences.

References

- [1] Omer Koksak, Bedir Tekinerdogan. *"Architecture design approach for IoT-based farm management information systems."* Precision Agriculture, 20, 926–958(2019).
- [2] Murakami, E., Saraiva, A. M., Ribeiro, L. C. M., Cugnasca, C. E., Hirakawa, A. R., & Correa, P. L. P. (2007). *"An infrastructure for the development of distributed service-oriented information systems for precision agriculture"*. Computers and Electronics in Agriculture, 58(1), 37–48.
- [3] Z.Laliwala, V.Sorathia, S.Chaudhary. *"Semantic and Rule Based Event-driven Services-Oriented Agricultural Recommendation System"*. IEEE Computing Systems, July 2006, DOI: 10.1109/ICDCSW.2006.95.