

Knowledge Society in Agriculture and Digital Networks for Farmers by using Spatial Data Mining

Mr. M. Srinivasan

Research Scholar

*Department of Computer Science & Engineering
Veltech University, Chennai, Tamilnadu*

Dr. S. Koteeswaran

Associate Professor

*Department of Computer Science & Engineering
Veltech University, Chennai, Tamilnadu*

Abstract

Agriculture is a driving force for fundamental force for economic and social revolution. We identify the clear road map to the Indian farmers through the Technology Centers. It speedup the globalization and it makes to knowledge and information so easier for the Indian farmers. To achieve the knowledge society in Indian agriculture, easily get the Information about agriculture through the information center at every village and interactive exchange of information for planning and day by day operation agronomists. The farmers easily connect and plug in to agriculture most recent advanced network the livelihood of farmers by making the data very useful and accessible. Our aim collects the data from agriculture department and cooperation foresees that the tool of KSA (Knowledge Society Agriculture) it will provide the network in agriculture field. Even globally and the central, state government sectors will have not have databases. Convey farmers, scientist, researchers, scholars and network engineers combine together by creating the Modern digital networks for Farmers through KSA Agricultures in online to interchange the ideas and agriculture information.

Keywords- Technology Centers (TC), Advanced Intelligent Network, Spatial Data Mining, Agriculture Information Systems, Data extensive analysis, System integration

I. INTRODUCTION

The Indian agriculture is the major essentials for the rapid growth of Indian academy. Indian economy is mainly based on the agriculture field only. Every year agriculture production and agriculture field is an important element in the growth of Indian economy [1]. Without agriculture products or agriculture based products the Indian economy cannot be increased the rate of growth. We need to increase the food grains in India because of every year rapidly increased the Indian population growth. The growth rate of food grains increased, why because fertilization and insecticides. In this paper give more attention on knowledge society [2] in the field of agriculture production and consumption of major crops in India. We detail discuss about the growth rate of agriculture [3, 4] crops and what are the factors which affect the growth rate of major Indian crops.

We achieve the knowledge society in agriculture especially in India; easily get the Information about agriculture through the Information Centre [5, 6] at each and every village interactive information exchange for planning and day by day operation by agronomists. All the extension and advisory service are available on request basis and identify the new agricultural successive pattern [7]. The Agriculture data simplified and real world seed intelligent from millions of acres. The farmers easily connect and plug in to agriculture most recent advanced network [8, 9] the livelihood of farmers by making the data very useful and accessible.

II. OBJECTIVES OF STUDY

We identify the following major problem in Indian Agriculture,

- Cannot reach the information to the Farmer
- Irrigated farming systems
- Modification of agriculture activities
- Lack of agriculture knowledge and lack of awareness
- Increase of existing production patterns
- Increase the new agriculture production patterns
- Expansion of Agricultural activities
- Extended Operated farm/herd size

III. MAJOR PROBLEMS IN INDIAN AGRICULTURE

The following major problems are found from Indian government agriculture sector because of those increasing the wide population, useless soils, existing technology are used, small land holdings, poor facility for storing the agriculture information and retrieve agriculture information.

A. Existing Methodology

Indian farmers are mostly following the old farming systems [10], they cannot interconnect each other. Farmers are not plug in to agriculture most recent advanced network.

B. People Growth in India

India is a world second most population country (year 2016 around 1.33 billion peoples are living in India) [11, 12]. Every year increasing the population very fast rate according to the national censuses year 2011 overall density of population is 320 square km [13] per persons. This ratio increased in future and created huge demand for land in very shortly in India. Every square meter of land brought this created great demand for land. Even hill slopes also were reducing into terraces for cultivation.

C. Irrigating Forming System

The irrigation facilities are available in India far away from adequate. So for 50 % of the total area [14] comes under the food crops have been brought irrigation and the remaining 50 % is left to the pity of rainy season [15] which is unpredictable in time and space.

D. Small and Fragmented Land Holdings

The pressure of increasing population and the practice of dividing land equally among the beneficiaries has caused unnecessary sub partitions of farm holdings [16, 17]. Accordingly the properties are very small and broken. The small size of properties makes farming activity inefficient and leads to social pressure and violence and dissatisfaction.

E. Useless Soils

Indian soils have been used for growing crops for thousands and thousands of years which have resulted in the useless of soil fruitfulness. With deforestation the sources of maintaining natural fruitfulness of soil has been drying out. Lack of material resources and lack (or) ignorance of scientific knowledge has further useless the soils of the natural fruitfulness. Earlier only animal waste was enough to maintain soil fruitfulness.

F. Storage of food grains

Storage of food grains is a big problem in agriculture field. Nearly ten to twenty percent of our harvest goes to waste every year in the deficiency of proper storage facilities. This massive wastage can be avoided by developing the modern scientific [18, 19] warehousing facilities. The state and central government has taken many steps to provide storage facilities.

G. Farm Trappings

Farming the trappings has taken place in some parts of the country most of the farmers are very poor and don't have the enough resources to purchase modern farm implements and tools.

1) Important Data Mining Methods

The important techniques for data mining are classification, clustering and association rule mining and regression techniques.

a) Classification

Classification and prediction are two forms of data analysis that can be used extract models and describing the most important data classes or predict the future data trends.

b) Clustering

In clustering is finding a partition of data records into clusters such that the points within the each cluster are close to the one.

c) Association Rule Mining

The technique of discovering association rules was originated by R.S.Agrawal, Imielinski, and Swami in 1993.

d) Regression Method

Regression is a learning function that maps the data item to a real valued prediction variable. There are two major predictions methods 1) Linear Regression (LR) & Non Linear Regression (NLR).

2) A Survey of Important Data Mining Methodology used in Agriculture Field

Table 1: Survey Table

S.No	Year	Author	Methods & Techniques	Key features
1	2015	Mucherino,A.,Papajorgji,P.&Pardalos,P	Analyzing data, describes the WEKA, domain model learned by the important mining algorithm. [1]	Case study of agriculture in the domain of crop yields
2	2014	Tellaeché,A.BurgosArtizzu,X.P.Pajaras,G.Ribeiro.A	K-Nearest Neighbor, Decision Tree,	Gathering, store,

			Bayesian Network, Fuzzy Set, SVM and K-Means.[2]	analysis and visualization of agricultural Information.
3	2014	Nidhi Dwivedy	Decker's High resolution continuous soil classification using morphological soil profile descriptions [3]	Yield Prediction in agriculture
4	2014	Altannar Chinchulunn and Petros Xanthopoulos and Vera Tomaino and P.M.Pardalos	Data Mining Techniques in Agricultural and Environmental Sciences.(Support Vector Machine) [20]	Classifying the sample information into linearly severable
5	2013	Fayyad.U Piatetsky Shapiro,G. & Smyth.P.	A K-Nearest Neighbor simulator for daily precipitation and other weather variable [4]	Appropriate for conducting climate impact studies
6	2012	Tripathi, S.SrinivasV.V & Nanjundiah.R.S	Using data mining techniques (Fuzzy Set) to predict industrial wine problem fermentations. [5]	Detecting weeds in precision agriculture
7	2012	Tellaache.A and Burgos Artizzu and X.P.Pajares	A vision-based hybrid (K-Means) classifier for weeds detection. Fuzzy k-Means paradigms [16]	Wine fermentation problem
8	2011	V.K.Somvanshi	Prediction of Rainfall using Artificial Neural Network and ARIMA techniques [8]	Rainfall prediction analysis
9	2011	I.Jagielska and C.Mattehews and T.Whitfort	K-means Algorithm [8]	Classifying soil in combination with GPS
10	2010	D.Sanjay and Sawaitul and Prof.K.P.Wagh and Dr.P.N.Chatur	Classification and prediction of future weather forecasting by using the back propagation method	Focuses on weather forecasts

IV. DATA MINING IN INDIAN AGRICULTURE

Data mining is the process of identifying the previous unknown interesting patterns from the huge amount of data. The useful required information used for representing the model for purpose of prediction and classification model. Data mining mainly divided as predictive and descriptive data mining. In the agriculture sector mainly focused on predictive data mining. There are two major techniques are namely clustering and classification. Data mining techniques is used for the prediction of future agriculture production of crops yield.

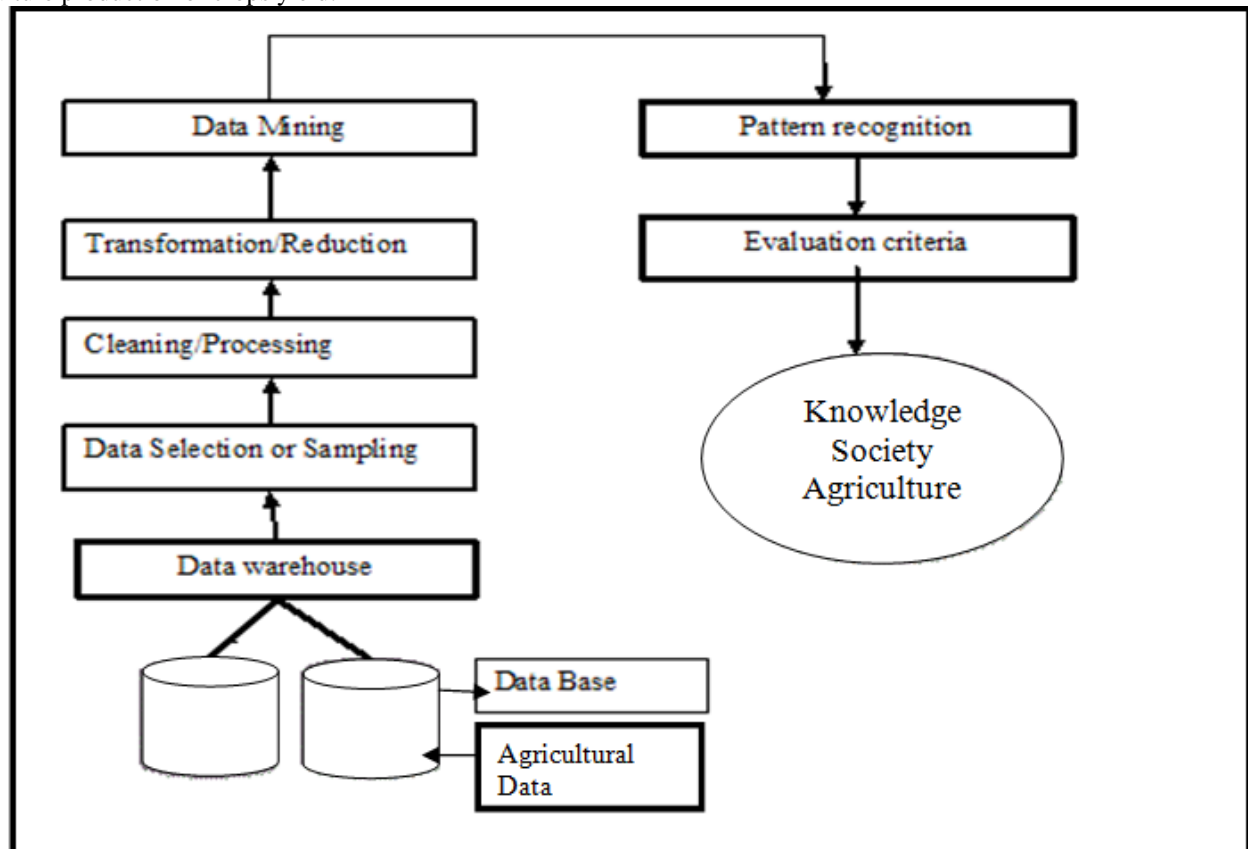


Fig. 1: KDD – Knowledge Discovery Data – KSA & Digital Network

A. Important Data mining methods in agriculture and its applications

Table 2: Important Data mining methods in agriculture and its applications

S.No	Methods	Applications
1	<i>k-means method</i>	<i>Forecasts of pollution in atmosphere Classifying soil in combination with GPS</i>
2	<i>k-nearest neighbor Method</i>	<i>Simulating daily precipitations and other weather variable</i>
3	<i>Support vector Machine Method</i>	<i>SVM methods and analysis of different possible change of weather scenario</i>
4	<i>Decision tree Analysis Method</i>	<i>Prediction soil department</i>
5	<i>Clustering Method for unsupervised</i>	<i>Generate cluster and determine any existence of pattern</i>
6	<i>Weka tool</i>	<i>Huge Data Analysis Tool</i>

V. KSA ARCHITECTURE

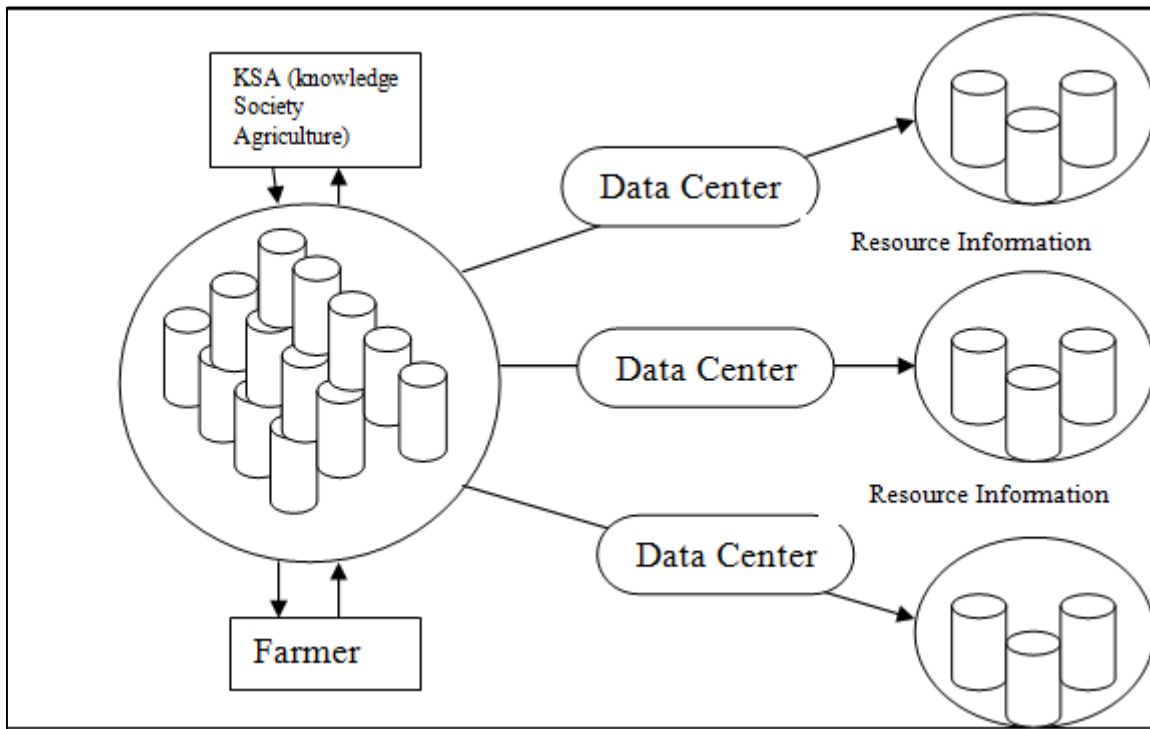


Fig. 2: KSA (Knowledge Society Agriculture) Architecture

VI. DATA MINING ALGORITHMS

A. Classification Algorithms

Forecast one or more distinct variables, based on the other attributes in the data set.

B. Regression Algorithms

Forecast one or more constant variables, such as profit or loss, based on other attributes in the data set.

C. Segmentation Algorithms

Partition data into groups or clusters of items that have related properties.

D. Association Algorithms

Discover correlations between dissimilar attributes in the data set. The main application of algorithm is creating association rules and used in a market basket analysis.

E. Sequence Analysis Algorithms

Review the numerous sequences in data, such as a Web path flow.

1) KSA - Knowledge Society Agriculture

The following five points are highlights the developing knowledge society in the agriculture:

- 1) Global networking
- 2) Education for developing a learning society

- 3) Vibrant government-industry-academia interaction in policy-making and implementation
- 4) Leveraging of existing competencies in Information Technology, Bio-Technology, Financial Service, and Enterprise management.
- 5) Economic and business strategic alliances built on capabilities and opportunities.

Such an agenda would help leverage competencies in the above areas to make India a knowledge super power. Experts predict that this millennium will belong to two Asian super powers, and that India is one.

2) *A Knowledge Society Requires Significant Investment in Harnessing Skills, Technology and Learning.*

Principal features of such a society include the following skills, technology and learning 1) Knowledge and information as major value-creators 2) Rapid changes in technology 3) Greater investment in research and development 4) Greater use of information and communications technology 5) Growth of knowledge-intensive business 6) Increased networking and working together 7) Rising skill requirements.

VII. CONCLUSION

Digital Technology and analytics are transforming into agriculture sector, it's making a farmers working more and more insight driven and efficient. Digital base farming system referred as knowledge based agriculture and precision agriculture. It has helping to improve the financial and other aspects to the farmers. Today only below twenty percentage of acreage is managed precious or modern technology (e.g., variable rate spraying) due to the high cost of gathering precise field of data. Help the farmers to increase productivity and productivity, Knowledge society agriculture has combined technologies (Data Center, IoT, Big Data analytics Etc.). KSA visualization capabilities, and industry knowledge to create the Precision Agriculture Service and the KSA Connected the farmers in wide range.

VIII. FUTURE WORK

State and central government itself come forward and creating the awareness about the importance of agriculture and how to improve the techniques in agriculture field. Discuss with the bottom of farmer problem and finding the right solution immediately. Apply the new innovative techniques in agriculture field; also extend the KSA parallel techniques to improve the result. Apply the KSA techniques in to attributes based methods also give the absolute solution of agriculture problems in future.

REFERENCES

- [1] Mucherino, A., Papajorgji, P. & Pardalos, P. (2009), "Data Mining in agriculture" (Vol.34), Springer.
- [2] Marcel Faf Champs and Bar Minten "Impact of SMS based agriculture information on Indian farmers" oxford journals Vol 26, No.3. Pp.383 to 414, 2012.
- [3] Nidhi Dwivedy "Challenges faced by agriculture sector on developing countries with special reference India". International journal of rural studies Vol.18.No.2, 2011
- [4] Jaideep Vaidya and Chris Clifton "Privacy Preserving K-Means Clustering over Vertically partitioned data". Department of CSE, 2013
- [5] Srikant, RVQ Agrawal, R. (1997), "Mining Association Rules with Item Set Constraints. In KDD" (Vol.97, pp.67 - 73)
- [6] Fayyad, U. Piatetsky Shapiro, G. & Smyth, P. (1996), "From data mining to knowledge discovery in databases" I Magazine, 17.3, 37.
- [7] Lathika Sharma & Nitu Mehta "Data Mining Techniques: A tool for knowledge management System in Agriculture" International Journal of scientific and technology research volume 1, issue 5, ISSN 2277 - 8616, 2012.
- [8] I. Jagielska, C. Mathehews, T. Whitfort, "An investigation into the application of neural networks, fuzzy logic, genetic algorithms, & rough sets to automated knowledge acquisition for classification problems", Neurons Computing, Vol.24, pp.37-54, 1999.
- [9] Mucherino G. Rub - "Recent developments in Data Mining and Agriculture".
- [10] Georg Rub "Data mining of Agriculture yield data: A compression of regression models"
- [11] D. Rajesh "Application of spatial data mining for agriculture" International Journal of computer application (097 to 8887) Volume 15, No.2, 2011.
- [12] Darcy Miller, Jaki McCarthy, Audra Zakzeski "A Fresh Approach to Agricultural Statistics: Data Mining and the Sensing" National Agricultural Statistics Service, 2009.
- [13] E. Van Baars and V. Vebruge "Knowledge based algorithm for multi agent communication".
- [14] Michel Charest & Sylvain Delisle "Ontology guided intelligent data mining assistance: Combining Declarative and Procedural Knowledge.
- [15] Srivastava, United Kingdom "Agro Processing Industries: Potential, constraints and tasks ahead" Indian journal of Agricultural Economics, 44(3), pp.242 - 256, 1999.
- [16] Tellaeche, A. Burgos Artiz, X. P. Pajaras, G. Ribeiro, A. (2007), "A Vision based Hybrid classifier for weeds detection in precision Agriculture through Bayesian and Fuzzy K- Means Paradigms", In innovations in Hybrid Intelligent system (pp.72-79). Springer Berlin Heidelberg.
- [17] B.G. Buchanan R. Duda, "Principles of rule based experts systems". Report STAN CS.82.926. Stanford University, August, 1992.
- [18] Gandhi Vasanth and Kumar Gauri and Manish Robin, "Agro industry for rural and small farmer development: Issues and great lesson for India", Indian food and agribusiness management review, volume 2, pp.331-344, 2001.
- [19] S. Veenadhari, Dr. Bharat Misra, Dr. Singh, "Data mining Techniques for Predicting Crop Productivity - a review article", International journal of computer science and Technology Vol.2, Issue 1, March 2011.
- [20] Tripathi, S. Srinivas V. V. & Nanjundiah, R. S. (2006), "Downscaling of Precipitation for climate change scenarios: A Support Vector Machine Approach" precipitation for climate change scenarios: a support vector machine approach", Journal of Hydrology, 330 (3), 621 - 640.