SENSOR DATA-BASED DECISION MAKING FOR AGRICULTURE

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ABSTRACT: *Agriculture is one of the most important sectors to growth Indian economic. Indian agricultural productivity is very less compared to world standards due to use of obsolete farming technology. With intelligent support system technology will help farmers to make smart decision which is give good benefit. This research work presents a review of the data requirements for agricultural decision making by reviewing decision support frameworks and data sensors for generated parameters to create rule in ANFIS (Adaptive Neuro-Fuzzy Inference System) method. This research work also provide information about crops which is have good criteria will growth in several season depends on climate, temperature and soil condition.*
Keyword: ANFIS, DSS, Crops Rotation

I. INTRODUCTION

Agriculture, the backbone of Indian economy, contributes to the overall economic growth of the country and determines the standard of life for more than 50% of the Indian population.Agriculture contributes only about 14% to the overall GDP but its impact is felt in the manufacturing sector as well as the services sector as the rural population has become a significant consumer of goods and services in the last couple of decades [1].
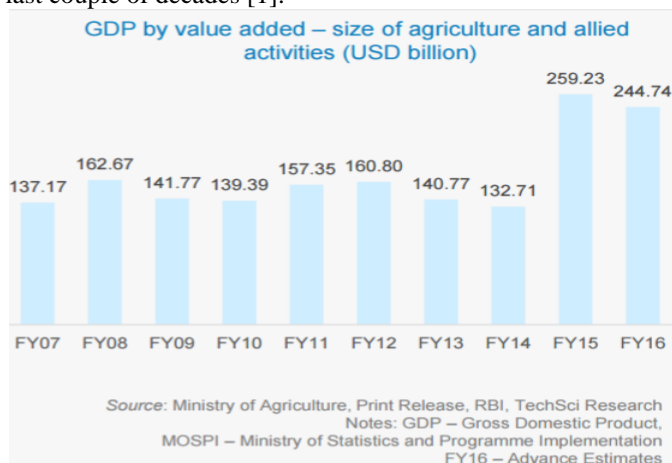

Figure 1. GDP Value Added Activity

Problems faced by the Agriculture Sector:
Need to modernize agriculture
By introducing farm techniques which guarantee a definite success, an increase in youth participation on agricultural fields is economically possible. This can be attained only by implementing new technologies. Research efforts should continue for the production of crops with higher yield potential and better resistance to pests. Technological advancement in agriculture should be passed down to the small farmers. Where the existing crops would not do well under drought and weather conditions, the farmers should be helped to shift to cultivating crops that would be easy and economical to cultivate.

Educate farmer
Many farmers in India are not aware of crop rotation. Though education in urban areas has improved a lot, the government has ignored the same in rural areas in general and in agriculture sector in particular. This is the reason why farmers are not adequately aware of the various schemes provided by the government.

Sustainability problems
Indian agricultural productivity is very less compared to world standards due to use of obsolete farming technology. Coupled with this, lack of understanding of the need for sustainability in the poor farming community has made things worse. Water usage is also unplanned with some arid areas misusing the irrigation facilities provided by planting water intensive crops. In areas where irrigation in the form of rivers and canals is not sufficiently available, ground water resources are heavily exploited.

Sustainability in agriculture is of utmost importance as many problems faced by farmers are related to this. Excess fertilizer usage not only makes the plants dependent on artificial fertilizers but also erodes the land quality, polluted ground water and in case of a surface runoff, pollutes the nearby water bodies.
Similarly, planting crops which require more water like rice on the basis of irrigation facilities extended to areas which are water deficient uses up more water than required. Besides, the excessive evaporation cause salts to accumulate on the fields making them lose their fertility quickly. This paper give solution to design model of application for intelligent decision support system to predict suitability crop depend on several parameters from data sensor using ANFIS (Adaptive Neuro Fuzzy Inference System) method.

II. RELATED WORK

The related work which are already implemented in the crops rotation in HAL (Julien Osman, Jordi Inglada and Jean Francouis , 2015) machine learning approach is the proposed to model crop rotation which can predict by image surface at the beginning of the agricultural season. This assessment is done using different setting temporal depth and spatial generalization coverage and the obtained result is only can be able predict the crop type of each field. Jerome Durry and Noemiescaler in Agro Sustain Developing Journal had done making management for choose crops. To support farmers and efficiently allocated scarce resource. But this work only for allocated resource used for efficiency and environmental processes at landscape scale

SENSOR DATA

Figure 2. Process Flow Diagram

Data
Temperature, humidity , rainfall , perception
From: India Meteorological Department, Gujarat
Type of soil
KrushiVigyan Kendra, Gandhinagar
Type of Crops
Handbook of Agriculture Indian Council of Agricultural Research

Data Pre-Processing

Data Climate	Temperature , Humidity, Rainfall, Perception
Data Cleaning	Data is cleansed through processes such as filling in missing values, smoothing the noisy data, or resolving the inconsistencies in the data.
Data Reduction	This step aims to present a reduced representation of the data in a data warehouse.
Data Crop	Type of Soil , Type of Crops
Data Integration	Data with different representations are put together and conflicts within the data are resolved.

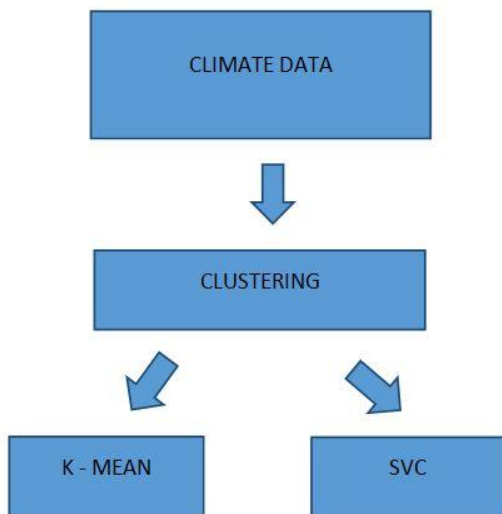Prediction of Climate

Figure 3. Prediction Climate

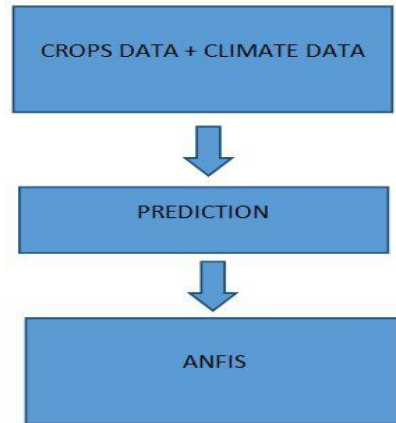Classification of Crop Data Using ANFIS

Figure 4. Classification of Crop Data
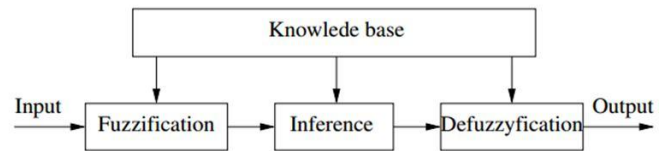
Generate DSS using ANFIS

Figure5. Classification Crop

• The fuzzy inference system that we have considered is a model that maps
 – Input characteristics to input membership functions
 – Input membership function to rules
 – Rules to a set of output characteristics
 – Output characteristics to output membership functions
 – The output membership function to a single-valued output
 – A decision associated with the output.
• We have only considered membership functions that have been fixed, and somewhat arbitrarily chosen.
• Also, we have only applied fuzzy inference to modeling systems whose rule structure is essentially predetermined by the user's interpretation of the characteristics of the variables in the model.
• In general the shape of the membership functions depends on parameters that can be adjusted to change the shape of the membership function.
• The parameters can be automatically adjusted depending on the data that we try to model
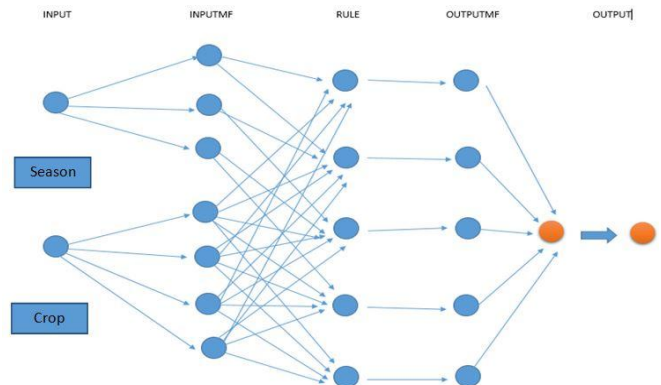
III. ANFIS MODEL

Figure6. ANFIS MODEL

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The model in the figure 6. Show us the processes ANFIS method to generate DSS from two input: Season and Crops Type. Season have 3 input as membership function which is summer, winter and monsoon season and Crops type have 4 input as membership function which is name of crops , temperature and type of soil and humidity both membership function generated five rule which suitable for make prediction in crops selection in several parameters.

IV. CONCLUSION

The model will help farmers to increasing their productivity by raising the yield in food grains: thus, leading to their economic growth. This system develops to make smart decision related to crops depend on climate change and type of crops. ANFIS algorithm will support system make prediction accurate compare with another application.

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