Analysis of Crop Phenology-a Component of Parallel Agriculture Management System using IOT

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Abstract— To study crop recommendation fertilization as per the weather condition of the rural farmers as the main in our country, the paper took towns and villages of Hua County as the study area, took recommendation fertilization of wheat, maize and peanut as the study object, designed model components of crop balance fertilization by using Object-Oriented technique, and developed the decision-making system about crop recommendation fertilization based on ArcGIS Server at village scale. The decision-making system realized farmland nutrient management and fertilization recommendations decision-making according to soil output capacity, agricultural production level and crop target yield. It was successfully applied in crop production in Hua County. The research results show that the system has the characteristic of better expansibility than before, and it is significantly simple and practical to reduce crop production cost and increase agricultural production efficiency, which provides technical support for crop fertilization decision-making and is significant to improve agricultural ecological environment and increase the comprehensive production capacity of farmland.

I. INTRODUCTION

India is one among the oldest countries which is still practicing agriculture. But in recent times the trends in agriculture has drastically evolved due to globalization. Various factors have affected the health of agriculture in India. Many new technologies have been evolved to regain the health. One such technique is precision agriculture. Precision agriculture is budding in India. Precision agriculture is the technology of "site-specific" farming. It has provided us with the advantage of efficient input, output and better decisions regarding farming. Although precision agriculture has delivered better improvements it is still facing certain issues. There exist many systems which propose the inputs for a particular farming land. Propose crops, fertilizers and even farming techniques. Recommendation of crops is one major domain in precision agriculture. Recommendation of crops is dependent on various parameters. Precision agriculture aims in identifying these parameters in a site-specific manner in order to resolve issues regarding crop selection.

This set is usually referred to as a training set, because, in general, it is used to train the classification technique how to perform its classification. The classification task can be seen as a supervised technique where each instance belongs to a class, which is indicated by the value of a special goal attribute or simply the class attributes. Classification routines with data mining use a variety of algorithms and the particular algorithm used can affect the way records are classified. This work talks about Decision Tree classifier assumes that the presence (or absence) of a particular feature of a class is unrelated to the presence (or absence) of any other feature. Depending on the precise nature of the probability model, K Nearest Neighbor (KNN) and Density based clustering can be trained very efficiently in a supervised learning setting.

II. Literature Survey

1. Rupanjali D. Baruah, Sudipta Roy, R.M. Bhagat, L.N. Sethi "Use of Data Mining Technique for Prediction of Tea Yield in the Face of Climate Change of Assam, India", 2016 International Conference on Information Technology.

Data mining is an emerging field of research in Information Technology as well as in agriculture. The present study focus on the applications of data mining techniques in tea plantations in the face of climatic change to help the farmer in taking decision for farming and achieving the expected economic return. This paper presents an analysis using data mining techniques for estimating the future yield prediction in tea cultivation with climatic change trends observed in last 30 years (1977-2006). The patterns of crop production in response to the climatic (rainfall, temperature, relative humidity, evaporation and sunshine) effect across the four tea growing regions (South Bank, North Bank, Upper Assam and Cachar) of Assam were developed using Multiple Linear Regression (MLR) technique. The tea production

estimation equations developed for the regions were validated for the future yield prediction (2007, 2009 and 2010) and were found to be significant. Thus it is suggested that the planters/farmers could use the technique to predict the future crop productivity and consequently adopt alternative adaptive measures to maximise yield if the

predictions fall below expectations and commercial viability.

2. Gregory S. McMaster, DA Edmunds, W.W. Wilhelm ,l, D.C. Nielsen, P.v.v. Prasad.c. Ascough, "PhenologyMMS: A program to simulate crop phonological responses to water stress "Journal Computers and Electronics in Agriculture 77 (2011) 118-125.

Crop phenology is fundamental for understanding crop growth and development, and increasingly influences many agricultural management practices. Water deficits are one environmental factor that can influence crop phenology through shortening or lengthening the developmental phase, yet the phonological responses to water deficits have rarely been quantified. The objective of this paper is to provide an overview of a decision support technology software tool, PhenologyMMS Vl.2, developed to simulate the phenology of various crops for varying levels of soil water. The program is intended to be simple to use, requires minimal information for calibration, and can be incorporated into other crop simulation models. It consists of a Java interface connected to FORTRAN science modules to simulate phonological responses. The complete developmental sequence of the shoot apex correlated with phonological events, and the response to soil water availability for winter and spring wheat (Triticum aestivum L.), winter and spring barley (Hordeum vulgare L.), corn (Zea mays L.), sorghum (Sorghum bicolor L.), proso millet (Panicum milaceum L.), hay/foxtail millet [Setaria italica (L.) P. Beauv.]. and sunflower (Helianthus annus L.) were created based on experimental data and the literature. Model evaluation consisted of testing algorithms using "generic" default phenology parameters for wheat (i.e., no calibration for specific cultivars was used) for a variety of field experiments to predict developmental events. Results demonstrated that the program has general applicability for predicting 3. Bruno Basso, Davide Cammarano, Elisabetta Carfagna, Review of Crop Yield Forecasting Methods and Early Warning Systems", Journal of convergence in engineering, technology and science, Vol.1,pp.1-8,2009.

The following review paper presents an overview of the current crop yield forecasting methods and early warning systems for the global strategy to improve agricultural and rural statistics across the globe. Different sections describing simulation models, remote sensing, yield gap analysis, and methods to yield forecasting compose the manuscript.

4. Young Ju Jeong, Kwang Eun An, Sung Won Lee, and Dongmahn Seo, "Improved Durability of Soil Humidity Sensor for Agricultural IoT Environments", 2018 IEEE International Conference on Consumer Electronics (ICCE).

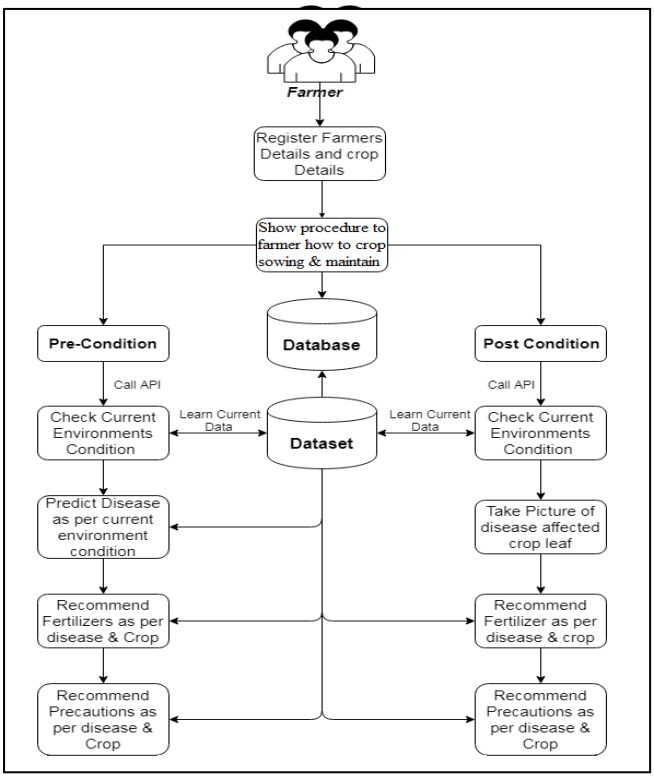
Soil humidity is the most important factor for plant growth. Therefore, the soil humidity sensor is an important part of smart farm application using agricultural IoT environments. Since soil humidity sensors are applied wet underground and the sensor consists of copper, rust eats away the copper surface of sensors. From rusting of sensors, wrong information of soil humidity can be collected on smart farm system based on agricultural IoT Environments. It makes that smart farm is not reliable. In this paper, we propose a new type of soil humidity sensor in order to extend life time.

5. M. Trnka, M. Dubrovsky, D. Semeradova, and Z. Z alud, Projections of uncertainties in climate change scenarios into expected winter wheat yields", in Proceedings of the 11th European Conference on Computer Vision: Part I, pp. 285298,2003.

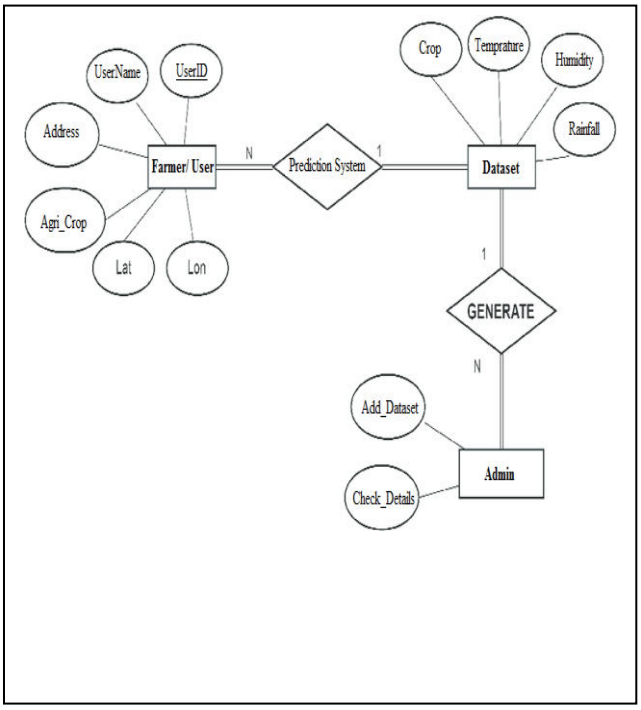
The crop model CERES-Wheat in combination with the stochastic weather generator were used to quantify the effect of uncertainties in selected climate change scenarios on the yields of winter wheat, which is the most important European cereal crop. Seven experimental sites with the high quality experimental data were selected in order to evaluate the crop model and to carry out the climate change impact analysis. The analysis was based on the multiyear crop model simulations run with the daily weather series prepared by the stochastic weather generator. Seven global circulation models (GCMs) were used to derive the climate change scenarios. In addition, seven GCM-based scenarios were averaged in order to derive the average scenario (AVG).

III. Proposed System

- *The datasets have been collected and refined based on commonality uses such as soil moisture, temperature, humidity, evaporation, rainfall, sunshine. These data sets need to be entered into the database .*
- *From these parameters name of the crop and predicted yield rate of the crop can be predicted. Past dataset is used as training data and the data which will be obtained using sensors will be used as testing data.*
- *Multiple Linear Regression model will be created using Training data. For testing, using sensors values, soil moisture, temperature, humidity, evaporation, rainfall, sunshine are measured and taken as input with the help of weather forecasting department.*
- *By analyzing and predicting, the crop name and approximate yield rate of particular crop can be found out. This helps the farmers to take the correct decision to sow the crops such that yield rate can be increased.*



IV. Entity Relationship Diagram



V. CONCLUSION

This system focuses on developing automated leaf diseases. It saves time and effort, In this project, we have proposed a new method for prediction of crop disease from current weather using Google API with the help of K-NN algorithm and measuring the crop diseases of the crop object and find weather prediction. In this work the experiments are performed two important and well known classification algorithms K-Nearest Neighbor (K-NN) and Density based clustering are applied to the dataset. There accuracy is obtained by evaluating the datasets. Each algorithm has been run over the training dataset and their performance in terms of accuracy is evaluated along with the prediction done in the testing dataset. The entire analysis process creates a data flow.

VI. REFERENCES

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