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"Disease Prediction of Pomegranate using Data Mining"

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Abstract - *Agriculture Research is rapidly growing, due to advancement of technologies and upcoming challenges now a days. It has been proven that leading role in improving the overall growth rate of any country. Climate changes have an adverse effect on agriculture. The traditional practices followed for this are planning, fertilizing and harvesting against predetermined schedule. Meteorological parameters like temperature, rainfall and humidity are important for agriculture systems. Weather fluctuations and improper cultivation methods results in to the loss of crop productivity. To deal with climatic changes and the its various adverse effects disease prediction system of pomegranate will help to predict the disease at early stage and will avoid the loss of crop and increase the productivity. Data mining approach classification helps to predict the crop diseases, production and loss.*

Keywords- *Agriculture, Fertilizing, Meteorological Parameters, Weather Fluctuations, Data Mining, Classification*

1. INTRODUCTION

In India the sustainable agriculture development is necessary to meet food demands, economic growth and poverty reduction. India is leading country for pomegranate production. Climate changes have adverse effect on agriculture and traditional practices followed are planning, fertilizing and harvesting against predetermined schedule. To deal with climatic changes and its various adverse effects disease prediction system for pomegranate farm will help to predict the disease at early stage and will avoid the loss and increase the productivity. In this system data mining technique SVM classifier is used for classification of data.

2. LITERATURE SURVEY

2.1. An Agro Advisory for Pomegranate Field Using Wireless Sensor Network

An agro advisory system is proposed for pomegranate field using wireless sensor network based on real time environmental conditions. The climatic changes are identified and accordingly diseases are tackled. Optimized usage of water, nutrients for crops and pesticides are suggested to the farmers.[1]

2.2 Data mining model for early fruit disease detection

The system to detect the diseases in pomegranate fruit at early stages. Model indicates when conditions for diseases development are not fulfilled so as to reduce the chemical treatments.[2]

2.3. Predicting Crop Diseases Using Data Mining Approaches: Classification

In this system extensive analysis of different data mining classifiers is done on different feature sets to predict the grass grub damage. Also various ensemble models are designed by combining different classifiers to improve accuracy of weak classifiers.[3]

2.4. A Neural Network approach for Disease Forecasting in Grapes using Weather Parameters

In this system considerable benefits can be accrued in terms of crop and environmental protection more efficiently by using the information generated on the weather forecast and disease forecast and immediately disseminating to the farmers through ICT.[4]

2.5. Agriculture Field Monitoring and Analysis using Wireless Sensor Networks for improving Crop Production

In this paper the overall WSN system architecture and data architecture is defined. The designs of the subsystems/modules are included to avoid agricultural land from weather effects, bugs and so on and make great sense for farming production.[5]

3. ARCHITECTURE DIAGRAM

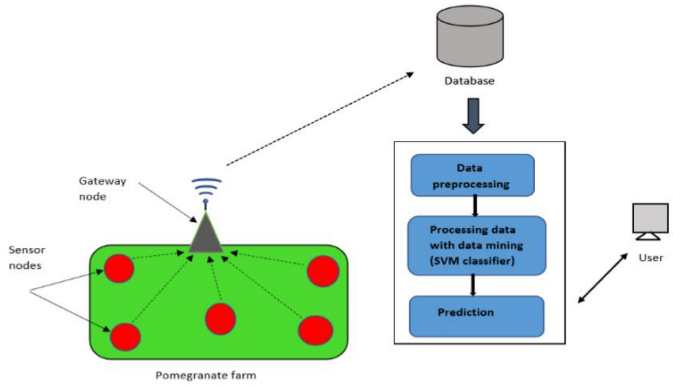

Fig. 1. System Architecture

Sensors are deployed in pomegranate farm and are used to sense the real time values of metrological parameters such as temperature, humidity, etc. The Gateway collects the data from sensors which are deployed in pomegranate farm and sends that collected data to the

database. It stores the real time data values collected from sensors through gateway and also the historical data. Data Pre-processing is used to transform the raw or inconsistent data into understandable format. SVM is used for training and classification of data. It is used to predict the disease. Depending upon metrological parameters the diseases such as bacterial blight, Alternaria fruit rot, wilt, etc. are predicted and notified to the user along with agroadvisory. User can register to the system and notification will be sent on their registered mobile number.

4. ALGORITHM

4.1. SUPPORT VECTOR MACHINE

Support Vector Machine or SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane. SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine. Consider the below diagram in which there are two different categories that are classified using a decision boundary or hyperplane. Support Vectors are simply the co-ordinates of individual observation. The SVM classifier is a frontier which best segregates the two classes (hyper-plane/ line).

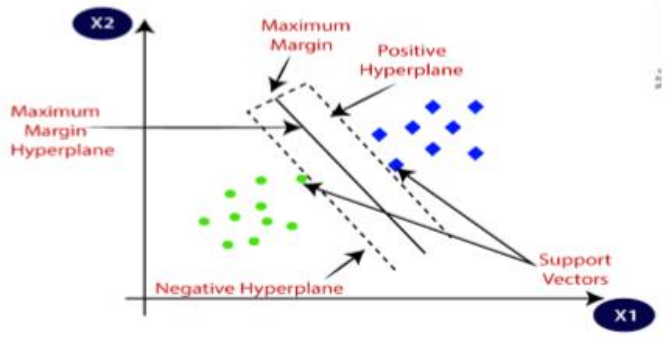

Fig. 2. SVM

4.1.1. Support Vectors: The data points or vectors that are the closest to the hyperplane and which affect the position of the hyperplane are termed as Support Vector. Since these vectors support the hyperplane, hence called a Support vector.

4.1.2. Multiclass Classification: Multiclass classification is a classification task that consists of more than two classes. The model learns patterns specific to each class and uses those patterns to predict the membership of future data.

4.2 SVM Classifier works as follows

1. Firstly plot the points in n-dimensional space(where n is number of features you have).The value of each feature should be the value of each co-ordinate.

2. Then draw the all possible hyper-planes that differentiate data into two classes.

3. Draw margins for each hyper-plane. Margin is the maximizing distance between nearest data point.

4. Select the hyper-plane with higher margin that segregates the two classes better.

5. Now the dataset is classified into two classes i.e diseased and Non-diseased.

5. RESULT DISCUSSION

To get the optimal as well as quality production there is need to provide water, nutrient and protection of plant from diseases and pests. If we give the exactly amount of the water to the plant then the maximum nutrients that are available in the soil will get absorbed by the plant. Soil is the source of nutrient so farmer must know what kind of the nutrient are there to be available in the soil. Soil test report gives exactly analysis of nutrient available in the soil. By following the report different nutrients which are not available in the soil are supplied externally to the plant. Proper management of diseases and pests is required to protect the crop from their attack and the application of sprays with proper schedule from pruning to harvesting period will help. The proposed systems dynamic climate change algorithm will detect the climate on fifth day as compared to open eye observation. This is due to precise real time field information available continuously. In case of open eye observation it is not possible because farmer cannot observe farm continuously being present over there physically and also precise readings are not possible by this method. Hence immediate climate change alert to the farmer will help to take preventative measure at early stage and avoid further crop losses.

6. CONCLUSION

Disease prediction System in Pomegranate farm helps to predict the disease at early stage using SVM classifier and sends the notification to the farmer regarding the current metrological parameters and name of the pesticides to be sprayed. This will help the farmers to increase their productivity and quality of pomegranate.

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