iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** V **Month of publication:** May 2018

DOI: http://doi.org/10.22214/ijraset.2018.5401

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue V, May 2018- Available at www.ijraset.com

Grape Disease Prediction Band Identification

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Abstract*: Agriculture is the prime occupation in India. Meteorological parameters such as temperature, rainfall, and humidity are important for agricultural systems. Changes in climatic conditions and improper methods of cultivation lead to loss of crop productivity. Therefore, forecasting of weather is of very important to overcome these problems. Information about predicted weather data can provide valuable and timely information for evaluation of various crop management techniques, to avoid potential losses thereby increasing crop production and income. The proposed work intends to predict the grape disease using a k-Nearest Neighbour (KNN) approach with parameters such as humidity, temperature, rainfall and windspeed to predict the disease outbreaks in grapes. The grape disease can be identified using pixel matching concept of image processing. Such predictions and identification would warn the growers of expected significant developments in grape disease. This work can be further extended to predict disease of various crops and providing solution to them. This will help to prevent the crops from the further destruction which will help the people in the agricultural sector.

Keywords*: Disease, Weather conditions, Prediction, Data mining, Image processing.*

I. INTRODUCTION

Data mining is used to extract the information from the large dataset and to predict patterns and behavior of an application. Data mining plays a chief role in the fields of e-commerce, healthcare sector, and agricultural sector.

Agriculture is the chief occupation in India, i.e. about 70% of people are engaged in this activity, Weather conditions play a vital role in the agricultural sector. Climatic changes cause a great impact on growth of grape crops. Due to slight variations in weather parameters, grape diseases arise. This leads to decrease in quality and quantity of overall production.

The applications or methods which were developed earlier to predict or identify crop diseases were mainly based on image processing algorithms. For the purpose of predicting and identifying the grape disease according to weather conditions, a web application is implemented. The prediction is done using a data mining K-NN algorithm.

It will also help to identify the grape crop diseases after it has been affected using image processing pixel matching technique. Predictive analysis is one of the important areas of data mining.

This prediction would help the people in agricultural sector to save the grape crops in advance by taking necessary actions. This would enhance the crop productivity and reduction in financial losses.

II. SYSTEM ARCHITECTURE

A. System Description

The User can either use the web application for prediction of grape disease or identification of grape disease.

For prediction the user has to log in to the system and select the area(district) by entering the location. The current weather conditions of that area would be fetched using the Open weather map API.

These weather conditions would be considered and KNN algorithm would be applied on the processed data-set to predict the disease.

For identification, the user has to upload or browse the affected grape image.

Pre-processing, pixel matching would be applied on this image.

This image would be matched with the database using pixel mapping and results would be displayed.

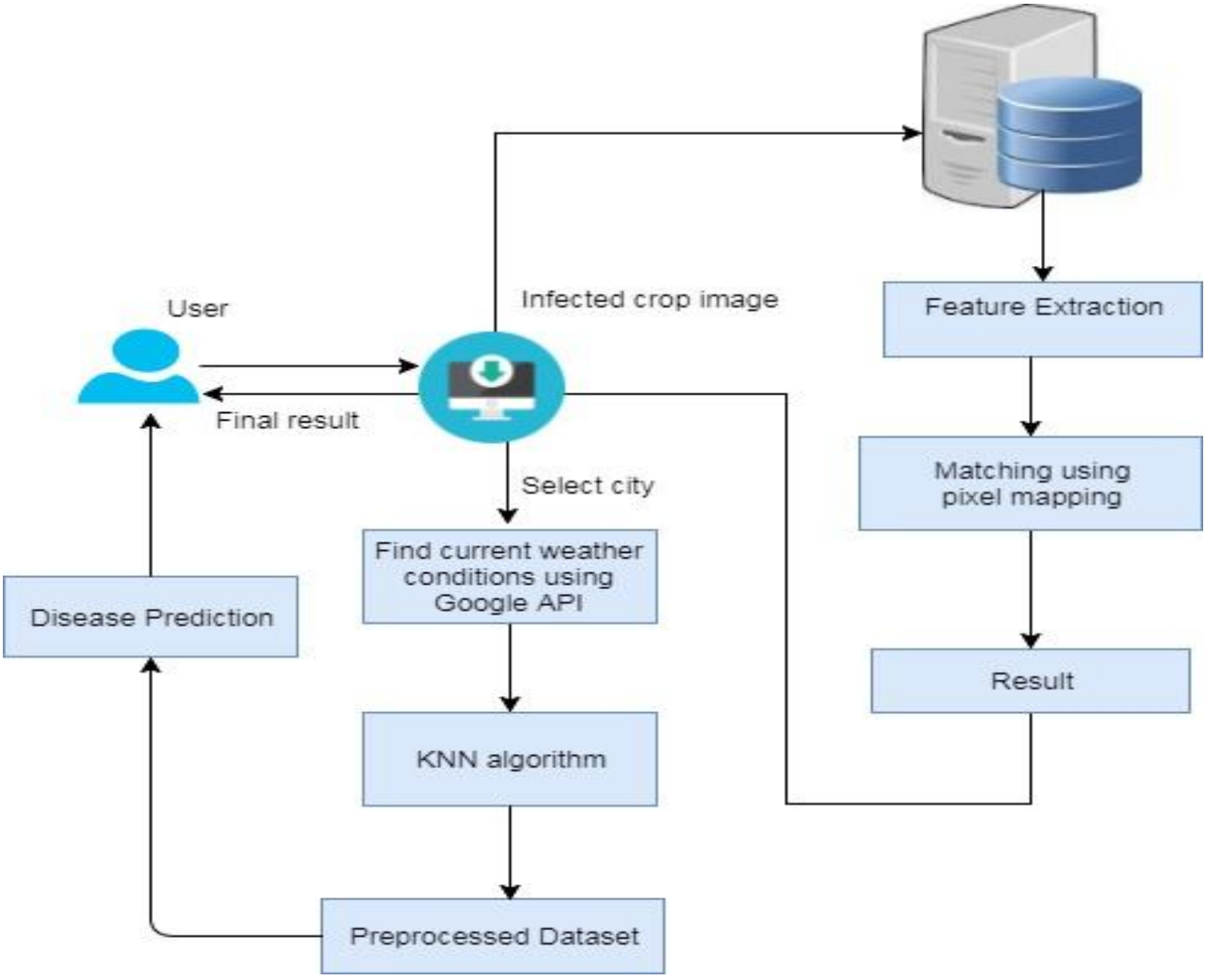

Fig. 1 Block Architecture Diagram

III.METHODS

A. *Algorithms*

1) *k-NN Algorithm (K-nearest neighbour/s Algorithm):* A case is classified by a majority vote of its neighbours, with the case being assigned to the class most common among its K nearest neighbours measured by a distance function i.e. Euclidean Distance If K = 1, then the case is simply assigned to the class of its nearest neighbour.

$$\sqrt{\sum_{i=1}^{k}(x_1 - y_1)^2} \quad \ldots (1)$$

$$\sum_{i=1}^{k}|x_1 - y_1| \quad \ldots (2)$$

Here are the steps for implementation of K-nearest neighbour/s (KNN) algorithm:

2) Determine parameter K = number of nearest neighbours.

3) Calculate the distance between the query-instance and all the training samples.

4) Sort the distance and determine nearest neighbours based on the k-th minimum distance.

5) Gather the category Y of the nearest neighbour.

6) Use simple majority of the category of nearest neighbours the prediction value of the query instance. In this application, k-NN algorithm is used for prediction.

$r(A)=argmin\ \{ \min_{n-1,..,N_k} D(A, B_{nk}) \}$ … *(3)* i.e. the test image is assigned to the class of the nearest reference image. For the distance calculation the test image

A= a_{ij}, i=1, …., I, j=1, …., J must be explained by a suitable deformation of the reference image B= bxy, x=1, …., X, y=1, …., Y. Pixel matching is used for identification of grape disease.

B. Data Set Details

The 'www.tutiempo.com' site has been used for preparing the datasets. Three types of grapes diseases are considered. They are Powdery Mildew, Downy Mildew and Anthracnose.

1) The training dataset contains values of weather parameters like temperature, humidity, rainfall and windspeed along with the disease labelled to each row.
2) The values are calculated by taking average of each weather parameters of 7 days.
3) The test data contains the averaged current weather conditions from current day to next 6 days.
4) There is also a dataset of images for identification part.

C. Abbreviations and Acronyms

1) k-NN: k- Nearest Neighbour

IV. RESULTS

Once the user enters the place, the current weather conditions are fetched and using k-NN algorithm the disease is predicted and displayed. The grape disease is identified if the user uploads the image of affected crop by using the technique of pixel matching.

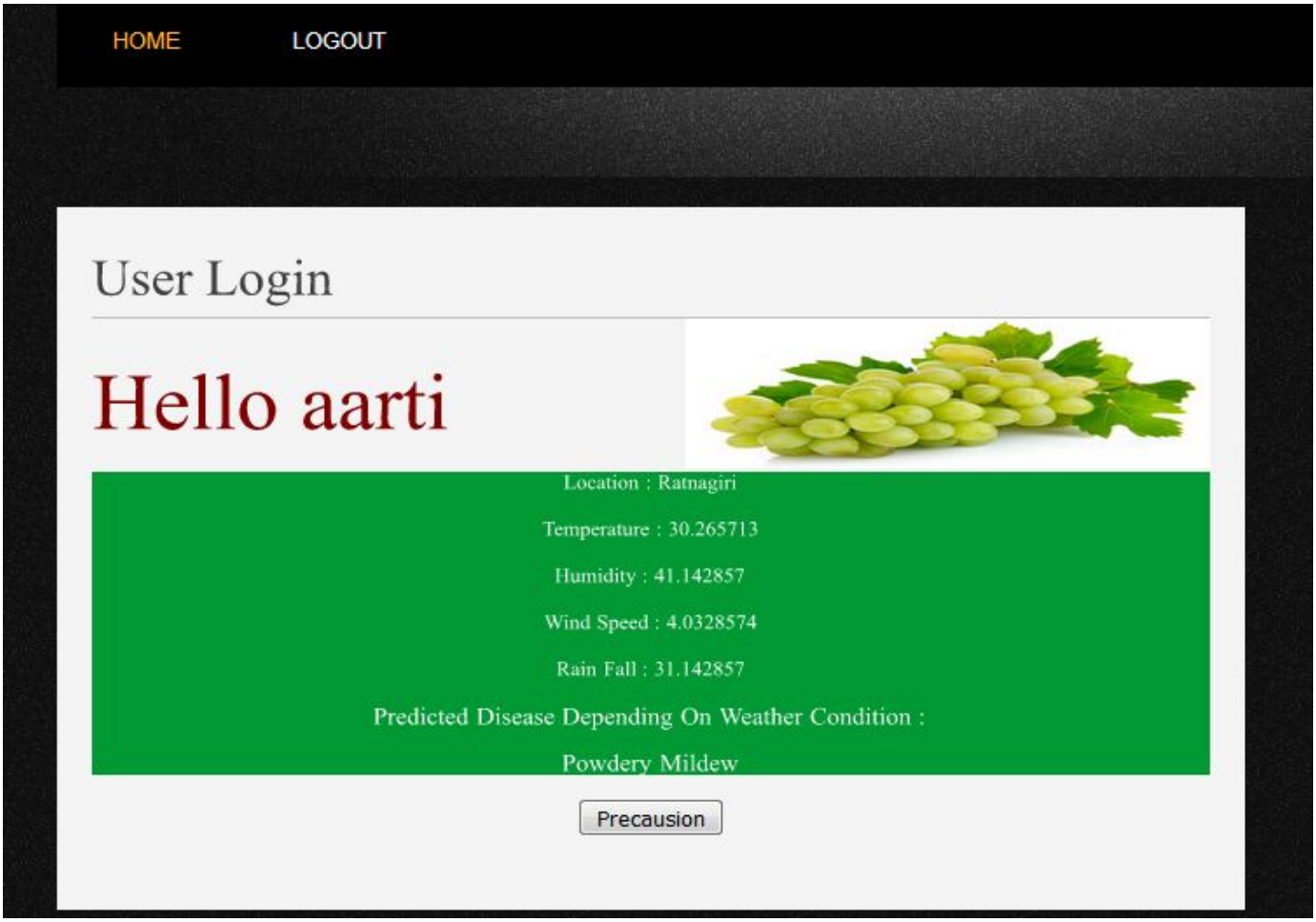

Fig. 2 Result

V. CONCLUSION

The web application implemented will help to predict the grape disease in advance. This will especially help the farmers to save the crops from further destruction. The application also allows the user to identify the disease if it has already been affected. The system will give the necessary preventive measures. This application will give benefits to the farmer and people in the agricultural sector. In future, this application can predict more types of grape disease and as well as different crop diseases.

VI. ACKNOWLEDGMENT

It gives us pleasure in presenting this paper on 'Grape Disease Prediction and Identification application using data mining. We would like to thank our guide Mr. Nilesh Deshmukh for his help in preparing this paper. His guidance and advice played a very important role in successful completion of the paper.

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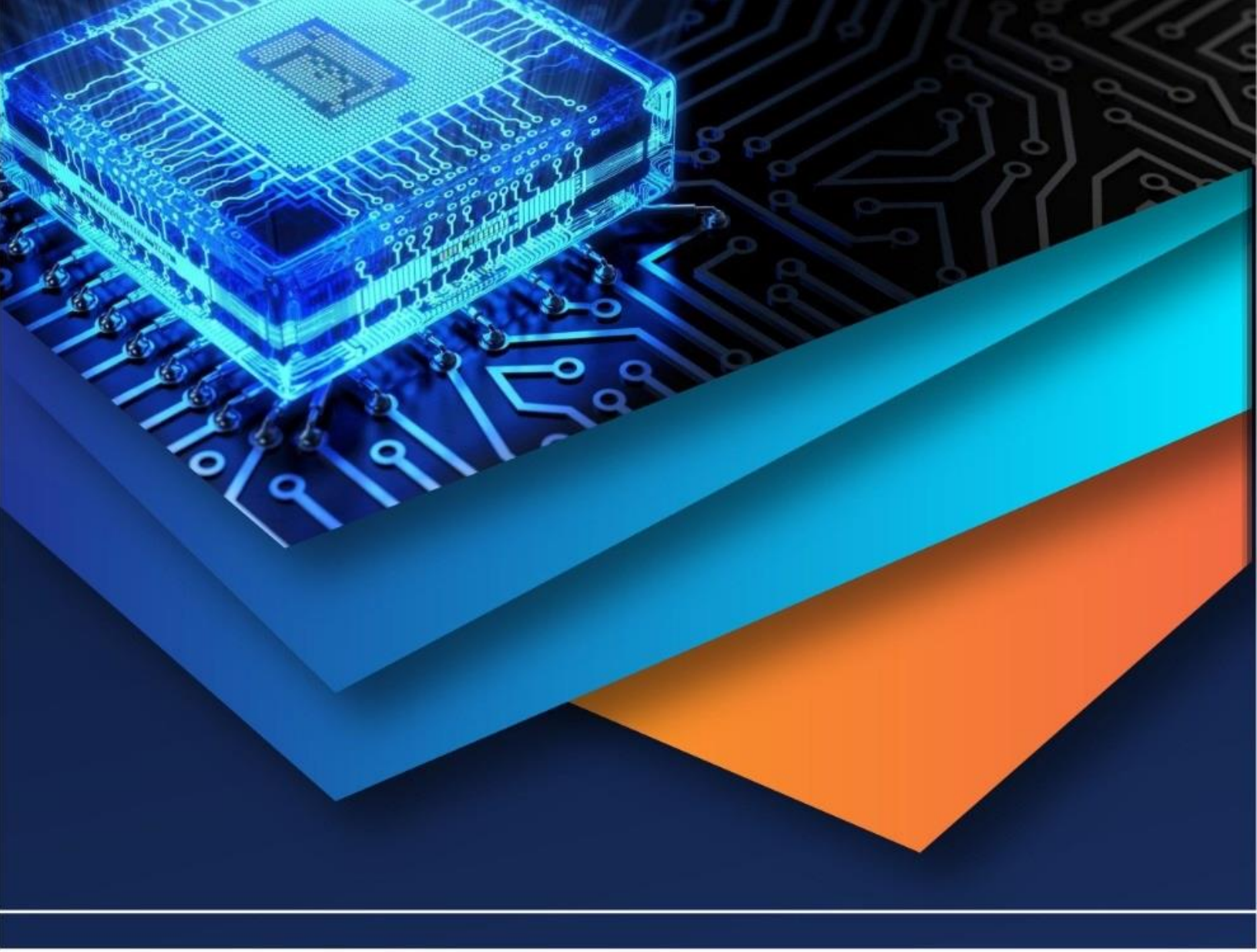

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