International Journal on Future Revolution in Computer Science & Communication Engineering
Volume: 4 Issue: 3
ISSN: 2454-4248
452 – 454

Raithara Bandu – A Digitalised Approach

Dr.Rekha B Venkatapur, Raksha D, Preksha V, Priyanka R, Ranjana N S
Department of Computer Science and Engineering
Visvesvaraya Technological University, Belgavi, Karnataka, India
vb_rekha2000@yahoo.com, raksha.deepak96@gmail.com, prekshav15@gmail.com, topriyankarajashekar@gmail.com, ranjana.2502@gmail.com

Abstract **-** India is one of the leading countries in sericulture. Karnataka's contribution is also significant as it is home land of Mysore silk. The mulberry is the main crop used for productivity of cocoon. The study of soil properties and appropriate usage of fertilizers effectively increase the yield of productivity. A data mining approach to analyze the soil properties such as Nitrogen, Phosphorous, Potassium and so forth and automatic decision making will greatly help the Agriculture scientists as well as farmers. The required quantity of fertilizer will be decided by the proposed system which in turn saves time, man power and cost. Classification techniques can be applied on soil parameters and decision making system can be further adopted to predict the mulberry crop production in cultivation lands.

Keywords **-** *Data mining, Classification techniques, Decision making, Prediction, Soil testing*

*****

I. INTRODUCTION

Agriculture and allied sectors provide largest livelihood in India. Its contribution to Gross Domestic Product(GDP)[1] is significant. Soil is very essential for the plant life. It is composed of solids, liquid, gases and living organisms. All these elements provide its physical and chemical properties. Managing the soil properly is necessary in order to preserve its fertility in order to obtain a better yield.

Soil test is the investigation of a soil example to discover supplement substance, composition and different attributes.

Tests on soil are normally performed to decide its richness and demonstrate insufficiencies that should be cured. Soil nutrients examination is valuable for agriculturists to figure out which kind of yield to be developed in a specific soil condition. In this work, data mining classification methods are used to investigate the soil nutrients.

Data mining is the process of extracting information from a dataset and converting it into an understandable structure. Classification is one of the data mining techniques that automatically create a model of classes from a set of records that contains class labels. Popular classification techniques are decision trees, k-nearest neighbor, Naïve Bayesian classifier etc.

Soil has three types of characteristics: physical, chemical and biological. This paper mainly focuses on chemical characteristics.

The nutrient forms are:

Primary Nutrients: Nitrate, Ammonium Phosphorous and potassium

Secondary Nutrients: Calcium, Magnesium and Sulphur

Micro Nutrients: Iron, Manganese, Boron, Copper, Zinc and Cobalt

II. RELATED WORK

Jay Gholap[2] predicts soil richness using decision tree algorithm. In [3], the author forecasted soil characteristics and examined soil data using classification techniques. Soil properties like pH value, Electrical Conductivity (EC), Potassium etc were classified using classification algorithms like Naïve Bayes, J48 and JRip.

Dildarkhan et al.,[4] gives an investigation of the soil data using different classification algorithms and forecasting methods. Soil testing centers examine the soil and give the sample dataset. It will require a considerable measure of time to characterize the soil datasets manually. This work focuses on the method that uses data mining technique to analyze the soil nutrients based on k-nearest neighbor algorithm.

III. Soil Nutrients Analysis

Data mining is curtail to determine the agricultural related facts such as soil fertility, yield prediction and soil nutrient analysis. This section analyses soil nutrients based on k-nearest neighbor classification algorithm. Fig 1 shows the architecture of proposed work.

A. Overview of Dataset

The dataset contains 13 attributes. The attributes are District, pH, EC, OC, N, P, K, S, Zn, Fe, Cu, Mn, B.

Table1 shows the description of attributes.

 ISSN: 2454-4248
452 – 454

B. *Methodology*

The proposed work starts with preprocessing step. In this step the data collected was preprocessed. In the data conversion step, the preprocessed data was converted based on nutrients value. Table 2 shows the value for three levels of nutrients.

After data conversion, the macro and micro nutrients are split into three types. The type-1 contains pH, EC, OC, N attributes. Type-2 contains P, K, S, Zn and Type-3 contains Fe, Cu, Mn, B attributes.

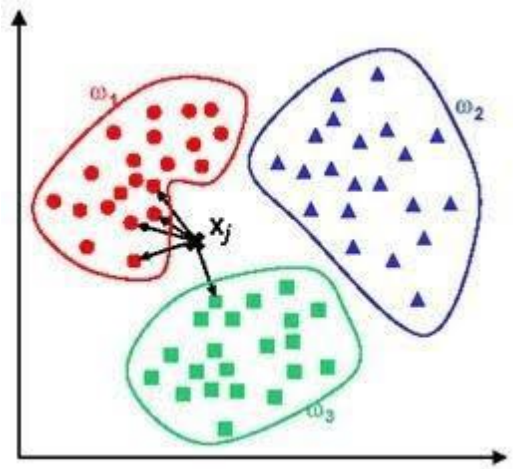
Decision Tree (J48):

J48 is an upgraded version of C4.5 decision tree algorithm. A decision tree is really a predictive machine learning model, which decides the dependent variable based on the available training dataset. The internal nodes of a decision tree denote varied attributes, the connecting branches of various nodes give us likely values of the attributes and the terminal node states the classification of the dependent variable. J48 decision tree classifier uses two phases: Tree construction and Tree Pruning.

K-Nearest Neighbor:

In pattern recognition, the K-Nearest Neighbors is a method used for classification and regression. The input consists of the K closest training examples in the feature space.

In K-Nearest Neighbor,classification is done based on classes. Each time a new training example arrives, the distance between the centroid of all class and its value is calculated. The training example belongs to the class having the least distance.



W1 – Class1
W2 – Class2
W3 – Class3
Xj – Values in class

Figure 1 : Classes in K-Nearest Neighbor

In Figure 1, each class contains centroid and the values of the class are nearest to the value of the centroid.

Training examples enter their respective class based on distance calculation and they are represented as Xj.

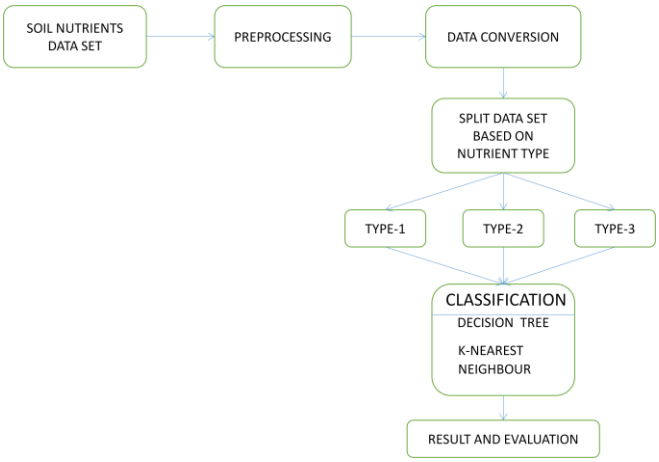


Figure 2 : Proposed Work Flow

Attributes	Description
District	The data collected from various districts of Karnataka
pH	The pH value of soil data
EC	Electrical Conductivity
OC	Organic Carbon
N	Nitrogen
P	Phosphorus
K	Potassium
S	Sulphur
Zn	Zinc
Fe	Iron
Cu	Copper
Mn	Manganese
B	Boron

Table 1 : Soil Nutrients Data set Description

Attribute	Low/Deficient	Medium	High/Sufficient
pH	<6.2	6.2-8.3	>8.3
EC	<1	1-2	>2
OC	<0.5	0.5-1.0	>1.0
N	<108	108-221	>221
P	<9	9-22	>22
K	<50	50-120	>120
S	<10	10-20	>20
Zn	<2	-	>2

 ISSN: 2454-4248
452 – 454

Fe	<2.5	-	>2.5
Mn	<4.0	-	>4.0
Cu	<0.2	-	>0.2
B	<0.5	0.5-1.0	>1.0

Table 2 : Nutrients Levels

District	Mysore	Mandya	Kolar	Hassan
pH	8.3	5.1	6.5	7.3
EC	0.26	0.17	0.38	1.18
OC	0.54	0.4	0.18	0.35
N	43.20	60.60	231	173
P	17.6	16.25	18	7.12
K	789	60	400	284
S	10.5	17.5	8.1	17.24
Zn	2.45	0.53	0.8	1.00
Fe	2.45	5.23	5.1	8.36
Cu	3.56	0.17	2.2	1.4
Mn	3.67	3.38	2.6	1.08
B	3.4	1.00	0.3	0.41

Table 3 : Sample Nutrient Data set

District	Mysore	Mandya	Kolar	Hassan
pH	M	L	M	M
EC	L	L	L	M
OC	M	L	L	L
N	L	L	H	M
P	M	M	M	L
K	H	M	H	H
S	M	M	L	M
Zn	H	L	H	H
Fe	L	H	H	H
Cu	H	L	H	H
Mn	L	L	L	L
B	H	M	L	L

Table 4 : Converted Data set

IV. CONCLUSION

Use of Information Technology in agriculture can enable a scenario of Decision Making, as a result of which, farmers can yield in a better way. Application of Data Mining techniques into agriculture adds value in the line of activity. According to the algorithm result analysis, J48 algorithm proves to be the best classifier for soil samples.

REFERENCES

[1] Jay Gholap, Anurag Ingole, Jayesh Gohil, Shailesh Gargade and Vahida Attar, “Soil Data Analysis Using Classification Techniques and Soil Attribute Prediction”, IJCSI, Vol. 9, Issue 3, No 3, ISSN : 1694-0814, May 2012.

[2] Jay Gholap (2012), “Performance Tuning of J48 Algorithm for Soil Fertility”, 2012. Asian Journal of Computer Science and Information Technology 2:8 (2012) 251-252.

[3] Gholap J, Lngole A, Gohil J, Shailesh, Attar V. (2012), “Soil Data Analysis Using Classification Techniques and Soil Attribute Prediction”, 2012 June : 9(3):1-4.

[4] Dildarkhan T. Pathan, Pushkar D. Joshi, Prof. S U Balvir, (2014), “Prediction of Soil Quality for Agriculture”, IRJSSE International Research Journals of sustainable Science and Engineering, Vol. 2,Issue 3, 2014.