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SOIL CLASSIFICATION AND CROP SUGGESTION USING MACHINE LEARNING ALGORITHM

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Abstract— **Agriculture is the basic source of food supply in all the countries of the world. In this system, proposed a method which would help suggest the most suitable crop(s) for a specific land based on the analysis of the data on certain affecting parameters like temperature, humidity, air quality and PH of soil using machine learning. Here used geometric progression for predicting best suited crop in field. A GUI is developed in Python to suggest a crop which can be grown in farm according to condition of farm. Geometric progression algorithm is used for predicting crop. To know the type of soil, in this work we perform descriptive study on agricultural data using various machine learning techniques.**

Keywords— **GUI, Machine Learning**

I. INTRODUCTION

In this age of technology and data-science, if implemented properly, the agricultural sector may also be greatly affected. It is true that a farmer is the best decider of crop selection and crop cultivation. However, machine learning techniques can be applied in this field for far greater precision and stability of selection. In this research, we have attempted to come up with a few techniques that will lead us to choose suitable crops based on specific state, specific district, season, and some other environmental aspects. Crop yield estimates include estimating crop yields from available historical data such as precipitation data, soil data, and historic crop yields. This prediction will help farmers to predict crop yield before farming.

Soil is important to humans and all the living things on earth because it acts as the root source for agriculture, food and medicine. Soils are of different types and each soil type can have different composition of minerals, humus, organic matter and can hold different characteristics based on which different crops can be grown. So we need to know the features and characteristics of various kinds of soils of different places to understand which crops grow better in certain soil types in different climatic conditions and what kind of fertilizers/ pesticides can be added to make the crop grow healthily. Farm products for their existence than anything else since food and clothing – the prime necessaries are products of farming. Even for industrial prosperity, farming forms the basic raw material. The majority of the farmers are cultivating their lands just for the sake of cultivation without the backup of full scientific and technological backup. They are satisfied with whatever they are getting finally.

II. LITERATURE SURVEY

S Saeed Khaki 1, Lizhi Wang, "Crop Yield Prediction Using Deep Neural Networks", 2019: In this paper, a machine learning model proposed illustrated the use of neural network and the concerned algorithm artificial neural network (ANN) has been evaluated. The dataset has been taken of 140 data points depicting the attributes effect on the yield of the crops.

Renuka, Sujata Terdal, " Evaluation of Machine Learning Algorithms for Crop Yield Prediction", 2019: Crop simulation models are widely used as research tools to explore the impact of various technologies and compliment field experimentation. Machine learning (ML) approaches have emerged as promising artificial intelligence alternative and complimentary tools to the commonly used crop production models. The study was designed to answer the following questions: (a) Can machine learning techniques predict maize grain yields under conservation agriculture (CA).

III. PROBLEM DEFINITION

A model is proposed for predicting the soil type and suggest a suitable crop that can be cultivated in that soil. The model has been tested using various machine learning algorithms such as KNN, SVM and logistic regression. The accuracy of the present model is maximum than the existing models. To Design, Develop and Implement the training model by using different inputs data. So machine will able to learn the features and extract the crop yield from the data by using machine leaning techniques.

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IV. SEQUENTIAL DIAGRAM

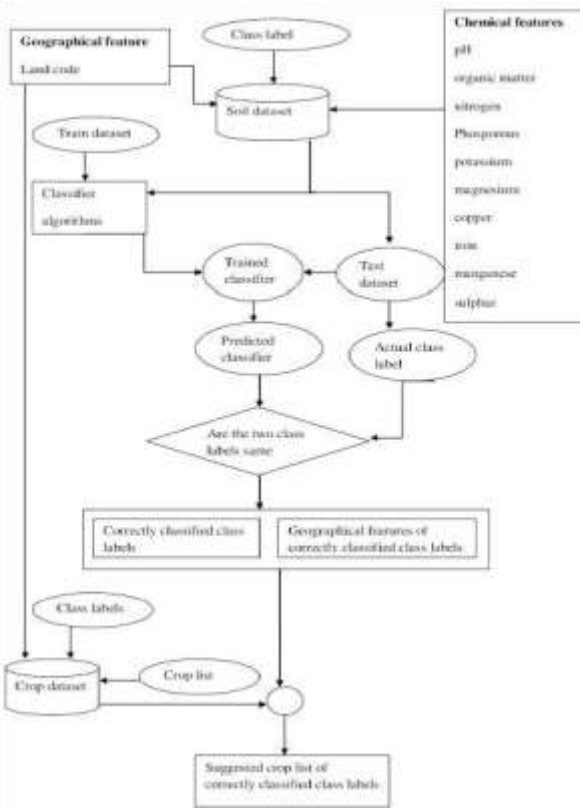

Fig.1. Block diagram showing the flow of our project

V. METHODOLOGY

5.1 Steps involved in the Soil classification process

Step 1: Input The input dataset is a comma separated values file containing the soil dataset, which has to be subjected to pre-processing.

Step 2: Pre-processing of input data Input dataset is subject to various pre-processing techniques such as filling of missing values, encoding of categorical data and scaling of values in the appropriate range.

Step 3: Splitting into training and testing dataset The pre-processed dataset is then split into training and testing dataset based on the specified split ratio. The split ratio considered in the proposed work is 75:25, which means 75% of the dataset is used for the training the ensemble model and the rest 25% is used as test dataset.

Step 4: Building individual classifiers on the training dataset the training dataset is fed to each of the independent base learners and the individual classifiers are built using the training dataset.

Step 5: Testing the data on each of the classifiers The testing dataset is applied on each of the classifiers, and the individual class labels are obtained.

Step 6: Ensembling the individual classifier output using Majority Voting Technique Some of the classification algorithms used are K-Nearest Neighbour, SVM and logistic regression.

K-Nearest Neighbor classifier

It is one of the method used for classification and regression. An object is classified by a plurality vote of its neighbors, with the object being assigned to the class most common among bits k nearest neighbours. It is widely used in real life scenarios since it is a non parametric meaning it does not make any underlying assumptions about the distribution data .

Support Vector Machine

Support vector machine is a supervised machine learning model that uses classification problems. After giving an SVM model sets of labelled training data for either two categories, they are able to categorize new examples. It works based on the decision planes that defines the boundaries. The decision plane separates one object from another object of different class. The data points that are nearer to the hyper plane are called as support vectors. Kernel function is used to separate non linear data by transforming input to a higher dimensional space. Gaussian radial basis function kernel is used in the model.

Logistic Regression

It is one of the predictive analysis. It is one of the predictive analysis. It is a classification algorithm used to assign observations to a discrete set of classes. The hypothesis of logistic regression tends it to limit the cost function between 0 and 1.

5.2 Soil Classification and main menu steps

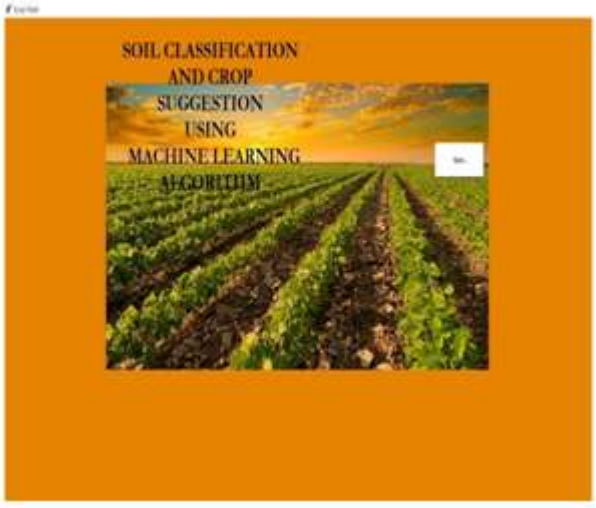

Fig.2.GUI main page

5.3 Crop yield menu

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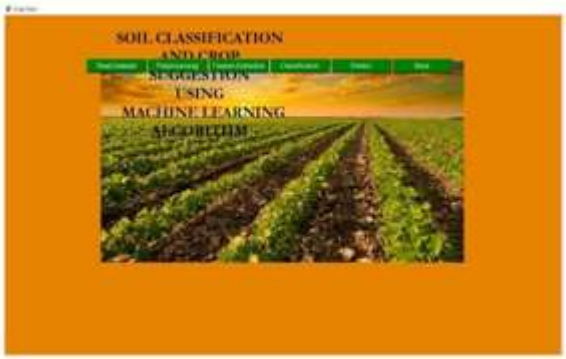
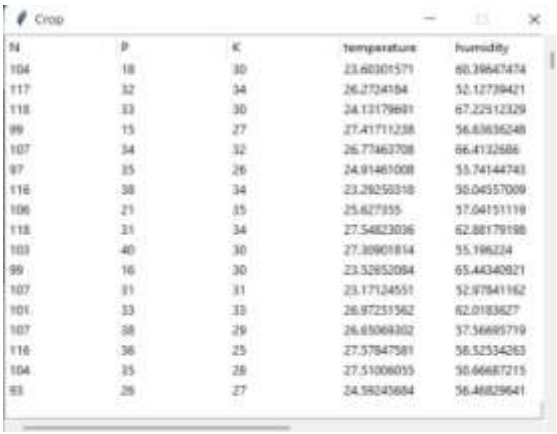


5.4 Dataset Table



N	P	K	temperature	humidity
104	18	30	23.60301571	60.39647474
117	32	34	26.2724184	52.12739421
118	33	30	24.13179691	67.22512329
99	15	27	27.41711238	56.63636248
107	34	32	26.77463708	66.4132686
97	35	26	24.91461008	53.74144743
116	38	34	23.29250318	50.04557009
106	21	35	25.627355	57.04151119
118	31	34	27.54823036	62.88179198
103	40	30	27.30901814	55.196224
99	16	30	23.52852084	65.44340921
107	31	31	23.17124551	52.97841162
101	33	33	26.97251562	62.0183627
107	38	29	26.65069302	57.56695719
116	36	25	27.57847581	58.52534263
104	35	28	27.51006055	50.66687215
93	28	27	24.59243684	56.46829641

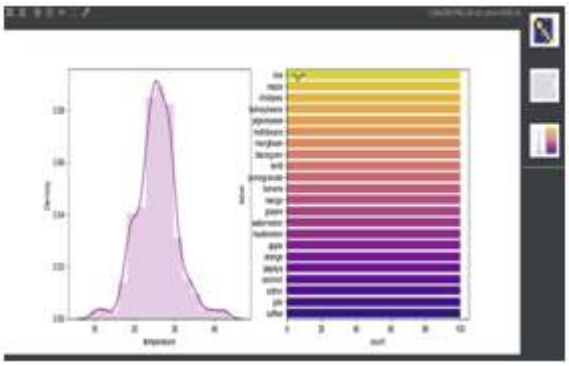


Fig.5.Shows Feature Extraction

5.5 Predict Accuracy by learning Algorithm

VI. CONCLUSION

Agriculture plays a significant role in the growth of the national economy. It relay on weather and other environmental aspects. Some of the factors on which agriculture is dependent are soil, climate, flooding, fertilizers, temperature, precipitation, crops, insecticides and herb. The crop yield is dependent on 5.4 Dataset table these factors and hence difficult to predict. To know the type of soil, in this work we perform descriptive study on agricultural data using various machine learning techniques.

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