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Soil Classification and Crop Prediction

Under The Guidance Of **Dr. S. Narayana**

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Abstract_ The Predominant Center Of Attention For Land Administration In Farming For Improving Crop Productiveness Is On Upkeep And Enchancment Of Dynamic Land Parameters. Populace Pressure, Earthy Obstacles And Diminishing Of Typical Soil Administration Techniques Have Directed To A Deterioration In Fertility Of The Soil In Growing Nation As India. Crop Fitness Is A Foremost Thing In The Surprisingly High Yielding Device Of Present-Day Agriculture. Significant Amplify In Crop Manufacturing Can Be Acquiring Through Adopting The Appropriate Crop Fitness Administration Scheme. Expanded Productiveness May Want To Be Done Via High-Quality Soil Aid Administration And Corrective Actions To Follow Micronutrients. Timely Detection And Controlling Of Troubles Linked With Crop Yield Pointers Permits The Choice Makers And Farmers To Figure Out On Splendid Soil Useful Resource Administration And Crop Surroundings Management. Keeping In Account In This "Farmer Buddy System" A Ml Based Totally Internet Site , The Crop Prediction And Classification Of Soil Issues Are Efficaciously Dealt With.

1. Introduction

The Motive Of The Project Is To Develop An Online Farmer Buddy System. The Entire Project Has Been Developed Keeping In View Of The Distributed Client Server Computing Technology, In Mind.

The Farmer Buddy System Is To Create An Ml Based Website For The Farmer And Organization that are related to predicting The Crop Using Soil Features Through this application any farmer can register himself.

Project Has Been Planned To Be Having The View Of Distributed Architecture, With Centralized Storage Of Database. The Application For The Storage Of The Data Has Been Planned. "Sql Connection" Methodology Is Used For Database Connectivity.. The Standards of Security And Data Protective Mechanism Have Been

Given A Big Choice For Proper Usage.

The Application Takes Care Of Dissimilar Modules And Their Correlated Reports, Which Were made As Per The Applicable Strategies And Standards That Are Put Ahead By The Management Staff.

The primary establishing of table spaces, Groups and indexes have been utilized to give Higher Stability and Reliability for the Data Storage. The Total Front End Was Dominated Using The Html,Js,Css Technologies And Machine Learning Techniques Are Used For Soil Classification And Crop Prediction. At All Acceptable Levels High Care Was Taken To Verify That The System Manages The Data consistency.

2. Litearature Survey

2.1: Classification Of Soilby Using Machine Learning Techniques And Crop Prediction Based On Soil Series

The Project Creates A Design That Can Predict Soil Series With Soil Type And It Can Suggest Suitable Crops According To Prediction. It Makes Use Machine Learning Methods Such As Weighted K-Nearest Neighbor (Knn), Bagged Trees, And Gaussian Kernel-Based Support Vector Machines (Svm) To Classify The Soil Series. The Soil Classification Philosophies Used, Follows The Existence Knowledge And Practical Circumstances. On The Land Surfaces Of Earth, Soil Classification Creates A Link Between Soil Samples And Manytypes Of Natural Entity. Based On These Classifications And The Mapped Data, The Suitable Crops Were Suggested For A Particular Region.

2.2 Soil Classification Using Machine Learning Techniques:

Soil Has A Vital Part In Successful Agriculture. The Main Role Of The Soil Is To Support The Growth Of Agriculture And Horticulture Crops. They Are Many Types Of Soil, Each Kind Of Soil Have Distinct Characteristics And Have Different Types Of Crops That Can Grows On. Therefore, It Is Needed To Know The Characteristics And Features Of Soils To Know Which Crop Can Grow Better On A Particular Soil. In This Case Machine Learning Can Be Useful.

This System For Image Classification Of Soil Based On Soil Image. The Initial Step Is Gather Soil Test Pictures Which Is The First Important Step In Soil Classification Based On Image Processing Because It Needs To Consider Factors Such As Scale And Soil Under Study. The Image Of Soils Are Captured Using Colour Camera And

Provided As Input To The System. The Feature Of Each Type Of Soil Is Collects And Stored In A Separate Database .Es, Certain Conditions Are To Be Considered, They Are Availability Of Ground

2.3 Methods Used In Existing System:

2.3.1neural Networks:

Generally There Are Three Layers In Neural Network. They Are Input Layer, Hidden Layer And Output Layer.There Is Only Is Only One Hidden Layer In This Paper. Sigmoid Is Used As Activation Function. As Per The Number Of Attributes , The Input Layer Is Comprised Of 10 Input With One Attributes As The Class Type. As Per The Number Classes , The Output Layer Consists Of 12 Outputs. A Package Called Back Propagation Neural Network Software Program , Based On The Back Propagation Procedure . Network With Arbitrary Layers, Nodes Per Layer , Link Connections Between Layers And Other Basic Network Design Components Can Be Generated Using This Package.

2.3.2 Decision Tree

It Is Represented As Binary Tree. A Single Input Variable(X) Is Represented On Each Node And A Split On The Variable . The Output Variable(Y) Containing On The Leaf Node Of The Tree Is Used To Make A Prediction S. Predictions Are Made By Walking The Spilt Of The Tree Till Entering At A Leaf Node. Decision Trees Are Very Fast For Making Predictions And Very Fast To Learn . For A Broad Range Of Problems , Decision Trees Do Not Need Any Special Preparation For Data And Is Also Error Free

2.3.3 Naive Bayes

In Naive Bayes, Input Variable Is Independent That Is A Naive Bayes Classifier Surmise That , An Article Feature Of Class Which Is Present Is Unrelated To Any Other Feature. It Is Based On The Bayes Theorem . The Method Of Maximum Likelihood Or Bayesian Method Are Used For The Parameter Estimation For Naive Bayes. The Supposition That Input Variable Is Independent Is Unpractical For Real Data Naive Bayes Classification Can Be Efficiently Trained In A Supervised Learning Setting. For Wide Range Of Complex Problems

2.3.4 Support Vector Machine

Support Vector Machine Is A Heuristic Algorithm, Which Comes Under Supervised Learning . In Svm, A Hyper Plane That Optimally Separates Two

Classes Is Determined . Between Two Classes , There Is Only One Hyper Plane That Produce Maximum Margin. Nonlinear Mapping Functions Are Used To Map The Data Into A Higher Dimensional Space(H) For Nonlinear Equations. Classification Function Can Be Solved Using Kernel Function.

3. Proposed Work

The Proposed System Is A Web-Based Application, Which Can Be Used For Identifying Ph Value Of Soil Sample. The Main Idea Of The Project Is To Provide Accessibility Of Soil Testing. We Are Trying To Execute It With Database Application. This Presented Solution Is Useful For The Farmer And The Government Laboratories.

1) To Recognize Soil Type.
2) To Determine Soil Parameters Like Nitrus(N), Phosphorous (P),Potassium(K).
3) To Determine Soil's Ph Level
4) To Recognize Soil Properties.
5) To Simplify Soil Testing For The Farmer.
6) To Recommend Best Suitable Crop For The Farmer.

As Per The Necessity Of The System As Automated. We Want To Create Software Which Process And Give Intermediate Results. So The People Who Want To Test The Soil Can Classify Test It By Using Software.

Digitalimage Processing Is A Word In Which Digital Image Will Be Considered And Calculate Some Values From It To Perform Particular Operation On It. Many Algorithms Are Used To Perform Both Mathematical And Scientific Operation On Digital Images. We Can Implement Our System Based On Needby Using Digital Image Processing. The System Work As By Providing The Image File Of Soil Sample As Input And Then Rgb Value Of Each Image Of Soil Sample Will Be Calculated By Using Digital Image Processing And By Using Some Constrained We Give Soil Ph And The Constraints Of Soil As Output.

To Calculate Ph Value For New Soil Sample First We Capture The Soil Image Then By Using Formula Of Soil Ph Value We Calculate The New Factor Of New Image .The Soil Image Capture In The System Can Be Taken As Matrix Of Pixels Associated With Fusion Of Red, Green ,Blue Values. Average Of Each Sector Can Be Used To Calculate The Single Soil Ph Value For Each Image.

As We Have Only Few Samples Ph Values And Their Calculated Ph Values. So We Can Add +0.01 And Subtract -0.01 To Get

The Approximation In The Results. Then Compare New Value With Values Which Is Stored In The Database Value Which Is In Specific Range Return The Ph Value Of Soil And According To It We Return The Soil Ph Factor Of New Soil Sample. With This Proposed System We Giveboth Soil Sample'sph Valueandsoil Type, The Nutritious Deficiency in Soil Range And The Type Of The Crop Suitable For The Soil. We Provide The Complete Report Of Testing Of Soil To The Farmer

3.1 Implementation

3.1.1 Farmer Module

Registration

User Need To Register Into The System Using His Credentials (First Name, Last name, Password, Address). Once The User Is Registered Then He Can Log In Any Time Using His Credentials.

Login:

After Completing His Registration User Can Login Into The System By Using Username And Password.

Farmer Actions:

Once the Farmer is logged into the System Then The System Asks The Farmer To Upload Colour Photo Of Soil .After Uploading The Colour Photo Of Soil And Farmer Will Wait For A While For The Suitable Crop To Be Displayed As Output Then Farmer Need To Select One Crop Among Them. After Successful Completion Of Actions, Famer Needs To Log Out From The System.

Log Out:

After Checking The Crops Farmer Log Out From The System.

3.1.2.Soil Classification:

To The Soil Photo, Apply Cnn Algorithm For The Soil Classification. Compare Soil Parameters With Existing Values In The Dataset, If Photo Is Not Match With Any Of The Photos In The Dataset It Means It Is Not A Soil Photo Then System Warns The Farmer That Please Upload Soil Photo

3.1.3 Crop Prediction:

After Soil Classification, The System Will Recommend Crop Based On Soil Features. For Crop Prediction We Apply Knn Algorithm. After Crop Prediction, The System Will Display Set Of Suitable Crops. Farmer Need To Select One Among Them And Then Log Out From The System.

3.2 CNN Algorithm

Now A Days, We See Convolutional Neural Networks Is Everywhere. Convolutional Neural Networks Is Possibly

Most Famous Deep Gaining Knowledge Of Building. Current Stream Of Hobby In Extensive Mastering Is Due To Great Reputation And Effectiveness Of Convnets. Activity In Convolutional Neural Network begined Out With Alexnet.

In 2012 And It Has Expanded Exponentially Ever Since. In Simply 3 Years, Researchers Improved From Eight Layer alexnet To 152 Layer Resnet.

Convolutional Neural Network Is Now The Go-To Mannequin On Each Photo Associated Issue. In Phrases Of Precisionthey Blow Opposition Out Of Water. Cnn Is Additionally Efficiently Utilized To Suggester Systems, Herbal Language Processing. The Primary Gain Of Convolutional Neural Network In Contrast To Its Predecessors Is That It Mechanically Detects The Essential Facets Except Any Person Supervision. For Example, Given Many Pix Of Cats And Puppies It Learns Special Facets For Every Classification Through Itself.

This Permits CNN Fashions To Run On Anywhere, Any Type Of Devices Making It Universally Attractive.

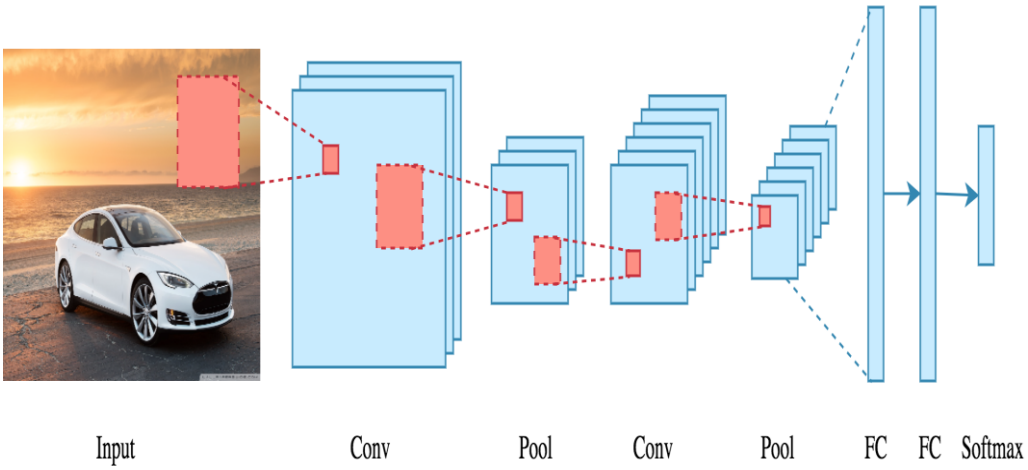

Fig 1:Cnn Structure

4. Results and Discussion

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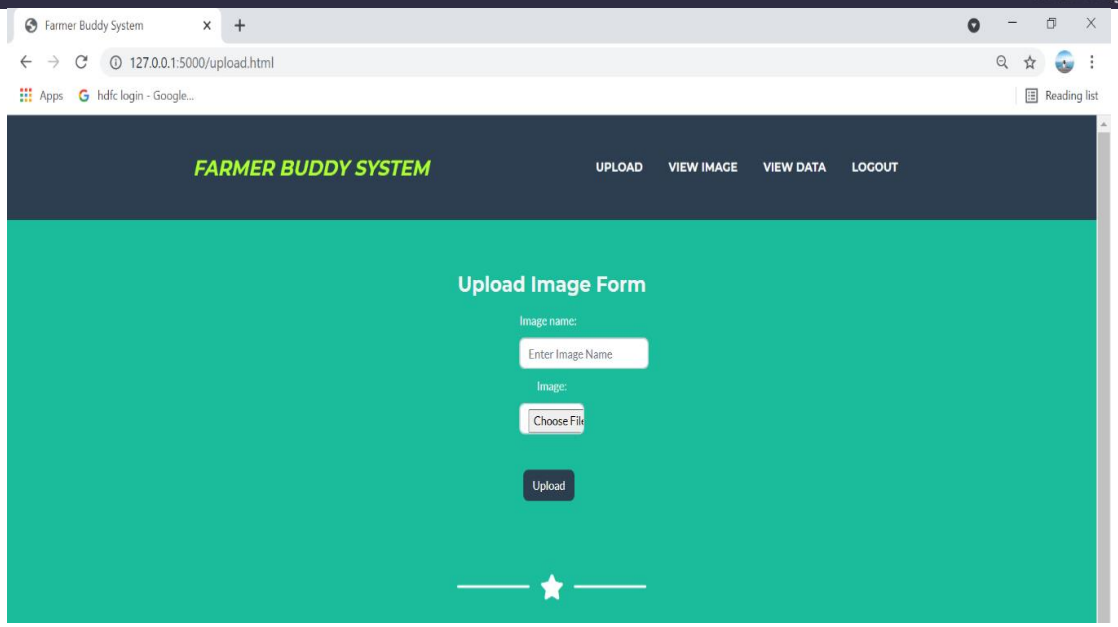

Fig 2:In The Above The Former Can Upload Image

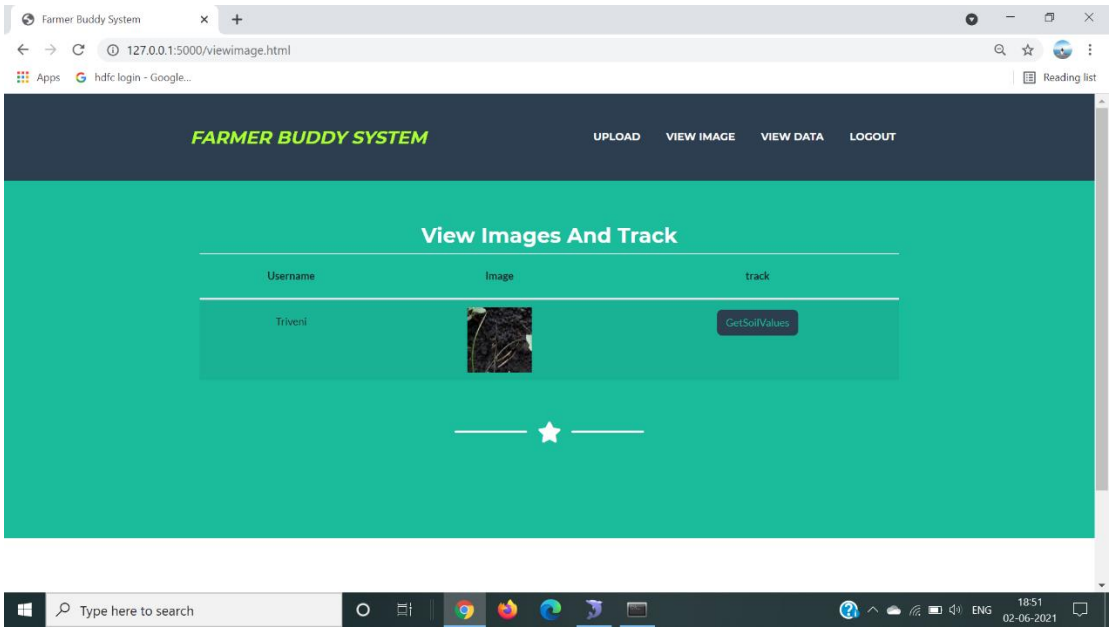

Fig 3:After Uploading Image Former Will Get The Above Screen

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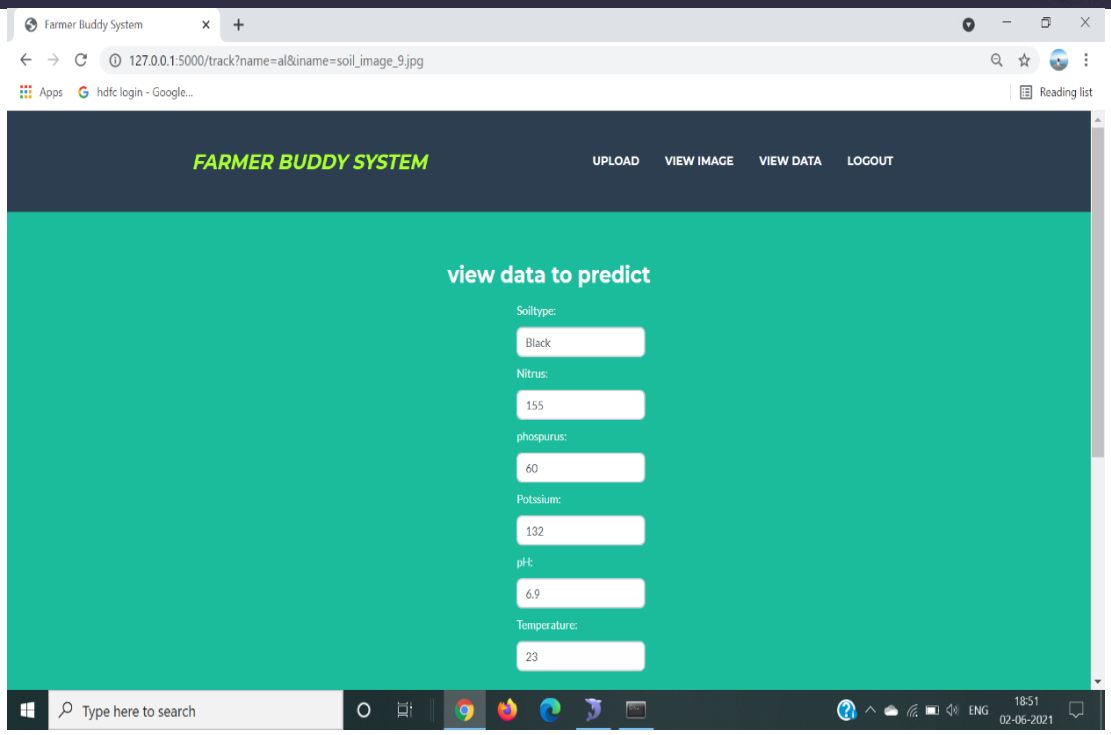

Fig 4: In The Above Screen The Former Can View Data To Predict

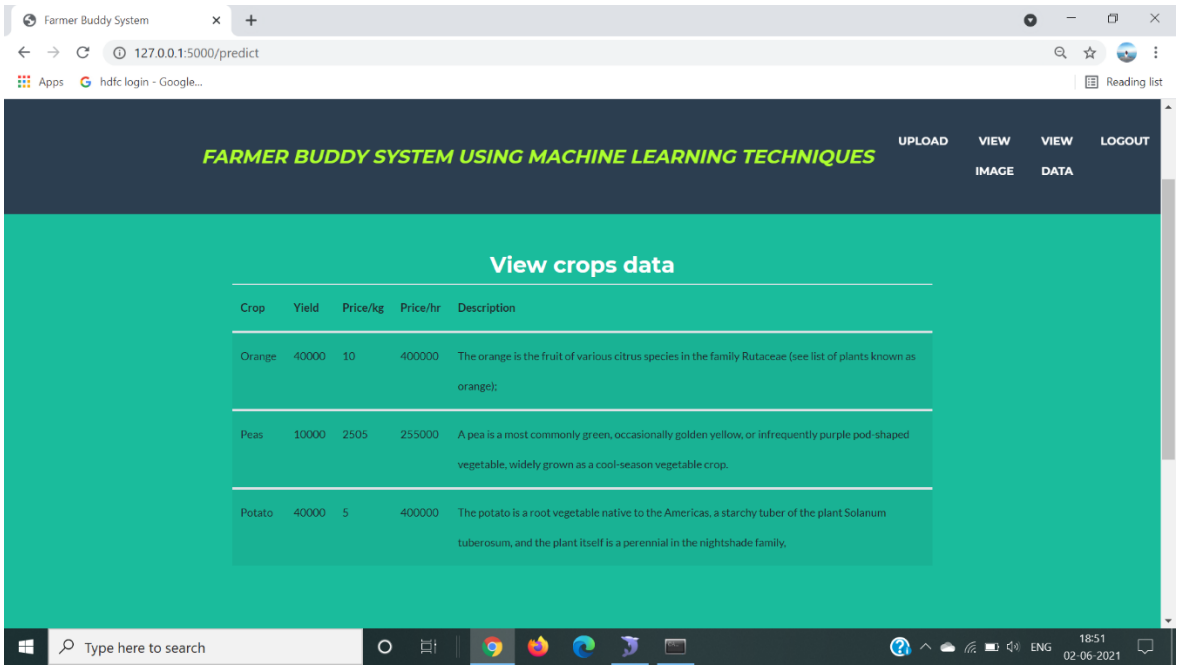

Fig 5:In The Above Screen Can Get The Crop Data

5. Conclusion

Soil Testing Is The Way To Access The Soil Constituent Which Is Useful To Know Fertility And Acidity Of The Soil.

This System Helps To Determine The Type Of Soil And Ph Of Soil That Must Be Applied. From Farmers Perspective Soil Ph And Soil Nutrients Value Plays An Important Role Because Growth Of Vegetables And Plantsdepended On Ph Value Available In The Soil. Normally Ph Value Of Soil And Soil Nutrients Are Calculatedby The Humans In Government Labs Because Instrument Are Not Available Everywhere. By Using Digital Image Processing We Calculate The Soil Ph And Soil Nutrients. The Ph And Nutrient Values Of Ten Soil Samples Were Collected Which Are Tested In Government Soil Testing Lab, And Also Determined By Using Digital Image Processing Technique. On The Basis Of Rgb Values, Pixels Properties And Their Digital Correlations, Results Showed That Our Ph Values Were Approximately Matching With Results From Government Testinglab And The System Will Recommend Suitable Crops Based On Soil Features.

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