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Crop Recommendation Using Support Vector Machine

Chavan Gaurav Shankarrao, Mane Sachin Shivaraj, Survase Deepak Jyotiba,Pathan Avej Javed,

Tanksale Shubham Ashok, Prof. S. S. Nannaware

Department of Information Technology, Jayawantrao Sawant College of Engineering, Pune, India

ABSTRACT: It is the web based application which is helpful for the farmers. Over the most recent couple of many years analysts are keen ashore planning and its arrangement because of different reasons. The purposes behind an expansion in the focal point of the exploration local area are, the expanding interest for agriculture land and soil wellbeing examination, as the strength of the dirt, is fundamental for the solid creation of yields. Picture order is one such methodology for soil and land wellbeing investigation. It is a mind boggling measure having the impacts of different components. This paper has proposed the investigation of flow explores the issues it tended to, and its possibilities. The accentuation is centred on the logical investigation of different progressed and effective grouping systems and procedures. Here, it has been endeavoured to consider the components these methodologies have routed to improve the precision of the characterization. Appropriate usage of the quantity of highlights of distantly detected information and choosing the best reasonable classifier are generally significant for improving the precision of the grouping. The information - based arrangement or Non-parametric classifier like neural network have acquired ubiquity for multisource information grouping as of late. Not with standing, there is as yet the extent of additional exploration, to lessen vulnerabilities in the improvement of precision of the Image grouping instruments. By using support vector machine algorithm is used to recommend the crops based on the soil.

KEYWORDS: Convolutional Neural Network, Support Vector Machine

I. INTRODUCTION

Data mining implies distinguishing concealed examples from enormous datasets and setting up a relationship among them to take care of the issue through information investigation. Presentation of information mining in agriculture field has made advantages in research field. Characterization is vital in any field of science to set up the essentials. It can help finding the variety between the items and ideas. It likewise gives essential data through which exploration can be made in a methodical way. Soil is one of the vital parts in farming field for yielding harvests. Soil arrangement ways of thinking follow the presence information and commonsense conditions. On the land surfaces of earth, grouping of soil makes a connection between soil tests and different sorts of characteristic substance. Soil classification has evolved as a very popular problem in Image processing and Computer Vision. Many new algorithms are being devised using convolutional architectures to make the algorithm as accurate as possible. These convolutional architectures have made it possible to extract even the pixel details. This research aim to design a binary face classifier which can extract the features like edges, color, texture irrespective of its

alignment. This research present a method to generate accurate soil classification from any arbitrary size input image. Soil images are recognized by cnn methods using various chemical features and possible crops for that soil series are suggested using geographical attributes using svm. It is web based application which is very much helpful for the farmer. In that the farmer will sell his product online also without going into market into this pandemic period.

1.1 Motivation

The main purpose of the proposed work is to create a suitable model for classifying various kinds of soil data along with suitable crops suggestion as well as providing the factory details for selling the crops which is very much helpful for the farmer or he/she purchase the product online also.

The problem with knowledge engineering method is that it requires constant updating of rules for classification which is very difficult. Over the last two decades, the application of Machine learning approach is increased due to various reasons like availability of large amount of data and the necessity of handling them in an efficient way.

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1.2 Need

To develop a system that classify soil and suggesting crops with maximum precision and with minimum processing timeto help in the law public sector.

II. LITERATURE SURVEY

Krizhevsky et al.[1] stated that, deep convolutional neural network to classify the 1.2 million high-resolution images in the ImageNet LSVRC-2010 contest into the 1000 different classes. On the test data, we achieved top-1 and top-5 error rates of 37.5% and 17.0% which is considerably better than the previous state-of-the-art. The neural network, which has 60 million parameters and 650,000 neurons, consists of five convolutional layers, some of which are followed by max-pooling layers, and three fully-connected layers with a final 1000-way softmax. To make training faster, we used non-saturating neurons and a very efficient GPU implementation of the convolution operation. To reduce overfitting in the fully-connected layers we employed a recently-developed regularization method called “dropout” that proved to be very effective. We also entered a variant of this model in the ILSVRC-2012 competition and achieved a winning top-5 test error rate of 15.3%, compared to 26.2% achieved by the second-best entry.

Dharesh Vadalia [2] proposed that farming is done by traditional method, farmer’s plant crops traditionally without knowing the content of soil and quality of that soil. As a result farmers will not gain sufficient profit from there farming. The existing method of soil testing is manual method which starts by taking soil samples and then sends to laboratories for testing. This manual process is time consuming and not so feasible. Due to human intervention there are chances of human errors so farmers may receive incorrect report. So there is need of automated process for soil testing and crop prediction. Testing of soil is important because soil testing helps to determine fertility of soil and thus crop prediction can be done. So we proposed a system which will have a handheld device which gives pH value and we will estimate Nitrogen (N), Phosphorus (P) and Potassium (K) from the pH of that soil. We are using classification algorithm to predict suitable crops based on the values we get from our device and we will also provide suitable fertilizers required for that land.

M. P. K., Anthiyur et al. stated that [3] Agribusiness is a spine of Indian economy that is the fundamental pay hotspot for a large portion of the populace in India. So ranchers are consistently inquisitive about yield forecast. Harvest yield relies upon different elements like soil, climate, downpour, composts and pesticides. A few components contrastingly affect farming, which can be evaluated utilizing fitting measurable systems. Applying such systems and methods on recorded yield of harvests, it is feasible to acquire data or information which can be useful to ranchers and government associations for settling on better choice and arrangements which lead to expanded creation. The goal of the work is to look at different information mining strategies which gives the most extreme exactness. Information mining is just the way that helps to change over colossal information into advancements and make them accessible to the ranchers. The colossal measure of information can be used to mine piece of information that can be valuable for ranchers and chiefs to take viable and brief choice. In this paper one of significant boundary which is utilized to build crop creation is thought of; that is soil. Distinctive characterization calculations are applied to soil informational index to foresee its richness. This paper centers around arrangement of soil fruitfulness rate utilizing K-Means, Random Tree, and Apriori.
Sk AlZaminurRahman et al. [5] proposed that Soil is an important ingredient of agriculture. There are several kinds of soil. Each type of soil can have different kinds of features and different kinds of crops grow on different types of soils. We need to know the features and characteristics of various soil types to understand which crops grow better in certain soil types. Machine learning techniques can be helpful in this case. In recent years, it is progressed a lot. Machine learning is still an emerging and challenging research field in agricultural data analysis. In this paper, we have proposed a model that can predict soil series with land type and according to prediction it can suggest suitable crops. Several machine learning algorithms such as weighted *k*-Nearest Neighbor (*k*-NN), Bagged Trees, and Gaussian kernel based Support Vector Machines (SVM) are used for soil classification. Experimental results show that the proposed SVM based method performs better than many existing methods.

III. PROPOSED METHOD AND ALGORITHM

1. Proposed Methodology:

In a proposed system, we are proposing experiment on detection of spam mails with limited set of supervised data.
Here a framework is proposed for soil arrangement, which is subsequently portrayed in the square chart. The underlying portion is to accumulate particular kinds of soil test picture which is viewed as the determination of appropriate sensor information is the principal significant advance in picture preparing based soil grouping as it requires considering variables, for example, clients need, scale and attributes of soils under investigation, the

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accessibility of information of soil, cost and time limitations of the examination. Various pictures of soil tests which are to be grouped are caught utilizing shading camera and are given as a contribution to the framework.
The System architecture of the proposed model is shown in fig. 1.

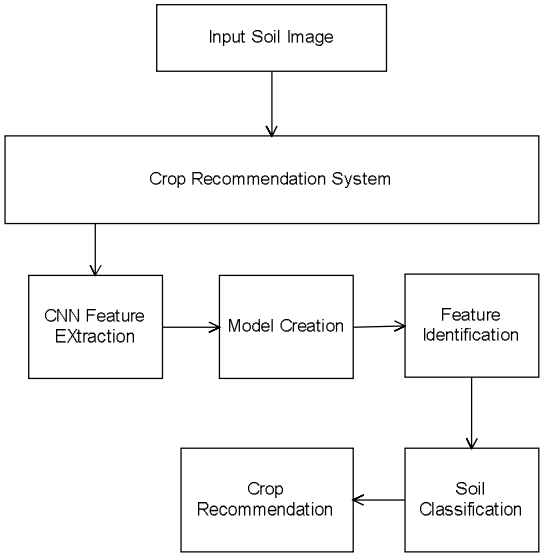

Fig1. Proposed Architecture

The image classification using convolutional neural network, a sufficient no. of training samples is required. The training samples are collected from fieldwork. The conditions considered while selecting training samples included spatial resolution of the collected images, availability of ground reference data, and complexity of the data being considered. After successful image classification the crops will be recommended by using Support vector machine (SVM). In that we are contributing one more facility to the farmer, he will sell his product online also without going into market into this pandemic period. The method involves two phases: training phase and testing phase. Two datasets are used: Soil dataset and crop dataset. Soil dataset contains images of every class such as Alluvial soil, Black Soil, Clay Soil, Red Soil. Crop dataset is used for the recommending the crops based on that soil class.

2. Algorithms

I. CNN

The overall of CNN model for advertisement images shows in the below diagram with four blocks (input, capturing, classification, output). In this picture have many components, with three main processing components: configurations and initialize, CNN Learning and Visualization and pick up Sample Test. Configurations and Initialize component has two inputs: instance and configurations. Firstly, the instance describes the number of layers, names of layers, the number of filters on each conv layer, the classification method, size of input images, the kernel of convolution layers. Lastly, the configuration describes some parameters for the model such as learning-rate, mini-batch, weight decay, momentum. CNN Learning and Visualization component of nLmF-CNN describes features of images in many layers such as input, conv, relu, pool, fc, and softmax layers. As shown in fig.2 It visualizes the current result of learning status.

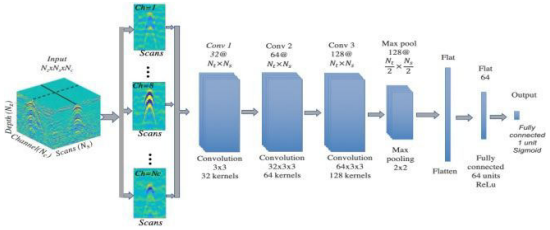

Fig2. CNN Architecture

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A convolution extracts tiles of the input feature map, and applies filters to them to compute newfeatures, producing an output feature map, or convolved feature (which may have a different size and depth than the input feature map).

Convolutions are defined by two parameters:
Size of the tiles that are extracted (typically 3x3 or 5x5 pixels).
The depth of the output feature map, which corresponds to the number of filters that are applied
During a convolution, the filters (matrices the same size as the tile size) effectively slide over the input feature map's grid horizontally and vertically, one pixel at a time, extracting each corresponding tile.
Following each convolution operation, the CNN applies a Rectified Linear Unit (ReLU) transformation to the convolved feature, in order to introduce nonlinearity into the model. The ReLU function, $F(x)=\max(0,x)$, returns x for all values of $x > 0$, and returns 0 for all values of $x \leq 0$.

ReLU is used as an activation function in a variety of neural networks;.
After ReLU comes a pooling step, in which the CNN down samples the convolved feature (to save on processing time), reducing the number of dimensions of the feature map, while still preserving the most critical feature information. A common algorithm used for this process is called max pooling.
Max pooling operates in a similar fashion to convolution. We slide over the feature map and extract tiles of a specified size. For each tile, the maximum value is output to a new feature map, and all other values are discarded. Max pooling operations take two parameters. Size of the max-pooling filter (typically 2x2 pixels)
At the end of a convolutional neural network are one or more fully connected layers (when two layers are "fully connected," every node in the first layer is connected to every node in the second layer). Their job is to perform classification based on the features extracted by the convolutions. Typically, the final fully connected layer contains a softmax activation function, which outputs a probability value from 0 to 1 for each of the classification labels the model is trying to predict.

IV. SUPPORT VECTOR MACHINE

Generally the use of machine learning algorithm is used for the recommendation. In this paper, the support vector machine will suggest the crops. SVM is a supervised machine learning algorithm which works based on the concept of decision planes that defines decision boundaries. A decision boundary separates the objects of one class from the object of another class. Support vectors are the data points which are nearest to the hyper-plane. 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 our proposed method.

V. RESULTS OF THE SYSTEM

In our experimental setup, as shown in table 1, the total numbers of 266 of trained images for four types of soil and 70 new images were tested. These images go through CNN framework by following feature extraction using our image processing module. Then our trained model of classification of soil get classifies the image into specifies color.

Sr. No.	Category	Number of Images
1	Positive Images	223
2	Negative Images	31

Table 1: Classification of Images

In our experimental setup, we are shown in table, the total numbers of images were 266. These images were then divided into Two subcategories; among which 223 predicted and 31 not predicted respectively. The figure shows predicted soil color and recommend the crops for it. We classified images data into predicted and not predicted categories based on accuracy factor which is our main motive.

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VI. CONCLUSION

A model is proposed for predicting soil and providing suitable crop yield suggestion for that specific soil. In this paper, we proposing an nLmF-CNN model improved from traditional CNN model and developed from ConvNetJS. Where n is a number of layers Convolution (conv) and pool, and m=2k is number filters in layer conv. We are using CNN model for soil image classification, which has four classes (Alluvial, Clay, Red, Black) images classification problem. Based on every class we are suggesting the crops by using support vector machine.

REFERENCES

[1] A. Krizhevsky, I. Sutskever and G.E. Hinton, "Imagenet classification with deep convolutional neural networks," Advances in neural information processing systems, pp. 1097-1105,2012.

[2] Dharesh Vadalia, Minal Vaity, Krutika Tawate, Dynaneshwar Kapse, " Real Time soil fertility analyzer and crop prediction," *International Research Journal of Engineering and Technology,* vol. 04,2017.

[3]Devi, M. P. K., Anthiyur, U., &Shenbagavadivu, M. S. (2016). Enhanced Crop Yield Prediction and Soil Data Analysis Using Data Mining. *International Journal of Modern Computer Science*,*4*(6).

[4] Surili Agarwal, Neha Bhangale, Kameya Dhanure, Shreeya Gavhane, V.A.Chakkarwar, Dr. M.B.Nagori "Application of Colorimetry to determine Soil Fertility through Naive Bayes Classification Algorithm" 9th ICCCNT 2018 July 10-12, 2018, IISC, Bengaluru.

[5] Sk AlZaminurRahman, KaushikChandraMitra, S.M. MohidulIslam "Soil Classification using Machine Learning Methods and Crop Suggestion Based on Soil Series" 2018 21st International Conference of Computer and Information Technology (ICCIT), 21-23 December, 2018.

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