

# A Novel Method For Classifying The Soil Type Using Support Vector Machine

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**Abstract**— Farming delivers nutrition along with the occupation openings to an enormous amount of inhabitants. Farming plays a major part in the Indian eco-system. The statistical growth of agriculture is assisted by the result of efficient use of scientific methods in agriculture. The good yields of crops depends on several factors, such as the soil, seeds, environmental conditions, and the especially monsoon in Indian scenario. Since the dawn of industrialization, the human activities and the lack of soil health awareness while using the fertilizers leading to the low quality of soil. That in turn affecting the overall agricultural yield. The main challenge is to know the type of soil suitable for growing different type of agricultural products. In this paper, we are proposing a novel method for predicting the soil type, that suitable for growing the specific crop. We use the machine learning model by the support vector machine algorithm on the digital image set.

**Keywords**—Component, SVM, Feature Extraction, HSV.

## I. INTRODUCTION

Farming assumes an imperative job in India's economy. 54.6% of the populace is occupied with horticulture and united exercises and it contributes 17.4% to the nation's Net Value (GDP) Added for the year 2016-17. The main challenge is to know the type of soil suitable for different type of agriculture. For giving the significance of agribusiness segment, Government of India made a few strides for its economic improvement. Steps have been taken to improve the soil fertility, but to check the fertility of the soil first we need to know the type of the soil is, because different type of soil have different characteristics.

The manual recognizable proof of soil type requires total knowledge about the soil. The experienced farmer can make the task easy but accuracy is not guaranteed. Farmers probably won't have a total information of the essential soil issues, apply unseemly strategies causing extensive misfortune in the items. Consequently, mechanizing the framework to predict the type of soil helps in diminishing the item loss and improving the agricultural products.

The study of soil means identification based on the external features of the soil. In manual process, the soil type analysis is carried out by collecting the soil samples from different areas and classifying them based on different methodologies. The machine learning technique on the other hand, makes it less time consuming and effective in classifying the soil into different types. This paper groups the soil image into various soil types by utilizing Machine Learning (ML) and Support vector Machine (SVM).

## II. RELATED WORK

Srunitha.k, Dr.S.Padmavathi [1] depicts grouping of the discovered fragments utilizing Machine Learning (ML) technique Support Vector Machines (SVM).

B.Bhattacharya, [2] utilizes the idea of division, highlight extraction and arrangement. The signs which are estimated sectioned utilizing division calculations. Limit vitality strategy is utilized for separating highlights from the information. Contingent upon these highlights classifiers, for example, ANN, SVM and choice trees are utilized and acceptable outcomes are acquired.

I.T. Youthful, [3] presents an idea for breaking down the system for organic shape dependent on bowing vitality. It discovers the measure of work utilized for average natural shape notwithstanding this it clarifies inspecting hypothesis for forms which are associated and shut and a quick calculation for ascertaining the bowing vitality.

Zhongjie Zhang and M.T. Tumay, [4] this paper clarifies that there will be a vulnerability between the soil piece relationship and mechanical conduct of soil while getting from CPT. This vulnerability prompts covering of various soil classes. The current technique accessible for this is point and area estimation. The creator presents another fluffy methodology here that is autonomous of CPT.

V. Sudarshan and B. Yamuna, [5] presents the idea of SVM decoder (bolster vector machine), it is an edge based arrangement and relapse system. This paper utilizes AI

calculation for preparing of the informational index. What's more, explicit decoders have been planned by utilizing preparing size productively. Svm is being constrained by a condition that is being planned as quadratic programming issue.

Branislav Bajat,[6] utilizes the idea of soil type characterization and estimation of soil properties utilizing bolster vector machines. This paper presents the idea dependent on help vector machine to gauge the estimation of soil properties and guide the soil properties. Mapping of the soil properties depends on shading and surface of the soil. Soil properties and soil type arrangement can likewise be founded on realized specific compound information esteems.

A.Coerts, [7] utilizes the idea of cone infiltration test (CPT) it is one of the soil examination technique. It is utilized in the job of sub surface soil and for profundity data from the gathered soil picture tests. This paper depends on limitation characterization and comprises of different calculations and properties of classes and topologies of choice tree graphs. This paper utilizes couple of parameters to speak to land models utilizing primary part examination (PCA). It is utilized for diminishing slope based methodologies and to improve the coordinating procedures.

C.H. Juang, X.H. Huang, and R.D. Holtz, [8] presents the idea of fluffy measure. It is utilized to gauge integrals of relationship thickness. It is additionally utilized for a base for collecting the connection between's relative densities and CPT (cone entrance test). There are three dimensions high, medium and low, sands are chosen by the erosion proportion. In light of the distinctions present between these dimensions the compressibility is estimated. Also, in view of fluffy c-means and integrals connection thickness is estimated and the outcomes are looked at.

### III. METHODOLOGY

#### 3.1 Image Filtering & Contrast Enhancement:

##### 3.1.1. Median Filter

The Median Filter is an non-direct advanced separating method which is utilized to remove noise from a picture. Such a commotion decrease is a pre-handling step that improves the consequences of later preparing. Middle sifting is frequently utilized in computerized picture handling as the edges are saved under specific conditions. while expelling

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noise.

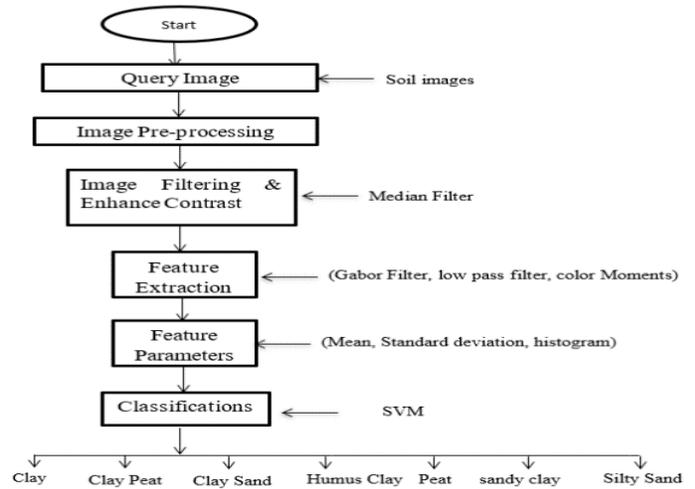


Figure 1: Generalized Methodology.

#### Low pass Filter

A low-pass channel passes repeat underneath the cut-off repeat and debilitates the higher repeat. The tightened repeat depends upon the channel plan. In sound applications this in like manner called as high-cut channel or treblecut channel.

#### 3.1.3 Color Moment

Color moments are strategies that depict color flow in an image like the central moments phenomenally delineate a probability assignment. are used for Color requesting purposes as features in picture recuperation applications to look at the two pictures dependent on color. Generally, one picture is contrasted with a database of advanced pictures with pre-processed highlights so as to discover and recover a comparative Image. Every examination between pictures results a closeness score, and the lower this score is the more indistinguishable the two pictures should be.

#### 3.2 Feature Parameter

1. Mean  
$$mean = \frac{\text{neighboring}}{\text{total}}$$

2. Standard Deviation

$$std = \sqrt{\text{Mean}}$$

#### Histogram

A histogram is a careful depiction of the allotment of numerical data. It is an estimation of the probability scattering of a steady factor. To assemble a histogram, the underlying advance is to "canister" the extent of characteristics which is to isolate the entire extent of characteristics into a movement of breaks, and after that check what number of characteristics drop into each between time. The canisters are ordinarily assessed as successive, non-covering breaks of a variable. The canisters must be head-to-head, and are oftentimes of equal size.

#### 3.3 Support Vector Machine

Support vector machine (SVM) is a strategy in AI which are appropriate for directed models related as for learning calculations. These are fundamentally utilized for examining the information for relapse and arrangement. For set of preparing informational collection precedents it has a place with both of the two classifications, a help vector machine calculation for preparing creates a model which advises the new thing falls in to which class by a non-probabilistic double classifier. SVM demonstrate is the model on delineation of focuses in space which is mapped. In this way, the information of various sorts are isolated beyond what many would consider possible and new information is mapped to which bunch it has a place with in svm relapse.

### PROPOSED SYSTEM

The rule task is to mechanize the strategy. With the ascending of picture taking care of and AI we can capably orchestrate the soil model in to group which it have a spot with. This paper depicts plan of the found segments using Machine Learning (ML) procedure Support Vector Machines (SVM). This paper elucidates support vector machine based plan of the soil type. Soil gathering consolidates steps like picture verifying, picture pre-planning, incorporate extraction and portrayal. The surface features of soil pictures are expelled using the low pass channel, Gabor channel and using shading quantization strategy. Mean sufficiency, HSV histogram, Standard deviation are taken as the quantifiable parameters. With more data and soil science space unequivocal snares, the potential for applying AI to soil property desire would most likely be augmented.

So as to characterize the soil there are sure strides to be pursued

1. Apply the change (low mask filter, Gabor Filter, histogram, Median Filter) to the first picture
2. Utilize factual measures to examinations the shading, surface, shape.
3. Finding the separation with Euclidean distance formula.

### IV. RESULTS AND DISCUSSION

An input image is given to the system will recognize the input of different soil images and classifies the image based on colour and texture and displays the outputs as shown below.



Figure 2: Input Color Image

The above image is the input image which we give it for the system to map the soil properties of the image based on texture and colour and display the output with name of the soil.



Figure 3: Input Resized Image

Resizing images is a crucial change to reduce the output image size. It is expressed as a requirement for the final *image* instead of defining the actual operations.



Figure 4: Filtered Image

Filtering is a technique for modifying or enhancing an image. We can filter an image to highlight certain features.

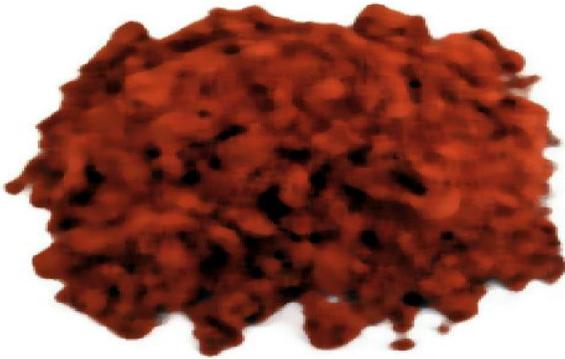


Figure 5: Contrast Enhanced Image

Contrast is determined by the difference in the colour and brightness of the image compared to the input image.

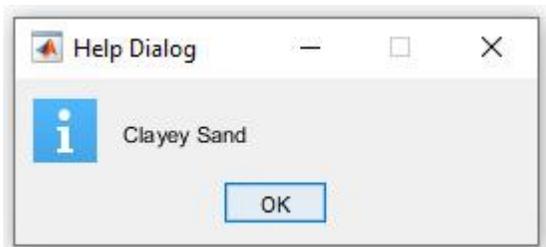


Figure 6: Predicted Soil Name

## V. CONCLUSION

In this paper, we utilized Support Vector Machine (SVM) classifier for the arrangement of Soil. SVM gives exceptionally straightforward technique to direct order. The grouping of non-sandy soils are better ordered with SVM. The execution of classifier as far as SVM is tantamount and gives better outcome. The workable for applying AI to soil property gauge would clearly be misused. It can accomplish a 95% precision rate for ordering.

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Mr. Pradeep Nayak pursued Bachelor of Engineering from SDMIT Ujire, Mangalore in 2011 and Master of Technology from Alva's Institute of Engineering and Technology He is currently working as assistant professor at AIET Mijar. Interested areas in Deduplication in Big Data Analytics and machine Learning.

