

Soil Classification and Suitable Crop Yield Prediction Using Support Vector Machine

Shivaputra S.Panchal¹, Laxmi Sharma²

¹Assistant Professor, Dept of CSE, BLDEA's CET, Vijayapur, Karnataka(India)

sps058@gmail.com

²PG Scholar, Dept of CSE, BLDEA's CET, Vijayapur, Karnataka(India)

laxmis022@gmail.com

Abstract: Identification of the soil is the key to avoid the losses in the quantity of the agricultural product and yield. The studies of the soil mean the studies of outwardly recognizable patterns seen on the soil. Soil grouping is extremely basic for feasible agribusiness. It is exceptionally hard monitor manually. It requires tremendous amount of work, and additionally require the inordinate processing time.

Henceforth, image processing is utilized for the identification of soil. Soil recognition includes the steps like image acquisition, image pre-processing, feature extraction and classification. This project describes a Support Vector Machine based classification of soil samples

Keywords: Statistical features, k-means clustering, SVM.

1. Introduction

“Image processing is a type of sign handling for which input is an image, video frame or photograph”. The output is an image or chracters of the images. “An image is an array, or matrix, of square pixels arranged in columns and rows”. Image processing typically doled out to Digital image processing technique. It deals with the advanced images with the assistance of a computerized PC .It additionally concentrates on performance processing the image by developing the computer system framework. System accepted the input as a digital image and using efficient

algorithms the system will process the image, and gives an image as an yield. The representation of image can be a man, protest or pictures which are fabricated by optical instruments like a lens, a mirror, or a camera or other optical gadgets. The image representation can be two dimensional (2D). Normally an digital image is alluded as picture components or pixels. Each pixel in the image is identified by one or more numerical values. For gray scale images a single value identifying the intensity of the pixel. The intensity range can be of [0, 255] range. For colour images, three values are used to represent the images are required to represent the images. “Image processing is a multidisciplinary field”. It comprise of various branches of science especially

material science, arithmetic and software engineering and designing, electrical building and optical. Additionally, it likewise concerns different territories, for example, machine learning, computerized reasoning, human vision research and examples acknowledgment and so on. It has turned out to be most vital segment in numerous fields of bio-medicinal examination and clinical related work.

Computerization and The intelligent sensing technologies advancements have reformed each single a portion of our reality like agribusiness, building, flight and so forth activities have been licensed to the increasing worries about item nature and security. Additionally, increasing work price, deficiency of gifted specialists and enhance creation forms have all add weight upon makers. Computerized arrangements, are the response for the issues that are being confronted today by the horticulture world. We researched the issue with a particular enthusiasm of robotizing grouping of soil layers from measured information. In structural designing it is an essential to know the dirt classes up to a few profundities preceding any development. The immediate strategy to recognize the dirt classes by boring boreholes and testing soil tests is exceptionally costly.

A most in vogue of-the-rack technique is a Support Vector Machine. It is an intense late continuation off the information extraction expert. The registering domain has a ton to pick up as new era training framework. Factual training hypothesis is the most recent approach in directed

training group. This is a ahead system and paired learning machine with profoundly exquisite premises. SVM has effervesce and built up by the method for kernel learning algorithm.

2. Methodology

The The soil type is classified using color, texture , boundary features. These three are the primary values necessary for identification of the crop to grow well and produce an efficient yield.

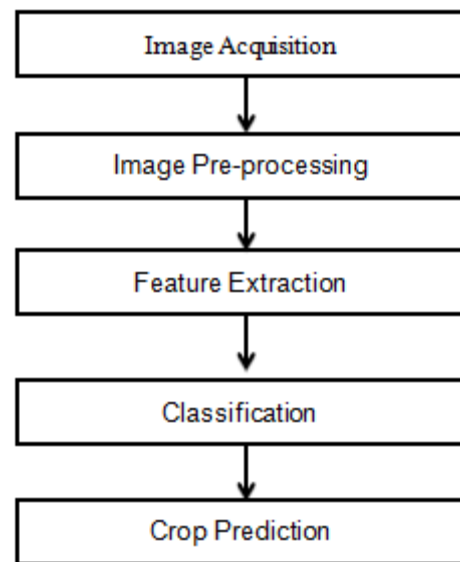


Figure 1.1 Proposed Block Diagram for Classification of soil

This Proposed Block is used to classify the soil. The work involves processing of images of different types of soil samples, extracting the features of the soil samples and finally developing a suitable model which recognize the different types of soil images. The classification makes use of hue, saturation, density, color, area, equidiameter and texture features extracted from images of bulk soli .From the original images, RGB component are separated. The components

RGB are of size $M \times N$. The variance, mean and range for all 3 components are calculated and a total of nine color features are stored suitably for later retrieval. The histograms for RGB components are also computed.

Image Acquisition

The images are captured with a camera (DXC-3000A, Sony Corporation, Japan) connected to a PC. Camera was settled over the light vestibule on a duplicate stick, which gave simple vertical development to finely tune the position of the camera concerning soil parts. Images were captured using the software Matrox Intellicam for Windows and saved in bmp format. Illumination source was a fluorescent light tube, which provided even illumination over the field of view.

Image Pre-Processing

The nature of the image is definitive for the outcomes of examination, influencing the capacity to recognize quality under examination and accuracy of consequent estimations. Therefore, the accompanying techniques are connected to obtain error free picture.

(1) Shade Correction

Few images, basically taken by advanced cameras, display uneven brightening, termed shade. Part of image is brighter and some other parts are darker than the mean value for the complete image. This marvel is a result of mistake in the framework as a matter of first importance, an nonhomogeneous light source. Exact modulating the amazing cameras will make

smaller this impact, however by and large it fundamentally irritates the examination. The primary issue brought about by the nearness of shade is that it can broadly influence the consequences of binarization, particularly of phases with gray levels near the background of the image. Along these lines, much exertion is consumed with a specific end goal to right this mutilation.

(2) Removing Artifacts

Certain images frequently consist of few artifacts convinced at the time of pattern arrangement, as claw mark, blur, put-outs, alleviation, lapping tracks or comet tails. of These components evacuation is typically exceptionally troublesome, other than incomprehensible. At the same time, image rectification will influence the components dissected this results to chance falling discipline over the entire examination methods. Along these lines, to result high quality initial images.

Features Extraction

The pattern is basic description of an article or a quantitative or an element of enthusiasm for a image. One or more descriptors of an object or a substance of an image form the pattern or pattern is an arrangement of descriptors. Features in pattern acknowledgment writing is called descriptors. The features are fundamental for separating one class of objects from another. A strategy is utilized to depicting the objects and the objects features are highlighted. Extraction of

features from the article/element of an image produces description of image.

3. Classification

The SVM classifier is used to identify the classes, which are closely connected to the known classes. The Support vector machine creates the optimal separating hyper plane between the classes using the training data. The optimal hyper plane increases the margin of the closed data points. If hyper plane is having the largest distance to the nearest training features of any class is considered as good separation. Margins and Maximum margin hyper plane for SVM classifier with from different samples present in two classes. The SVM samples present on the margin are called as support vector. SVM divides the given data into decision surface. Decision surface is further divided the data into hyper plane of two classes. Training points defines the supporting vector which defines the hyper plane. The basic idea of SVM is used to increase the margins between the hyper plane of two classes. Basically, SVM can only resolve problems which are related to binary classification. Now they have been enlarged to process multi class problem. It uses the one after one method to fit all binary sub classifiers and also to find the correct class by electing mechanism to grant the multi class classification.

4. Conclusion

In this paper, The identification of soil types take place. The soil samples are given to the terminal soil elevators this will identify the different types of soil. So this technique will not consuming

more time for the image processing routines such as Fourier descriptors. This work involves image processing and pattern recognition techniques and this is the relevance to real world classification. For more accuracy in classifying different types of soils SVM is used. In this study images are acquired from clean soil samples.

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