

# Soil Classification Using Machine Learning

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Deepak(19021140017)  
Nishant Kumar(19021011649)



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# Soil Classification Using Machine Learning

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**SCHOOL OF COMPUTING SCIENCE AND  
ENGINEERING**

*by*

**Deepak-19021140017**

**Nishant - 19021011649**

**Under the Supervision of Guide.**

**Dr. Shiv Kumar Verma**

# Abstract

- **Soil is an important ingredient in agriculture. There are several types of soil. Each type of soil can have a variety of characteristics and different types of plants that grow in different types of soil. We need to know the characteristics and characteristics of different soil types to understand which plants grow best in certain soil types. Machine learning techniques can help in this case. In recent years, it has improved greatly. Mechanical learning remains a emerging and challenging field in the analysis of agricultural data.**
- **In this project, we have proposed a model that can predict soil sequences by soil type and predictably can suggest suitable plants. Several heavy machine learning algorithms are used for Nearest Neighbor (k-NN), Bagged Trees, and Gaussian kernel based Support Vector Machines (SVM) used for soil classification. Test results show that the proposed SVM method works better than most existing methods.**

# Introduction

- Machine learning technique could be used to classify soils. Bhargavi & Jyothi [1] used naïve bayes data mining technique for classification of agricultural land soils. The error of naïve bayes classifier is less than the remaining classifier like bayesian classifier. However, Bhargavi & Jyothi did not publish the performance value. Kovacevic & Gajic [2] used support vector machine for soil type classification based on known values of particular chemical and physical properties in sampled profiles. They compared the classification performance of logistic regression, multinomial naïve bayes, and SVM (linear SVM – LSVM and gaussian SVM – GSVM). Their conclusion, classification models such as linear support vector machine could be used to automate soil classification with satisfactory accuracy. Linear SVM demonstrated the better result with accuracy 57.61%.
- This paper will assessed several machine learning algorithms to classify soil type using real data soil. The algorithms assessed involve SVM, neural network, decision tree, and naïve bayes which are available in RapidMiner Software.

## Machine learning aspect in Soil Classification

- In, soil classification the systematic characterization of soil systems in dealt, this characterization is based on the distinguishing characteristics as well as criteria that dictate choices in use. This type of classification is a dynamic subject, which ranges from the system structure, to class definition, and finally field applications. These methods can be approached from the perspective of soil as a resource like the engineers who classify soil according to the engineering properties of the soil. Present day building arrangement frameworks are intended to permit a simple change from field perceptions to fundamental expectations of soil designing properties and practices.

## Proposed plan

- **Image Acquisition**

Different images of soil samples which are to be classified are captured using color camera and are provided as an input to the system. The features of each type of soil are collected and are stored in a separate database. This database is later used in the final stage for soil and crop detection.

- **Image Pre-processing**

The image acquired from our previous stage is not error free. The quality of the image is decisive for results of analysis as it affects both the ability to detect features under analysis and precision of subsequent measurement. In order to get an error free image pre-processing techniques are applied.

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- **Segmentation**

Once the enhancement of the image is completed in the previous stage using image pre-processing techniques segmentation of the image is performed. Popular known algorithm K-means Clustering algorithm is employed for segmentation of the image. It is used as a partition clustering which aims at partitioning a given data set into disjoint subsets so that specific clustering criteria are optimized.

- **Feature Extraction**

After the segmentation of the image is performed by k-means in the above phase our next step is the feature extraction stage. This is the foremost step in this methodology. All the features that are required for us to classify the soil type and crop detection are done in this phase. A number of features like the texture, colour, intensity, saturation, hue, etc are extracted for detection of soil type.

- **SVM Classification**

Support Vector Machine (SVM) algorithm is used for soil classification. It has successful applications in many fields like bioinformatics, text, image recognition, etc. SVM is a universally accepted algorithm due to its simple nature. It is considered as an alternative to neural networks algorithm.

# Literature survey

- Machine learning is utilized to prepare machines the ability of dealing with the information all the more proficiently. Now and again in the wake of survey the information, we can't decipher the example or concentrate data from the information. Machine learning is an effective method for application in the field of analytics of data to predict the result of the system using some models and algorithms. There are several applications for Machine Learning (ML), the most significant of which is image classification. Classification using ML refers to the process of labeling a wide set of images into a number of predefined categories, decided by the users requirement. The classification system developed needs to be trained using the predefined patterns from the training database, to classify the set of images. The classification system, after being trained, then successfully compares the test image with the training database and classifies the detected object or feature into a proper category or class.

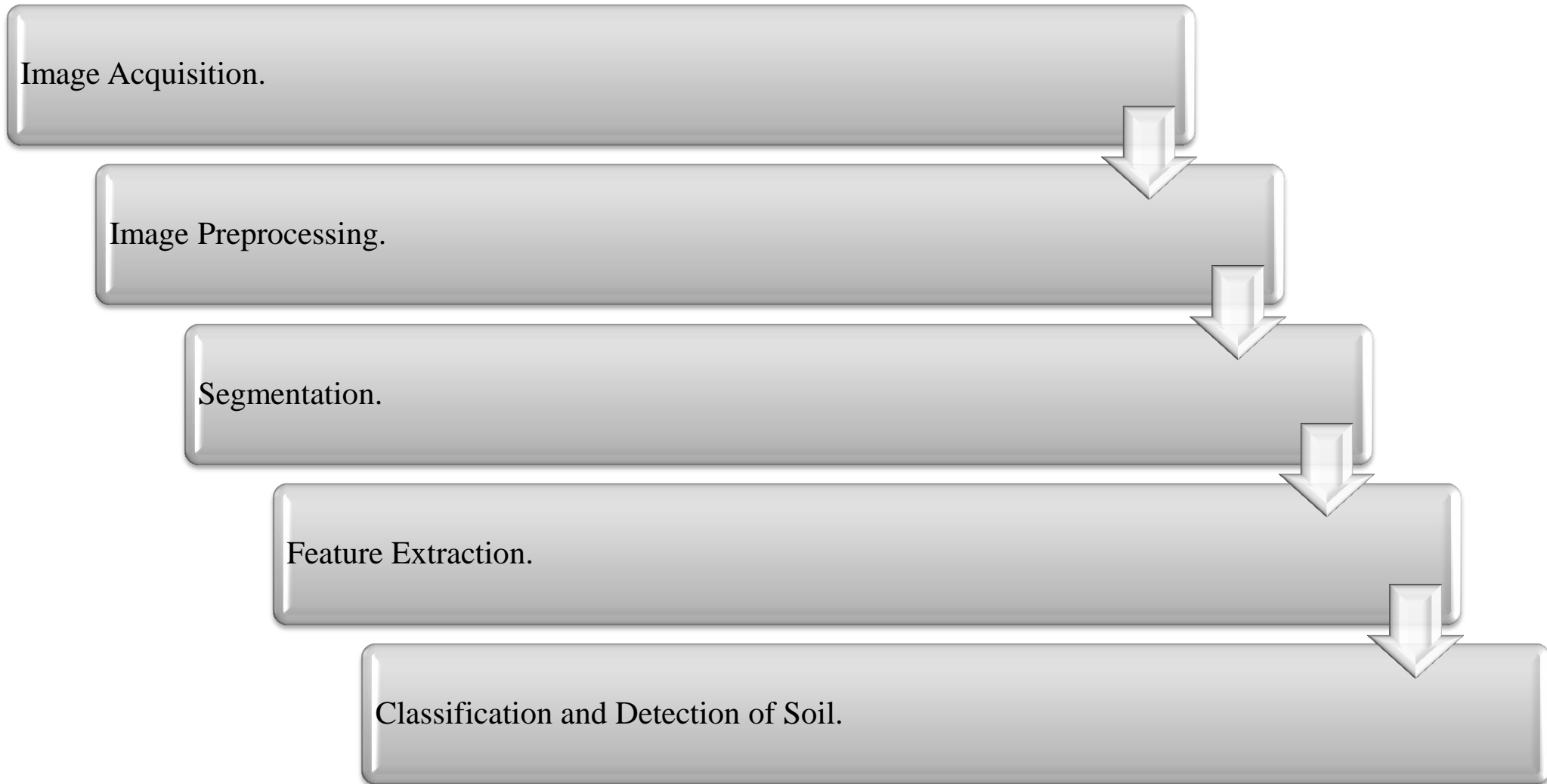
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## Contd..

- This project creates a model that can predict soil series with land type and according to prediction it can suggest suitable crops. It makes use machine learning algorithms 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, classification of soil creates a link between soil samples and various kinds of natural entity. Based on these classifications and the mapped data, the suitable crops were suggested for a particular region.

# Course of action



Thank you

