# SOIL TYPE PREDICTION USING KERAS FRAMEWORK

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**Abstract** - The soil characterization is one of the major prerequisites in grounding system studies. Along with an adequate measurement procedure and a reliable field data processing, they are responsible for the success in the design and the installation of grounding grids in electrical power systems. In this frame of reference, the purpose of this work is to present an embracing investigation combining in-situ measuring data from soil resistivity and geological survey, supported by the Wenner Method and Standard Penetration Test (SPT). The study is focused on investigating the differences in the apparent soil resistivity interpretation, provided by distinct approaches, identifying the one that better correlates with SPT.

**Keywords:** Soil type, deep learning, TensorFlow, Keras, CNN

## 1.INTRODUCTION

Trustily procedures involved in the project of grounding systems are mandatory requirements to assign both electrical performance and safety for people inside an installation or in its surrounding. In a general manner, the first step in a grounding study is the characterization of the medium, where this fundamental device is inserted, *i.e.*, the soil properties must be known, qualified and quantified, as best as possible. In this context, the soil structure is one of the most important parameters in grounding studies. Specifically, in the design of a grounding grid located in an electric power system substation (SE), the soil characterization is the parameter that will determine its performance regarding people's safety and equipment integrity when a ground fault occurs..

## 2.Body of Paper

### Scope:

A collection of Soil images we have. To train the machine to classify the types of Soils. This project contains four different Soils like Angry, Happy, Cry and Neutral. We train to teach the machine to achive the accuracy and get the possible outcome

### Project Requirements:

Requirements are the basic constrains that are required to develop a system. Requirements are collected while designing the system. The following are the requirements that are to be discussed.

1.Functional requirements

2.Non-Functional requirements

3.Environment requirements

### 1.Software Requirements:

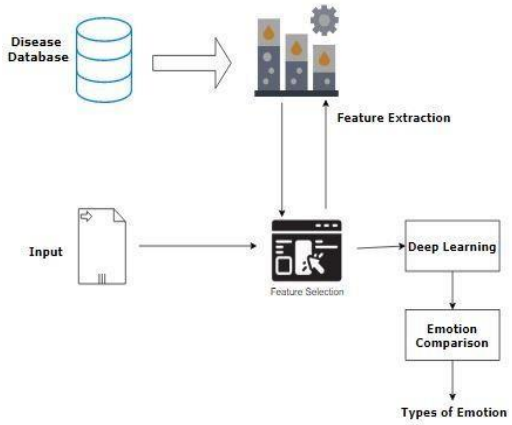
Operating System : Windows / Linux
Simulation Tool : Anaconda with Jupyter Notebook

### 2.Hardware requirements:

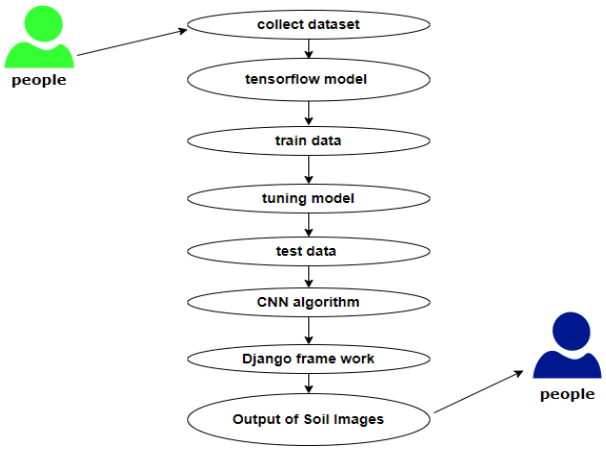
Processor : Pentium IV/III
Hard disk : minimum 80 GB
RAM : minimum 4 GB

## DESIGN ARCHITECTURE:

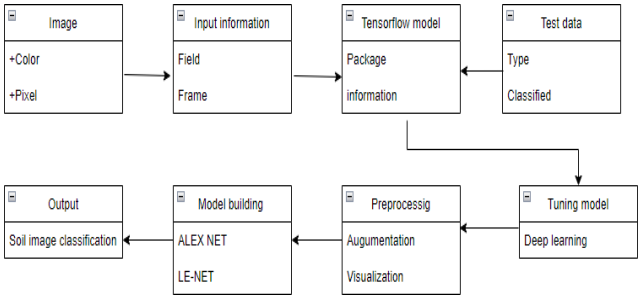
### System Architecture:




### Usecase Diagram:




### Class Diagram:




## ARTIFICIAL NEURAL NETWORK:

Artificial Neural Networks (ANN) are multi-layer fully-connected neural nets that look like the figure below. They consist of an input layer, multiple hidden layers, and an output layer. Every node in one layer is connected to every other node in the next layer. We make the network deeper by increasing the number of hidden layers.

Artificial Neural Network(ANN) uses the processing of the brain as a basis to develop algorithms that can be used to model complex patterns and prediction problems.

## CONVOLUTIONAL NEURAL NETWORK:

A Convolutional neural network (CNN) is one type of Artificial Neural Network. A Convolutional neural network (CNN) is a neural network that has one or more convolutional layers and are used mainly for image processing,classification,segmentation and also for other auto correlated data.

## WORKING PRINCIPLE:

### CNN Model:

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other.

### Data Collection:

Input layer in CNN contain image data. Image data is represented by three dimensional matrixes. It needs to reshape it into a single column. Suppose you have image of dimension 28 x 28 =784, it need to convert it into 784 x 1 before feeding into input.

## Advantages:

- To classify Soil type image used on artificial neural network.
- It is best model for deep learning technique to easily soil type

## CONCLUSION:

In this project a research to classify Soil type over static soil images using deep learning techniques was developed. This is a complex problem that has already been approached several times with different techniques. While good results have been achieved using feature engineering, this project focused on feature learning, which is one of DL promises. While feature engineering is not necessary, image pre-processing boosts classification accuracy. Hence, it reduces noise on the input data. Nowadays, we find Soil type to easily software includes the use of feature engineering. A solution totally based on feature learning does not seem close yet because of a major limitation. Thus, Soil classification could be achieved by means of deep learning techniques.

## FUTURE WORK:

Further improvement on the network's accuracy and generalization can be achieved through the following practices. The first one is to use the whole dataset during the optimization. Using batch optimization is more suitable for larger datasets. Another technique is to evaluate soil one by one. This can lead to detect which soil are more difficult to classify. Finally, using a larger dataset for training seems beneficial. However, such a dataset might not exist nowadays. Using several datasets might be a solution, but a careful procedure to normalize them is required. Finally, using full dataset for training, pre-training on each Soil, and using a larger dataset seem to have the possibility to improve the network's performance. Thus, they should be addressed in future research on this topic.

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