SOIL TYPE PREDICTION USING KERAS FRAMEWORK

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Abstract: When composition is degraded or decomposed into minute fragments, minerals form, and soil is made up of these minerals. Soils are made up of loose humic substances materials that include 25% oxygen, 25% liquid, 45 percent minerals, and 5% organic compounds . Like different soil classification systems, the various soil system has multiple levels of information varying from the most basic to the most specific. Examples include cinder soil, siliceous soil, marsh soil, and yellow soil. Using TensorFlow and Keras, we demonstrate how to classify type of soil that used a convolutional network. The proposed technique distinguishes soil types from photos using CNN. The soil types were classified using the CNN model. The success of the acquired findings should improve if the CNN methodology is supplemented with additional image processing techniques and appropriately recognises soil types. We demonstrated how successfully convolutional neural networks (cnn analyse various types of images. Finally, in building and deploying the model, host the Django framework.

I. INTRODUCTION:

Data Science: Data psychology is a scientific area that uses research techniques, procedures, algorithms, and platforms to extract knowledge and insight from both aggregation and analysis data, but to also apply that insight and actionable insights to a variety of applications.

Data science is a combination of numeracy, industry knowledge, techniques, analytics, and machine learning approaches that assist in the discovery of secret insights or trends in raw data that can be used in the importance of critical business decisions.

Data Scientist: Data scientists look at which questions need to be answered and where the relevant data may be found. They're business-savvy and analytical, with the ability to gather, clean, and display data. Data scientists help companies find, organise, and analyse massive quantity of data.

Artificial Intelligence: Ai technology (AI) is the concept of emulating human intelligence in technologies that have been programmed to look and behave in human-like ways. Any computer that demonstrates human-like characteristics such as real concernand learning is referred to as a humanoid computer. AI systems, in general, consume enormous volumes of annotated training data, evaluate it for connections and characteristics, and then utilise those patterns to forecast future states. The three

reasoning ability that AI programming emphasises are learning, reasoning, and self- correction.

Natural Language Processing (NLP): Natural language processing allows computers to read and understand human speech (NLP). Organic users and knowledge acquisition from human-written sources such as newswire publications could be possible with a sufficiently capable machine translation system.

II.   RELATED WORKS

A random forest region is a supervised desktop studying algorithm. It uses random choice forests with an ensemble learning method to solve classification problems; it is usually good at "bagging." The bagging strategy assumes that combining fashion knowledge with other abilities will result in a better outcome than usual. It applies it for each classification and regression challenge. Several laptop mastery techniques are utilised individually to comprehend the world. Take a look at the image below. The classification document and confusion matrix for each algorithm are also obtained. Deep learning is a relatively recent and contemporary approach to photo processing and information analysis that has a lot of promise and potential. The benefits and drawbacks of using CNNs in agriculture are examined, along with comparisons to other recent efforts. According to the findings of this survey study, deep learning models give high accuracy and outperform typical image processing approaches, and machine learning strategies outperform a number of popular methods in prediction. The development of plants and the keeping of livestock are the two most important causes for agriculture. Fertile land completely relies on the first class of soil to produce vitamins for crops. The vitamins found in soil can be utilised in a variety of ways. This paper offers ecologically friendly optimization strategies and high-quality crop planning while using minimal resources to address current agricultural concerns. The state's growth is dependent on agronomy, which is dependent on soil and water. We grant the idea of a oneof-a-kind irrigation strategy in this work. This allows you to use the least amount of water while increasing the majority of harvests.

In order to determine which plant vitamins are present in the soil, soil analysis is necessary. The primary vitamins are absorbed by plants from the soil. Aside from soil, a range of other vital factors such as rainfall, precipitation, fertiliser, and so on have an impact on plant growth. Our goal is to develop a crop prediction engine that is tailored to a particular soil type. In the beginning, we concentrated on predicting the correct crop output for the consumer. Inspect the soil fertility and rainfall in the input location with the assistance of a person. India's economy is based on agriculture. Agriculture accounts for the majority of India's financial system. Using a data mining approach in a crop yield prediction study is incredibly beneficial. The developed mannequin is quite useful for estimating agricultural productivity based on soil composition for the formers. Among the features are the state, district, season, year, crop, and the overall field region. The ethics of employing these technologies for decision-making in water resource management and governance are investigated as key challenges and concerns in the implementation of these approaches in the water sector. Finally, we present pointers and future directions for the software of deep studying methods in hydrology and water resources Agriculture is a large sector that has a significant impact on the country's

V.   MODULES

Manual Net:
- **Import the given image from dataset:**

To import our data set and build size, rescale, reach, zoom range, and horizontalflip, we must use Keras' preliminary image data generator function. Then we load our established to promote into the data production programme from the folder. We target a particular size, number of iterations, and class mode forthe model, along with train, test, and verify it. Following that, we must use CNN to train our custom-built network.

- **To train the module by given image dataset:**

We use the learner and fit alternator methods to train our dataset, which includes instructional stepsper period, totaltime steps, test dataset, and validation steps utilising this data.
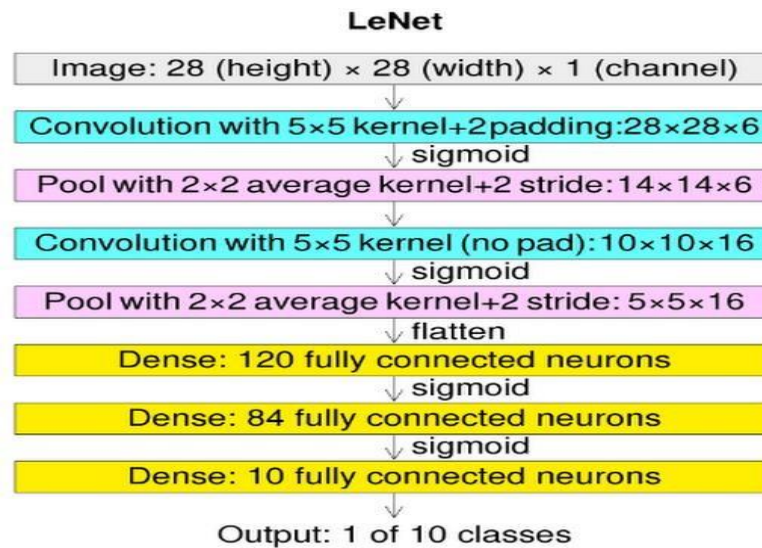
Alexnet:

Cnn model is a multilayer perceptron that has had a serious influence on machine learning, particularly in machine vision. AlexNet was the first multilayer perceptron that use graphics processing units in order to improve performance. AlexNet has five cnn architecture, three give or take layers, two feature maps, max - pooling layers, or each softmax layer. Convolution layers acts as a filter and the input vector function ReLU are used in each convolutional layer. Maxpooling is done using the pooling layers.

AlexNet

Image: 224 (height) × 224 (width) × 3 (channels)
↓
Convolution with 11×11 kernel+4 stride:54×54×96
↓ ReLu
Pool with 3×3 max. kernel+2 stride: 26×26×96
↓
Convolution with 5×5 kernel+2 pad:26×26×256
↓ ReLu
Pool with 3×3 max. kernel+2 stride:12×12×256
↓
Convolution with 3×3 kernel+1 pad:12×12×384
↓ ReLu
Convolution with 3×3 kernel+1 pad:12×12×384
↓ ReLu
Convolution with 3×3 kernel+1 pad:12×12×256
↓ ReLu
Pool with 3×3 max. kernel+2 stride:5×5×256
↓ flatten
Dense: 4096 fully connected neurons
↓ ReLu, dropout p=0.5
Dense: 4096 fully connected neurons
↓ ReLu, dropout p=0.5
Dense: 1000 fully connected neurons
↓
Output: 1 of 1000 classes

Architecture of AlexNet

Lenet:

One of several cnn models to contribute to deep learning development was LeNet. But after many years of researchand numerous intriguing revisions, the final product was named LeNet.

LeNet

Image: 28 (height) × 28 (width) × 1 (channel)

↓

Convolution with 5×5 kernel+2padding:28×28×6

↓ sigmoid

Pool with 2×2 average kernel+2 stride:14×14×6

↓

Convolution with 5×5 kernel (no pad):10×10×16

↓ sigmoid

Pool with 2×2 average kernel+2 stride: 5×5×16

↓ flatten

Dense: 120 fully connected neurons

↓ sigmoid

Dense: 84 fully connected neurons

↓ sigmoid

Dense: 10 fully connected neurons

↓

Output: 1 of 10 classes

Architecture of AlexNet

DEPLOY:

Deploying the model in Django Framework and predicting output

This module converts the trained deep learning model into a hierarchical data format file (.h5), which is then utilised in our Django framework to improve the user experience and predict if the provided image is Brick Mud, Impact on the manner Soil, Peat Soil, or Yellow Soil.

VI.   RESULT:

By analysing supervised approaches and building a transfer learning model to forecast soil type, the goal was to combine fully editable overseen transfer network prediction model with projecting based on the achievement of maximum accuracy.

VII.   CONCLUSION:

This research utilizes deep learning techniques to create a system for detecting soil type from passive soil photos. This is a complicated topic that has been handled in a variety of ways in the past. While feature engineering has produced excellent results, this research focused on feature learning, which is one of the DL's benefits. Without needing feature engineering, image preprocessing enhances classification accuracy. As a result, there is reduced

noisein the input data. Using feature engineering, soil types may now be easily included. A solution based solely on featurelearning does not appear to be practicable due to a significant constraint. Dirt may be classified using deep learning techniques.

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