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Predicting the Crop Type and Region of Abundance using Machine Learning

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Abstract: ***In this modern age of science too technology, students and people in big cities ignorance of many things, such as how we get food, how things are processed, and much more. We are just it focuses on the results we get, because of this morality our knowledge diminishes, as if we did not know the crops or the goods ourselves using. As we visit the rural area when we arrive beyond some kind of plant, we can't know that, so we have identified this place to resolve the problem of students, researchers and many more people by creating a plant identification system which will predict the type of crop and the location of abundance where the harvest is planted.***

Keywords: Crop Identification System, Convolution Neural networks, MobilenetV2.

I. INTRODUCTION

In this age of science and technology, students and city dwellers know little about many things, such as how we get food, how things are processed, and much more. We just focus on the results we get, because of this behavior our knowledge is limited, as if we don't know the foods or things we use. As we visit a rural area when we come across a particular plant, we cannot understand that, so we have identified this area to solve the problem of students, researchers and more people by creating a plant identification system that will predict the type of crop and crop area. 1.1 Problem Statement: The system to be developed will provide researchers and students with an easy-to-use tool for analyzing and interpreting crop data and will inform the production rate of a particular situation. Develop a computer-based crop analysis system that analyzes crop yields and sub-conditions in order to recommend suitable crops to be planted there, good results and recommendations for user-friendly crops. In development, the study will involve the analysis, design, implementation and forecast of a crop analysis program with a focus on high-performance activities. Also, crop classification can be done more accurately. This project will help many people in many different ways, such as it will save researchers time while they are working on field, will help students to improve their knowledge. This project will make crop analysis much easier and will save you time and effort in many ways.

II. LITERATURE SURVEY

A recent report published by The New Vision, (2009) [1] states that Uganda's soil is depleted of nutrients due to bad weather and hot weather and unreliable rainfall patterns. This has made it difficult to feed food production without the use of chemical fertilizers. Indeed, research has shown that the areas around Lake Victoria, Bunyoro and Eastern Uganda are no longer able to feed food production for 3.6% of the population growing at an annual rate; these places additionally form a world food basket. There has been a significant decline in fruit yields since the 1950s when the final soil map was developed and there is a need to analyze soil samples across the country to help provide solutions for farmers who have tolerated a very poor harvest. The Food and Agriculture Organization (FAO) has identified three major challenges affecting agricultural production in agriculture.

FAO, (2006) [2] summarize that; -

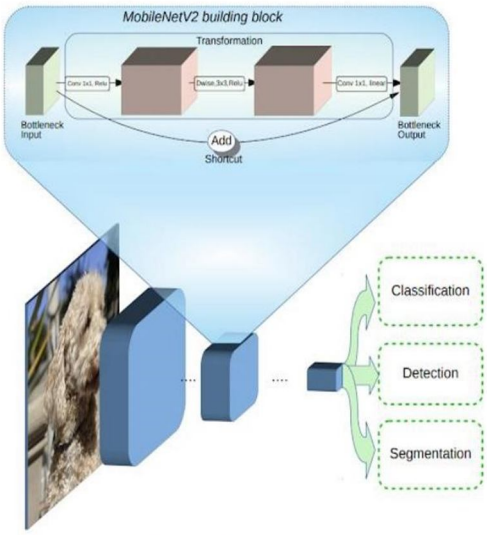
Decreased trends in soil fertility and soil nutrient mining due to the adoption of strong crops and varieties with short-term yields and the use of nutrient-dense nutrients without the aid of appropriate and timely soil analysis is not sufficient to maintain soil nutrient reserves or long-term, cost - high crop production. - Decreased global ecosystems caused by farm malpractice, due to lack of relevant information and technology transfer to farmers elsewhere. - Overuse and misuse of mineral fertilizers and environmental degradation. Montgomery, (1999) [3] warns that we humans are depriving the Earth of its fertile soil by our ancient methods of farming. Ubuntu has used the same farming methods since the start of large-scale agriculture 5,000 years ago. These methods not only rob the soil of nutrients but also leave them unable to feed agriculture. One has to use the most efficient methods of soil so that instead of depriving the soil of its nutrients, add to it the proper nutrients needed for proper cropping.

13 Gruhn, Goletti, and Yudelman, (2000) [4] have expressed concern about the potential for global agricultural food production, which is expected to exceed 7.5 billion by 2020. There is a decrease in the availability of agricultural land and yet the existing land suffers from loss of fertility and nutrient depletion. As depots are depleted, crop growth and production can be disrupted. Over time, reduced accumulation can reduce agricultural production, crop yields, and soil fertility, and lead to soil degradation. Strategies for deploying and adding nutrients to the soil using organic or inorganic fertilizers can help to conserve and increase soil nutrient reserves. However, the supply of nutritious food can also be problematic, resulting in economic instability, environmental degradation and, in some cases, damage the plants themselves, and the animals and humans who eat them or the products from which they are made. It is therefore very important to be able to get the exact fertilizer needed for a particular soil and to be able to make the right decisions about which crops should grow there so as not to destroy the soil as quickly as needed. Since the soil cannot supply the food that is needed for mankind, it creates an environment in which food security is lacking. Food security refers to a situation where people produce a sufficient amount of food for themselves or commercial activities or food aid provide the bulk of the food needed to feed people at the national level for a long time.

As the soil is depleted of nutrients, and often poorly adapted to growing plants, food security risks will threaten the world's population. FAO, (2003) [5] estimated the number of undernourished people at the starting of the new millennium at 842 million in year (1999-2001). Therefore, in order to meet the nutritional needs of a growing community, farmers need to be able to balance the nutrients and nutrients of the soil to ensure that they grow the right crops and that the soil has the right nutrients to feed in order to achieve improved yields.

III. METHODOLOGY

This project is CNN mobile network based v2 model. Mobile Net v2 model: Family of the common purpose of computer discovery on neural networks designed with mobile devices in mind to support divergence, discovery and more.. The ability to use deep networks on your mobile devices improves user experience, providing you at any time, any access, with additional benefits for security, privacy and power consumption. As new systems emerge allowing users to interact with the real world in real time, so does the need for better neural networks. In today's world, its our honour that MobileNetV2 is available of mobile vision applications to the next generation. MobileNetV2 is much better than MobileNetV1 and pushes the state-of-the-art visual visual acuity that includes segmentation, object discovery and semantic segmentation. MobileNetV2 is opened as part of the Tensor Flow-Slim Image Classification Library, else you can initiate program MobileNetV2 directly at synergy. Alternatively, you can download the brochure and check it out locally using Jupyter. MobileNetV2 is available as modules in TF-Hub, and pre-configured test locations can be found on github. MobileNetV2 builds on ideas from MobileNetV1 [1], using highly flexible flexibility as functional building blocks. However, V2 introduces two new features in architecture: 1) direct intermediate layers between layers, and 2) shortcut interactions between bottles1. The basic structure is shown below.



Overview of MobileNetV2 Architecture. Blue blocks represent composite convolutional building blocks as shown above.

Figure 1

The intuition is that the bottlenecks incorporate intermediate inputs and models while the inner layer incorporates the model's ability to convert from low-level concepts such as pixels to high-definition descriptions such as image categories. Finally, like the remaining traditional connections, shortcuts allow for faster training and better accuracy. How it can be compare with generation first mobilenets? Overall, the MobileNetV2 models accelerated with the same accuracy across all latency spectrum. In particular, the new models use 2x less performance, require 30% less value and almost 30-40% faster on a Google Pixel phone than MobileNetV1 models, all of which achieve maximum accuracy.

Convolution Neural Network also known as CNN- It is a category of deep neural networks, oftenly used in visual image analysis. Based on their number of shared weights figures and translation signals they are also known as shift invariants or space invariant network networks (SIANN). They have applications for image and video recognition, complimentary programs, image classification, medical image analysis, natural language processing, and financial timetable. Before we get into the Convolution Neural Network, let's first explore some of the Neural Network concepts. In standard Neural Network there are three types of layers 1. Input lists: A layer where we provide input to our model. The number of neurons in this layer is equal to the total number of elements in our data (the number of pixels in the case of the image). 2. Hidden Layout: Input from the input layer and inserted in the hidden layer.

There can be many hidden layers depending on our model and data size. Hidden layers can have different numbers of neurons usually larger than the number of features. Outputs in each layer include the matrix duplication of the previous layer by the readable weights of that layer and then by inserting readable bias followed by the activation function that makes the network out of line. Output layer: The output is in a hidden layer and is embedded in a structured function such as sigmoid or softmax that converts the output of each phase into possible points for each phase. 19 Definition: The term "convolutional neural network" indicates that the network uses a mathematical function called convolution. Convolution is a special kind of line function. Four dynamic networks of neural networks use convolution instead of the normal duplication of the matrix in at least one of their layers. Layers that are used to form ConvNets- A covnets layer by layer, and the entire layer converts one volume to other by taking a new function.

Types of layers: Let's make an example by starting image covnets of size 32 x 32 x 3.

1) *Installation Tip:* This layer contains a green image input with 32 widths, 32 height and 3 depths.
2) *Convolution Layer:* This layer pays for the output volume by inserting a dot product between all the filters and the image scarf. Suppose we use 12 total filters for this layer we will get an output volume of 32 x 32 x 12.
3) *Setting Startup Task:* This layer will work with the smart application of extracting a layer of convolution. Other typical RELU activation functions: max (0, x), Sigmoid: 1 / (1 + e ^ -x), Tanh, Leaky RELU, etc. The volume remains unchanged which is why the output volume will be the size 32 x 32 x 12. 21
4) *Pool Layer:* This layer is periodically applied to the voters and its main function is to reduce the volume size which makes the calculation faster reduce memory and prevent overcrowding. The two most common types of layers combine high-density and medium-density. If we use a large pool with 2 x 2 filters and stride 2, the resulting volume will be 16x16x12 size.
5) *Fully-Connected Layer:* This is a standard neural network layer that takes input from the previous layer and calculates the grade scores and produces a 1D size list equal to the number of classes. 22 When setting up CNN, the input is a conditioned tensor (image number) x (image width) x (image height) x (image depth).

After passing through the convolutional layer, the image is removed from the feature map, by shape (number of images) x (map width included) x (map height feature) x (feature map channel).

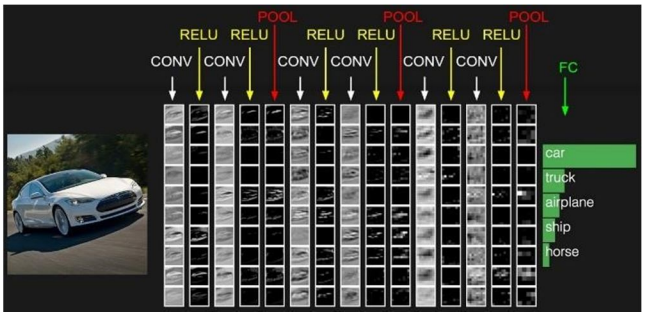


Figure 2

When editing CNN, the input is the firmness of the shape (number of images) x (image width) x (image height) x (image depth). After passing through the convolutional layer, the image is removed from the feature map, by shape (number of images) x (map width included) x (map height feature) x (feature map channel). The conversion layer within the neural network should have the following characteristics: • Variable characters defined by width and height
(hyper parameters). • Number of input channels and output channels (hyper-parameter). • The depth of the Convolution filter (input channels) should be equal to the number channels (depth) of the input feature map. Conversion layers align inputs and transfer their effect to the next layer. This is similar to the response of a neuron to the visual cortex in a particular stimulus. [11] Each convolutional neuron processes data only in its receiving field. Although fully connected feedforward neural networks can be used to study features and separate data, it does not work to apply this technique to images. A very large number of neurons will be required, either in shallow (opposite and deep) construction, due to the large input size associated with the images, where each pixel is a corresponding contrast. For example, a fully connected layer of (small) image size 100 x 100 contains 10,000 weights of each neuron in the second layer. The convolution functionality brings a solution to this problem as it reduces the number of free parameters, allowing the network to be deeper by a few parameters. [12] For example, regardless of image size, typing circles of 5 x 5, each with the same weight allocated, requires only 25 readable parameters.
In this way, it solves the problem of extinction or explosion of gradients in training traditional multi-layer networks using retrieval.

A. DFD

Figure 3

B. Flowchart

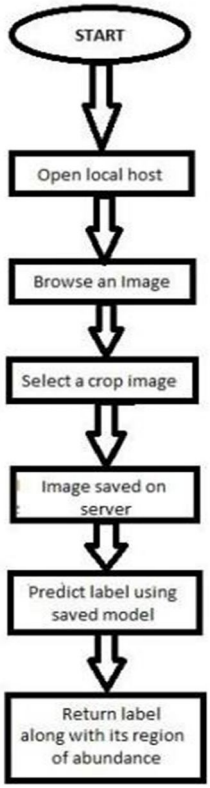


Figure 4

C. Algorithm

Input: Acc_x, Acc_y, Acc_z, Gry_x, Gry_y, Gry_z, Mag_x, Mag_y, Mag_z, Pre

```
Sliding Window Process
sf ← Extract Shadow Features
Normalize sf by equation (2)
regularization feature data, size = 13×13
repeat:
  Forward Propagation:
  cd ← Convolution2D(sf);
  mp ← Max_pooling(cd);
  fc ← Fully_connected(mp);
  class label ← Soft_max(fc);
  Backward Propagation:
    conduct backward propagation with Adam;
Until w_i convergences;
  Use the trained network to predict the labels
```

Fig. 4. The CNN learning algorithm

D. MobilenetV2

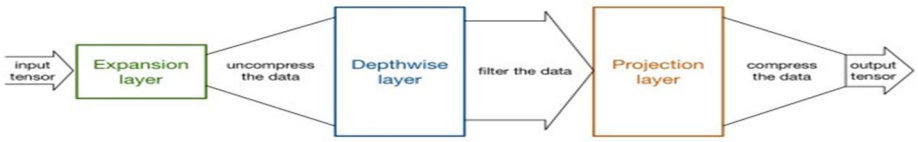


Figure 5

Input tensor: A tensor is a vector or stand matrix representing all types of data. All values in the tensor hold the same type of data with a known (or lesser known) shape. ... The tensor can come from input data or from a computer output. In TensorFlow, all operations are performed within the Expansion Graph graph The purpose of which is to increase the number of channels in the data before entering into a depth agreement. Therefore, this expansion layer always has more output channels than input channels - doing the very opposite of the guessing layer. Exactly how much data is amplified given the expansion feature. Layer depth The most important of these hyperparameters is the depth, confusing frequency known as the "frequency range". From this we can count number of channels present in layer. Using a depth of 0.5 depths will reduce the half number of channels used in each layer, which reduces the number of combinations of 4-factor numbers and the number of readable parameters per element 3. It is therefore much faster than the full model but also less accurate. 32 Guess System In V1 the directional mix keeps the number of channels equal to or doubled. In V2 do the opposite:

reduces the number of channels. This is why this layer is now known as the projection membrane - it prints data with high magnitude (channels) to a tensor with a very low magnitude. Output Tensor Output is a symbolic handle for Tensor. The tensor value is calculated by performing an Operation Session. Using the Operand interface, the features of this section also operate as an operand.

IV. CONCLUSION

A. Crop analysis is used to determine the yield level obtained from the sample.
B. As a result, it can only be as accurate as a sample taken in a particular field.
C. From the above, we have used an in-depth machine learning approach and in that Convolution Neural Network to identify yields.
D. The same approach can be applied to agricultural production.

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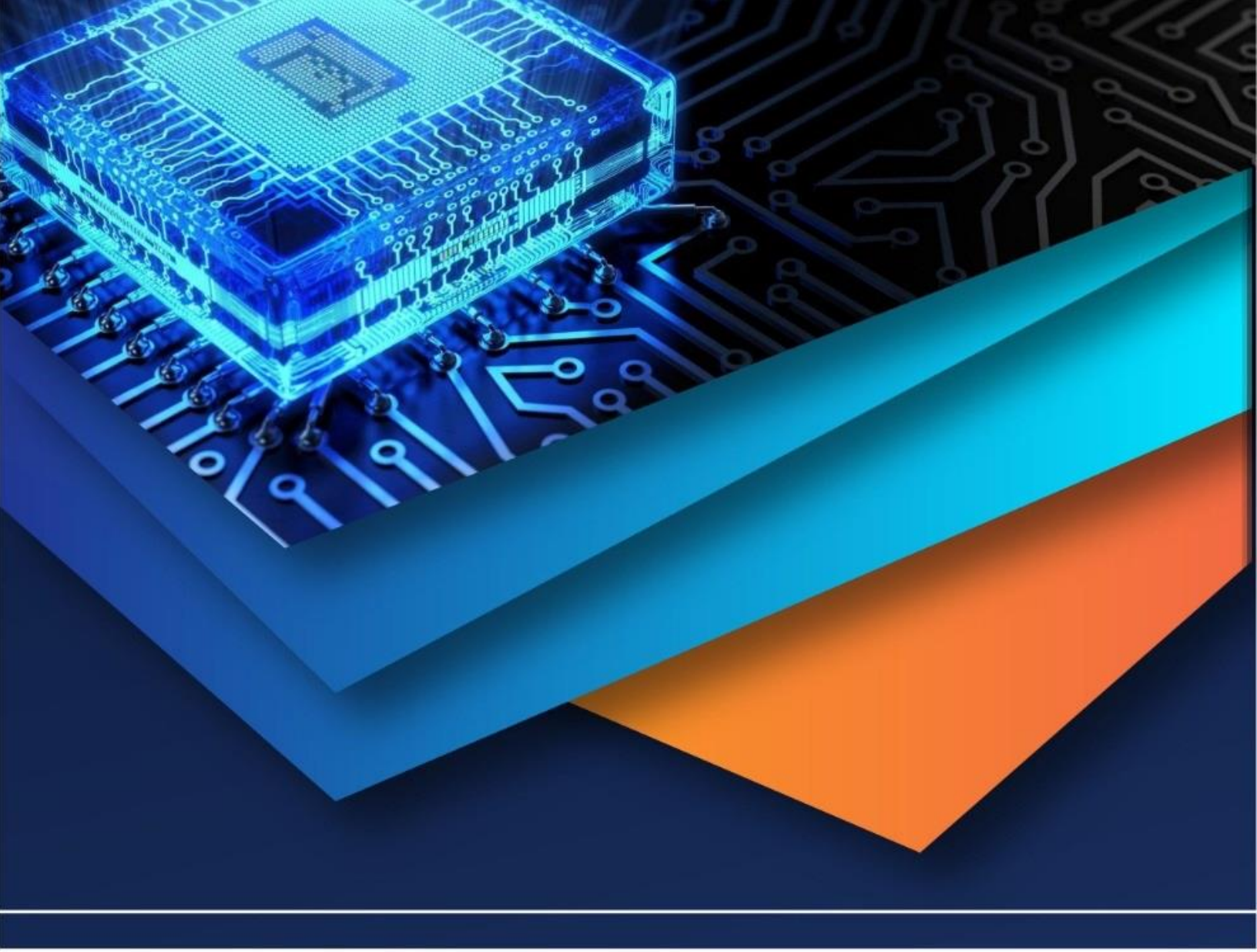

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