Ai Based Crop Identification Mobile App

Surya.B[1], Titu Joachim.P[2],Salomi Samsudeen.M[3]

Student, Dept. of Computer Science and Engineering, KPRIET, Tamil Nadu, India.[1]

Student, Dept. of Computer Science and Engineering, KPRIET, Tamil Nadu, India.[2]

Assistant Professor (SI.G), Dept. of Computer Science and Engineering, KPRIET, Tamil Nadu. India.[3]

ABSTRACT

Everyday new species of plants are being discovered, hence we have taken an approach to tackle the confusion and complications it may bring us when multiple species of plants are discovered. We have taken an approach in creating an AI model to identify crop fields and provide the user with the exact name, origin and basic info about the crop in question. Using this application, one will be able to identify a crop by taking a picture of the cultivation field and successfully determine the crop and learn about its origin, where it can be cultivated optimally and other basic information. This app makes to identify the geo location of crops and helps us to identify a particular crop just by the field view of it. We have developed a prototype using AutoML and TensorFlow lite in the backend. The work has been provided in the offline mode and hence it is user friendly. Android studios has been used in front end. This was the main process that has been done to provide it as an app for the users.

Keywords: AutoML- Auto Machine Learning, AI- Artificial Intelligence.

1.INTRODUCTION

KROPF- **AI based crop identification app.** The application confers the name and basic information of the crop by uploading images from local memory storage or by taking a picture of cultivation field. The process is done in **AUTOML** and android studios. The process in AutoML is to train the dataset and converting into a **TensorFlow Lite** model. The process in Android Studios is linking the TensorFlow Lite model to integrated mobile app and it will test accuracy togive the name and basic information about the crop.A plant that is grown with proper care and management for its economic value is termed as crop. A mobile application is developed in this research that can identify crop using only field photo of a crop, in which input is an image and the output is provided with the characteristic features associated with that image. It is useful for the foreigners who are travelling to India and to many village places and also those who are not very well known about the field crops.

Computer aided tool can be used to implement this technique for the perfect identification of the field crops. The image and the information of the crop along with the geolocation information are stored in the internal data base which is further exported.

The emphasis on the offline functionality of the app is very important as most cultivation fields are present on the outskirts of the city, due to which one many not always have access to a stable internet connection. This may cause an issue with apps that require internet access to get a similar task done. Hence this will allow us to achieve the goal offline further enabling ease of access in areas that lack stable internet connections.

2.RELATED WORK

An app is developed using the android studios, that identifies the crop using the image of the field crop which is either directly taken from the field or uploaded from the storage device. Here the dataset is trained using AUTO ML. Since it is an app the project was created using the TensorFlow Lite model to identify the crop in the mobile. Then importing the image as a **.zip file** with the sub folders and uploading it to the Auto ML and finally converting it into as a TensorFlow Lite model. The accuracy is tested and the latency of the crop image are uploaded, finally obtaining the required crop name with the geolocation information. This app is capable of producing accurate accuracy and information of the field image of the crop. The user can take the picture of the field crop or they can upload itfrom the mobile storage device and this app comes up with the features of source, latency and the result. This app is completely done on the offline mode.

3.PROPOSED METHODOLOGY

The data set is trained using the AUTO ML(Auto Machine Learning).

One trend that's going to fundamentally change the face of ML-based solutions is AutoML. It is going to enable business analysts and developers to evolve machine learning models that can address complex scenarios.

AutoML focuses on two aspects – Data acquisition and prediction. All the steps that take place in between these two phases will be abstracted by the AutoML platform. Essentially, users bring their own dataset, identify the labels, and push a button to generate a thoroughly trained and optimized model that's ready to predict.

As an APP was the requirement, we have created the project in Tensor flow lite model to identify the crop using mobile.

TensorFlow Lite is the lightweight version which is specifically designed for the mobile platform and embedded devices.It provides machine learning solution to mobile with low latency and small binary size.TensorFlow supports a set of core operators which have been tuned for mobile platforms.

PROCESS IN AUTOML:-

STEP 1:-Importing the images as a **.zip file** containing the crops images in the sub folders.

STEP 2:-Uploading the contents to AUTOML and converting it into as TensorFlow Lite model.

PROCESS IN ANDROID STUDIOS:-

STEP 1:-Linking the TensorFlow Lite model to the integrated mobile app.

STEP 2:-Testing the accuracy and the latency of the uploaded crop image.

STEP 3:-Obtaining the required crop name.

ALGORITHM USED:

Convolutional Neural Networks:

Convolutional Neural Networks (CNNs) is the most popular neural network model being used for image classification problem.

The big idea behind CNNs is that a local understanding of an image is good enough.

The practical benefit is that having fewer parameters greatly improves the time ittakes to learn as well as reduces the amount of data required to train the model.

Instead of a fully connected network of weights from each pixel, a CNN has just enough weights to look at a small patch of the image.

Example: It's like reading a book by using a magnifying glass; eventually, you read the whole page, but you look at only a small patch of the page at any given time.

A convolution is a weighted sum of the pixel values of the image, as the window slides across the whole image.

Turns out, this convolution process throughout an image with a weight matrix produces another image (of the same size, depending on the convention).

Convolving is the process of applying a convolution.

As an example, an image goes through a convolution layer on a weight matrix of $5 \times 5 \times 64$.

It generates 64 convolutions by sliding a 5×5 window.

Therefore, this model has $5 \times 5 \times 64$ (= 1,600) parameters, which is remarkably fewer parameters than a fully connected network,

256×256 (= 65,536).

The beauty of the CNN is that the number of parameters is independent of the size of the original image.

You can run the same CNN on a 300×300 image, and the number of parameters won't change in the convolution layer.

BASIC IDEA FOR THE APP:

- Software platform identification.
- Construction of problem statement.
- Identifying the basic requirements for proceeding.

- Identification of the crop.

- Collection of the dataset.

- Training the dataset.

- Importation of the crop.

- Testing phase.

- Exporting the tested phase.

- Implementation of each crop.

- Validating phase.

- User satisfaction.

- Expected result achieved.

- Accuracy attained.

- Confidence level up to the user expectation.

A common use of machine learning is to identify what an image represents.

For example, we might want to know what type of animal appears in the following photograph.

Use a pre-trained and optimized model to identify hundreds of classes of objects, including people, activities, animals, plants, and places.

The task of predicting what an image represents is called *image classification.*An image classification model is trained to recognize various classes of images. This is an application for TensorFlow Lite on Android. It uses Image classification to continuously classify the plants it sees from the device's back camera.Inference is performed using the TensorFlow Lite Java API.The demo app classifies frames in real-time, displaying the top most probable classifications. It allows the user to choose between a floating point or quantized model, select the thread count, and decide whether to run on CPU, GPU, or via NNAPI.
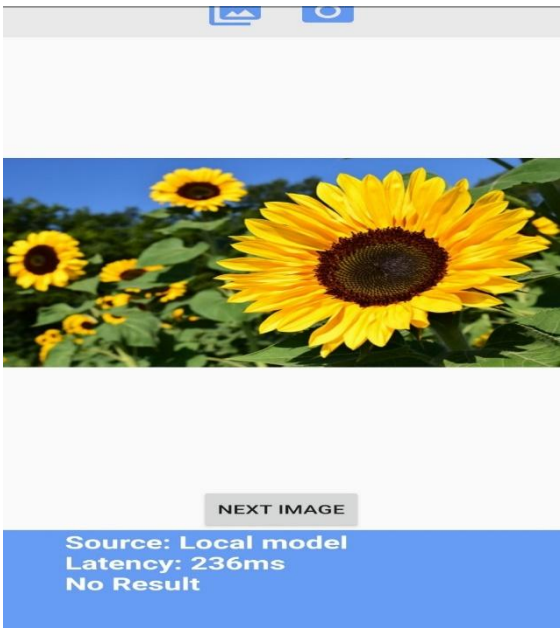
4.RESULT AND DISCUSSION

Android Studio 3.2 (installed on a Linux, Mac or Windows machine). Android device in developer mode with USB debugging enabled. USB cable (to connect Android device to your computer).

ON SCREEN:

DEMO APP:

Source:- Local Model that has been defined in the app which is a complete offline **TensorFlow Lite** model.

Latency:- The time taken by the app to find the name of the crop.

Result:- The exact label of the crop image uploaded with its confidence level.

Icon for uploading crop images.

Icon for taking a direct snap of the real time identified crop.
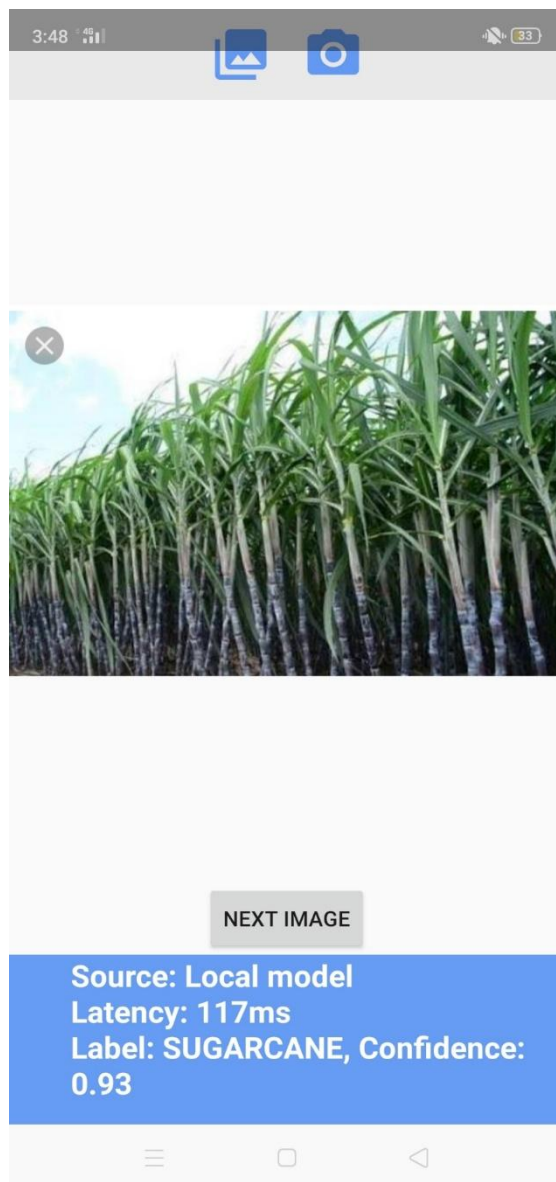
DEMO FOR WHEAT CROP:

DEMO FOR COTTON CROP:

As visible on the screenshot provided the app can be used to identify an image by taking a new picture or using a picture present in the local storage. The image that is being analyzed will be present at the center of the screen and the details will be displayed below. The "next image" button is used to iterate through the local storage images. Below that the details are displayed "Source" indicating that the app is running in an offline mode. "Latency" indicated the time taken to determine what crop is present in the image. Below that the result is

displayed by the crop's name ifit is identified with its "Confidence" levelwhich indicated the likeliness that the crop in the picture is an identified crop. If no result is found the message "No Result" is displayed.

DEMO FOR SUGARCANE CROP:

This app is developed using the android studios that identifies the crop using the image of the field crop which is either directly taken from the field or uploaded from the storage device. Here the dataset is trained using AUTO ML. Since it is an app the project was created using the TensorFlow lite model to identify the crop in the mobile. Then importing the image as a .zip file with the sub folders and uploading it to the Auto ML and finally converting it into as a TensorFlow lite model. The accuracy is tested and the latency of the crop image are obtained. It is shown to have a high accuracy of up to 98%. The user can take the picture of the field crop or they can upload it from the mobile storage device and this app comes up with the features of source, latency and the result. This app is designed to operate on an offline mode.

5.CONCLUSION

KROPF-our project is done to help the farmers to identify the crop with highest latency and itact as techno-friendly application to the young developing farmers the following are some points that can add value to our project: Agriculture is the backbone of the economic system of a given country. In addition to providing food and raw material, agriculture also provides employment opportunities to a very large percentage of the population. It contributes to the nation's food safety and health. Agriculture was the primary source of the economy prior to the industrial revolution. Agriculture is the most peaceful and environmentally friendly method. It is a very reliable source of life for humanity, as well as one of the honest sources of income. Many people from developing countries rely for their livelihood on agriculture

- Evolution from conventional farming to smart farming.

- Large employment opportunity.

- Contribution to National revenue.

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