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E-Agri Kit - Agriculture Aid Using Deep Learning

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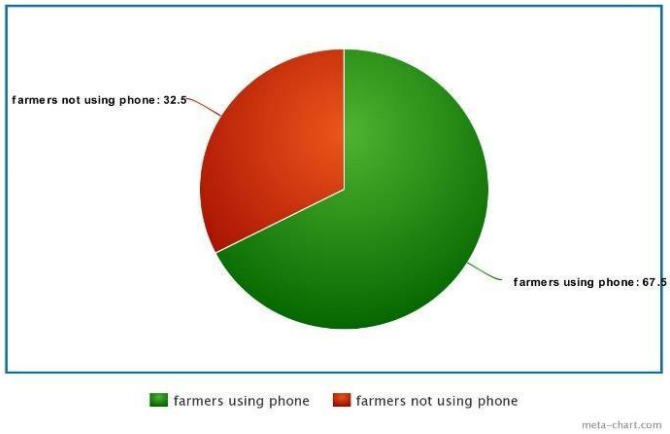
***Abstract* - Agriculture is a critical development in the rise of sedentary human civilization, as the farming of domesticated species produced food surpluses that allowed people to live in cities. And identifying each crop simply by looking at the leaves will be difficult, and selling the crop at a suitable and affordable price will be difficult for a farmer. To address all these issues, we are developing an application in which we are developing an algorithm that detects the type of crop by providing the leaf input image, as well as a platform in which an investor can invest in a crop by funding a crop that is provided by the farmer, and where a farmer can sell his or her crops to buyers at crop-appropriate prices.**

Keywords: Agriculture, Deep Learning, Investment, Farmers, Selling.

I. INTRODUCTION

Farmers get agriculture assistance program that is created and intended to assist farmers, which is generally considered to be very significant. As cultivation of domesticated species produced food surpluses that, for the most part, allowed humans to live primarily in cities, which is, for all intents and purposes, rather substantial, agriculture was unquestionably a crucial step in the creation of sedentary types of human civilization. Additionally, selling the harvest for an appropriate and cheap price is difficult to a farmer in a subtle way, and it will be tough for a person to exactly identify every crop just by looking at the essentially leaves.

Where can I find solutions to these issues? We are specifically developing an algorithm that determines the type of crop by using an image of a leaf as input, and we are also developing a platform where an investor can typically invest in a crop by funding a crop that is specifically provided by a farmer, and where a farmer can actually sell their crops to buyers at prices that are generally suitable with the crop, demonstrating how and why it will typically be difficult for a farmer to make a profit. The below pie chart shows the comparison between the farmers who are using smart phone and not using a smart phone.



II. LITERATURE SURVEY

In [1], C. Sireesha, Dr. K. Hemalatha proposed a system E- Agri Kit using Deep Learning in which Image processing techniques were applied to the input image to produce a final output image that marked the infected area and calculated the percentage of the infected area in the leaf. A CNN (Convolutional Neural Network) is a deep learning model that takes inputs and assigns weights to them based on various features. CNN is a common neural network used for image-based datasets. This approach worked on real images of healthy and diseased cotton leaves taken from field and labelled by industries experts. Where input images were processed to get a proper cotton dataset which is used to train the model then it can be accommodate into real time images. Due to insufficient images for other disease classification, only the Healthy and leaf images which contain Magnesium Deficiency were considered for training our model. For earlier diagnosis, using more sophisticated methods like deep learning approach would be beneficial where image processing techniques can help with the preprocessing like removing background noise and segmentation. Cons: This can only be used for a few crops and the other algorithms are expected to adapt better and can provide real time conditions and also provide wide coverage.

In [2], Mythresh, Lavanya, Meghana, Nisarga proposed a system that includes Crop Prediction using Machine Learning. A machine learning model is developed to consider different set of information to obtain the resulting outcome. This will take the inputs from different types of sources i.e., from weather, soil and crop then applies the naïve bayes technique

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to predict the suitable crop for the particular area. crop is predicted using the Nave-Bayes algorithm. The system gathers weather, soil, and crop requirement data from various sources and repositories and employs Nave-Bayes algorithm to predict the best crop for any given area. The developed user interface is adaptable and highly interactive, which will entice farmers to use it The productivity of the crop definitely depends on the land resources and also the climate area along with the other factors such as pesticides and fertilizers.The crop requirement dataset will contain all the details about the conditions stand in need for the growth of the crops. Cons: no language barrier is available; this app should be bendable to everyone with respect to diverse nature of the country. While he is in a coma, unconscious, or illiterate.

In [3], Sue han lee, Herve, Gosau, Pierre Bonnet, Alexis Joly proposed some new point of views on plant disease characterization based on deep learning technologies. In This paper they introduced three types of CNN architectures with varying depth sizes: VGG16 (16 layers), InceptionV3 (48 layers), and our architecture GoogLeNetBN (34 layers), which is inspired by the InceptionV2 and InceptionV3 architectures, which bring several upgrades to the initial GoogLeNet architecture in order to increase accuracy while decreasing the computational complexity. To test and train a dataset a disease classifier based on the common disease independent of crops. The images of the PV dataset are the first separated into 21 classes. BN proved the speed up convergence and also the limit overfitting. To improve the computational speed, they introduced Inception V3 architecture. A model will pre-trained with the ImageNet and then fine-tuned on the plantCLEF2015 dataset. Cons: Here, we had showed the CNN trained images in crop disease terminology may or may not focus on disease regions.

In [4], Lala Ale, Alaa Sheta proposed Deep Learning-based Plant Disease Detection for Smart Agriculture. This method is used to detect the plant diseases and is supposed to run on any of the edge servers with supplemented computing measures. Light weight Deep Neural Networks (DNN)s are used for running on Internet of Things (IoT) devices with limited resources. In this three types of CNN architectures are there with difference in its depth size. The accuracy of various inputs is around 70% to 90%. Also, we have Dense Net based approach for plant disease detection. We should consider the performance of DL models with various image resolutions. High resolution will convey more data about the features whereas raises the computational cost exponentially. Cons: To reduce the size of the model and convolution operations, depth-wise separable convolution, inverted residuals.

In [5], Abdelmalek Bouguettaya, Hafed Zarzour, Ahmad zlechida and Amine Mohammed Taberkit propses deep learning techniques to classify agricultural crops through UAV imagery system where Unnamed Aerial Vechile-based remote sensing technologies and Deep Learning methods are utilized to enhance the agricultural sector as well as address many connected challenges, including crop/plant categorization. Different object-based and pixel based algorithms were investigated that help researchers and farmers to choose the right classifier according to the targeted crop, the used camera sensors, among other parameters but limits in terms of performance.

In [6], Maha Atlalak, Mohammad ammad Uddin, Amal alajimi, Alwaseemah rizg. In this study, convolutional neural network models and object detection techniques used for detecting and classifying plant diseases. Although these models give us high accuracy results. Proposed a hybrid model (CNN-SVM) for the early detection of plant leaf diseases where many drones captured images will be used as the data set. Then this proposed hybrid model will process the data and generate early decisions. model consists of three main parts a CNN model with an attention mechanism applied and an SVM classifier and Residual Attention Network. Cons: Low efficiency.

In [7] Ahmed Addelmoamen ahmed, Gopireddy Harshavardan reddy Introduced A Mobile based-System for Detecting Plant Leaf Diseases Using Deep Learning. In this it utilizes Mask Region-based CNN (R-CNN) model as the foundation for deep learning to present a method for detecting apple leaf disease. R-CNN is a DL model for object instance segmentation.CNN model is trained using an imagery dataset consisting of 92,206 photos of healthy and diseased plant leaves, where crowded backgrounds, low contrast, and diverse illumination condition images are taken into consideration. To increase the system usability mobile app is developed that would create a better opportunity for limited resources farmers to detect plant diseases in their early stages and eliminate the use of incorrect fertilizers that can hurt the health of both the plants and soil.

In [8], Shubham Anand, Sukita Shettigar, Suman Goudar, Aditi Ohol, Prof. Surekha Janrao proposed E-Agriculture -A Way to Digitalization. This research established the idea of "smart farming," which makes use of web-based wireless sensor technology. The proposed survey analyzes the use of data mining techniques in forecasting weather, classifying users. E-Agriculture platform will serve as an easy and efficient way to farmers their marketing crops and sell them across different market through computerized system. E-agriculture will establish direct communication between farmer traders this will avoid intermediate commission agents and farmer will not be levies with extra unnecessary taxes and charges, this will help farmer to gain fair and wrathful price

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for their product.Cons of KNN and decision tree algorithms used in data mining: High Time Complexity.

In [9], Thomas Van Klompenburg, Ayalew Kassahun, Cagatay Catal published a review paper on the Crop yield prediction using machine learning-Machine Learning based crop yield prediction papers have been synthesized. The most widely used ML algorithm is neural networks and deep learning algorithms are Long Short Term Memory (LSTM) and Deep Neural Networks (DNN) may aid in the adoption of blockchain technology across all industries, making life easier.

In [10], ON Oguoma, VI Nkwocha, II Ibeawuchi proposed a paper on the Implications of Middlemen in the Supply Chain Of Agricultural Products -Utilizing frequency distribution and percentages, data were examined. The percentage levels in the three agro ecological zones were represented using bar charts. The results showed that climate and weather are known limiting factors of production in agriculture. Also, middlemen intervation raise price for consumers. Farmer profits will decline.

In [11], D. Ramesh, B. Vishnu Vardhan proposed the Analysis of Crop Yield Prediction using Data Mining Techniques For the estimation of agricultural yield analysis, the statistical approach of multiple linear regression and the data mining methods of density-based clustering were used in this research. A Multi Linear Regression Approach was used for the estimation of crop yielding Analysis. It involves linear relationship in between the dependent variables and the independent variables. The dependent variable is known to be predictant and the independent variable is termed as predictors. All the estimation of the yielding will purely based on the density and Density based approaches for 6-clusters. Many soil profile descriptions were proposed in combination of GPS based technologies. Cons: The multiple linear regression method falls short of density-based grouping in accuracy.

In [12], Sachin D. Khirade, A. B Patil proposed Plant Disease Detection Using Image Processing. It includes image filtering using a median filter and converting the RGB image to CIELAB color components, image segmentation using a k-medoid technique, masking green pixels and removing masked green pixels, then computing texture feature statistics, and finally feeding these features through a neural network. It helps in preventing the losses in the yielding quantity and Quality of the product.con: Disease detection is a time-consuming procedure that includes processes including picture capture, image pre-processing, image segmentation, feature extraction, and classification.

In [13], Shruthi Jadon ,proposed a SSM-Net for plant disease Identification in Low Data Regime. In this study, a new metrics based few shot learning SSM Net Architecture introduced, which consists of stacked Siamese and matching network components to address the problem of disease detection in low data regimes. This experiment made on two datasets: mini leaves diseases and sugarcane diseases dataset. SSM-Net approach can achieve better decision boundaries with an accuracy of 92.7% on the mini-leaves dataset and 94.3% on the sugarcane dataset. The accuracy increased by 10% and 5% respectively ,compared to the widely used VGG16 transfer learning Approach. Cons: Time consuming, Security and privacy policy issues.

In [14], Amira Abdelwahad, Abdulaziz Alhumam: proposed a Convolutional Neural Network for automatic Identification of plant diseases with limited data .In this several approaches were developed such as Transfer learning, Triple network, and Deep Adversarial Metric learning(DAML) for classifying plant diseases that can learn from little data. It achieved a very high accuracy of 99% for new classes when the source and target domain data are captured under the same condition and a reasonable accuracy of 81% for novel dataset that is captured under different conditions. Pros: Better classification results. Cons: A lot of training dataset is required.

III. CONCLUSION

After throughout research of various papers all the existing solution has one or the other cons. so we are making an application in which a farmer can detect a type of crop using our application and establish a platform in which an investor can invest in a crop, fund a crop, and a farmer can sell their harvests without the participation of a third party.

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