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E-Agri Kit Using Deep Learning and Machine Learning

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Abstract: ***For farmers major challenge is getting high production with higher yield due to improper guidance of getting higher yield and crops with different diseases. In the proposed method web application is prepared using Django framework.Our paper presents an agriculture aid application which is developed and designed to help the farmers. As Agriculture was the key development inthe rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that enabled people to live in cities. And it will be difficult for a person to identify every crop just by lookingat the leaves and along with that selling the crop for suitable and affordable prices is difficult to a farmer. We there overcomes this all problems we create an application where we are developing an algorithm that detects thetypeofcropbygivingtheinputimageand also creating a platform where an investor can invest into a crop by funding into a crop which is given by a farmer and where farmer can sell their crops to buyers with the rates that which are suitable with the crop.***
Keywords: E agricart , farmers module , machinelearning,deeplearning,cropyield,plantdisease.

I. INTRODUCTION

Agriculture is a vital industry that supports the world populations in terms of food, raw materials, and economic system. Nevertheless, growing processes in most parts of the world still suffer significant setbacks due to fluctuating weather patterns, illnesses of crops, the lack of fertility and soil quality, and the lack of human expertise. These problems have a due bearing on crop yields andproductivity especially to small scale farmers that might greatly depend on manual observation and ancient farm practices. The traditional methods of crop surveillance and diagnosis may be time- consuming, inaccurate, and inadequate to fulfill the requirements of the modern agriculture practice.

The recent development of Artificial Intelligence (AI) afforded new possibilities to revolutionize theagriculture sector as new data-driven and automated decisions became possible. DeepLearning(DL)andMachine

Learning (ML) models have shown a great opportunityinplantdiseasedetection,crop identification, yield prediction, and precision farming. Such technologies can be used to interpret patterns and predict with great accuracy using image data, environmental data, and computational models. The CNNs (especially Convolutional Neural Networks) have performed very well in the extraction of visual features of the leaf images, and hence can be used in real-time agriculture applications.

Even with these technological upgrades,agreatnumberoffarmersdonot have access to integrated and user friendly digital applications that will integrate crop diagnosis and market connectivity and support. The current systems are usually restrictedtothedetection ofdiseasesorthe classification of crops, and there is a technological gap in the area of offering the end to endagronomial support. Thereis also the problem of the farmers notbeing able to sell their produce at reasonable prices because of the middlemen and lack of access to transparent market environments. Also, small farmersareoftenstrainedfinancially and this hinders them to invest in better seeds, fertilizers or farm machinery.

In response to these issues, this paper suggests the E-Agri Kit, which is an all-in-one system based on AI algorithms, involves the use of deep learning, and machine learning models to offerautomatic crop identification, disease diagnosis, and decision support. The system takes the leaf images that havebeen taken using a mobile device and uses preprocessing algorithms to classify the cropandidentifypossiblediseasesusinga trained CNN model. The platform also has an online marketplace where farmers can selltheircropsstraighttopurchasersatfair priceswithelevated levelsof transparency.

Besides crop diagnosis and integration of markets, the E-Agri Kit also has an investment module through which outside investors can finance farming projects. This aspect allows the farmers to receive financial aid and also provides investors with a clear cut and keeps track of their investment. The proposed systemis a technical and financial module which makes it a complete solution to ensuring farmers are able to enhance crop healthand its economic results. The system provides the motivation to adopt smarter and sustainable agricultural practices by providing accurate predictions, accessible tools and real-time support.

The E-Agri Kit is provided to fill the gap between the conventional farming and intelligent digital agriculture byuniting deep learning models, decision support mechanisms, financial tools, and market connectivity. With this combined technique, the proposed system will increase crop monitoring and increase productivity, losses will be minimized and farmers will make sound decisions. The findings prove that the system can play an important role in the development of precision agriculture and help to digitalize the agricultural industry.

II. LITERATURE SURVEY

The data augmentation is essential to the sound diagnosis of plants and disease since models that are trained with a small or biased set of leaf images tend to fail in generalizing to new background and field settings.TheLeafGANsubmission presented an attention-conditioned image- to-image translation system providing lifelike diseased leaf versions of healthy leaves, which is much more effective at diagnostic generalization than vanilla CycleGAN-style augmentation. Augmentation with LeafGAN created significant cross-domain disease classification and particularly effective in cases where there is high in-field variability. [1]

Hybrid networks Local texture and global context in leaf images can be represented by hybrid architectures, which incorporate convolutional neural networks (CNNs) with components of transformers. PlantXViT model is a network that combines Vision Transformer and CNN featureextractionto providehigh accuracy with numerous crop collections but issmall enough to be deployed to the IoT. The identified method proves that the attention-based models can enhance recognition in the case of complex backgrounds, and provide a reasonable trade-offs between explainability and performance of mobile agricultural tools. [2]

CNN-based end-to-end systems designed to classify plant diseases (e.g., DeepPlantNet) have demonstrated very good performance on multi-crop tasks, whereby discriminative features are automatically learnt without any human feature engineering. The DeepPlantNet paper has recorded high multi-class accuracy and the robustness to class imbalances, which demonstrates that well-constructed CNN pipelines are still very competitive in the fundamental tasks of identifying diseases and class differentiation.Thesearchitecturescreate the real world basis of systems that are requiredtoreliably classifyalargenumber of disease types. [3]

Accuracyisassecondaryasmodelsize and latency when it comes to applicationin the real world on smartphones or edge devices. The guava disease detection study was device-friendly by using model quantization and analyzing several small CNN backbones, which demonstrated that quantized models could slash storage and inference cost by orders of magnitude without decreasing classification accuracy, which is a major factor when creating anE- Agri Kit to be used in the field. [4]

Recent systematic surveys summarize the strengths and weaknesses of DL/ML to detect plant diseases: they includecommon pitfalls like bias of dataset, non- stable imaging, absence of off-the-shelf labeled field datasets and explainabilityand localization (rather thanclassification). These surveys find a synthesis of effective augmentation, domain adaptation, and lightweight, to be the most feasible route to deployable agricultural diagnostics. [5]

The recent comparative studies and survey articles (since 2020) focus on the significance of hybrid solutions (image processing + DL), multimodal sensing (RGB + multispectral), and decision-level fusion to enhance reliability under adverse conditions. They suggest testing on cross- domain testbeds and emphasize the notion of suitable systems to contain severity estimation, localization and human decipherable explanations to be actually applicable in the field by farmers. These guidelines are directly used in guiding design decisions of an integrated E-Agri Kit. [6].

III. PROPOSED METHOD

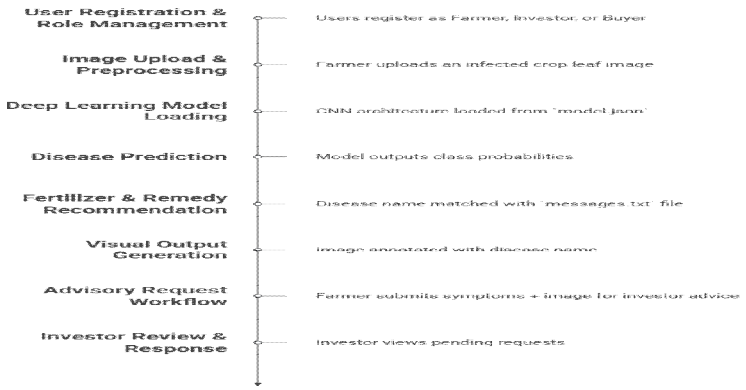

Fig.Flowoftheproposed method

Proposed method is having below modules

- System/Adminmodule
- FarmerModule
- InvestorModule
- Buyer Module

All the above modules even has multiple features like user registration and role management. Uploading image which ask farmers to upload the image and predictthe disease and respective fertilizers using CNN algorithm which is from deep learning.
Fertilizers are recommended Using machine learning algorithms we have to give the different crop features or soil features based on that which crop gives how many yield will be predicted. Visual graph also plotted for performance of cnn for disease prediction. There is a use of advisoryrequestflowwhichseeksadvice from the investors. And investors can see the details of farmers crops. Review and responses also added in this application so that farmers investors and buyers can give the reviews based on the crop type or quality.

IV. RESULTS ANALYSIS

Proposed method has basically 4 modules such as

- System/ Admin module
- Farmer Module
- InvestorModule
- BuyerModule

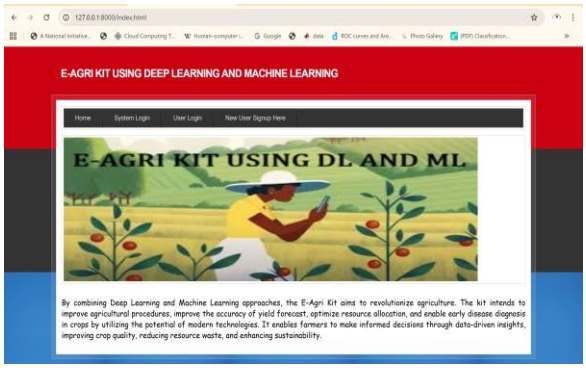

Fig. Home Pageof theproposed model

Fig.System Page

Systemhasbelowfeaturesas,

- ViewandActivatethe Profiles
- Takecropyield dataset
- TrainDLalgorithm
- Logout

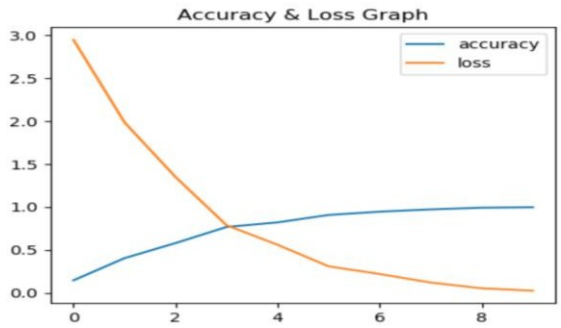

Fig. Performance of CNN model used for disease prediction

PerformanceanalysisofCNNmodelfor disease prediction.

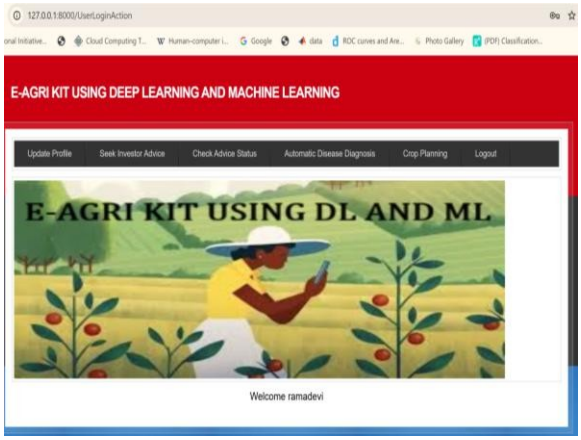

Fig. Farmer Page with multiple features Farmerpagehasdifferentmodulessuchas

- Updateprofile
- Getinformationfrominvestor
- Checkinformationreceived
- AutomaticDiseasepredictionusing DL
- Crop yield
- Logout

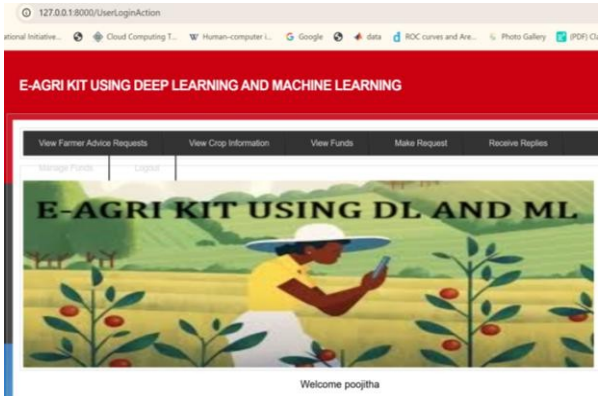

Fig.InvestorPagewithmultipleFeatures Investor module has below features as

- Viewcropinformation
- Viewfarmer messages
- View funds

Fig.BuyerPagewithDifferent Features Buyer has following features,

- View crops
- Viewselling
- Manageselling
- logout

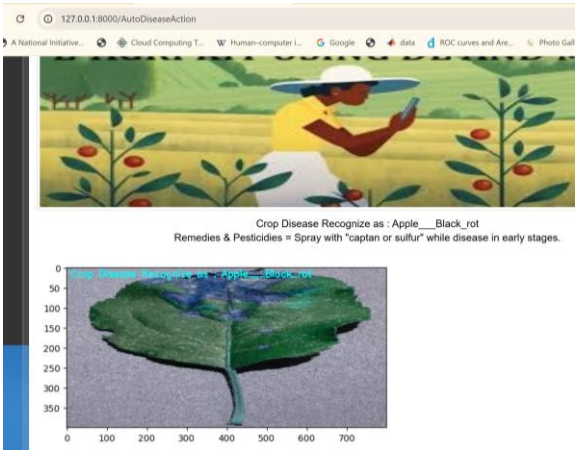

Fig. Disease Predicted and Pesticides suggested are shown

Here the disease predicted and respective fertilizers are shown.

V. CONCLUSION

This user-friendly application is prepared to help different users from farming filed. Proposed web application helps for farmers, investors and buyers to easily access the application and improve the growth. This proposed application has 4 modules as system module, investor module, farmer module, buyer module. System module has different features such as approval of different users, Get information from investor, check information received, Automatic Disease prediction using DL, Crop yield Logout. Investor module has below features as View crop information, View farmer messages ,View funds.

VI. FUTURE SCOPE

In the future this application can be improved by preparing the Android application for the same. As users has Android mobile phones, they can use the application very easily even in the future this applicationcanbeintegratedwith IOT tomakemoreinteractiveandmode advance solution for the farmers, investors and buyers. Buyer has following features,Viewcrops,Viewselling,Manage selling , logout.

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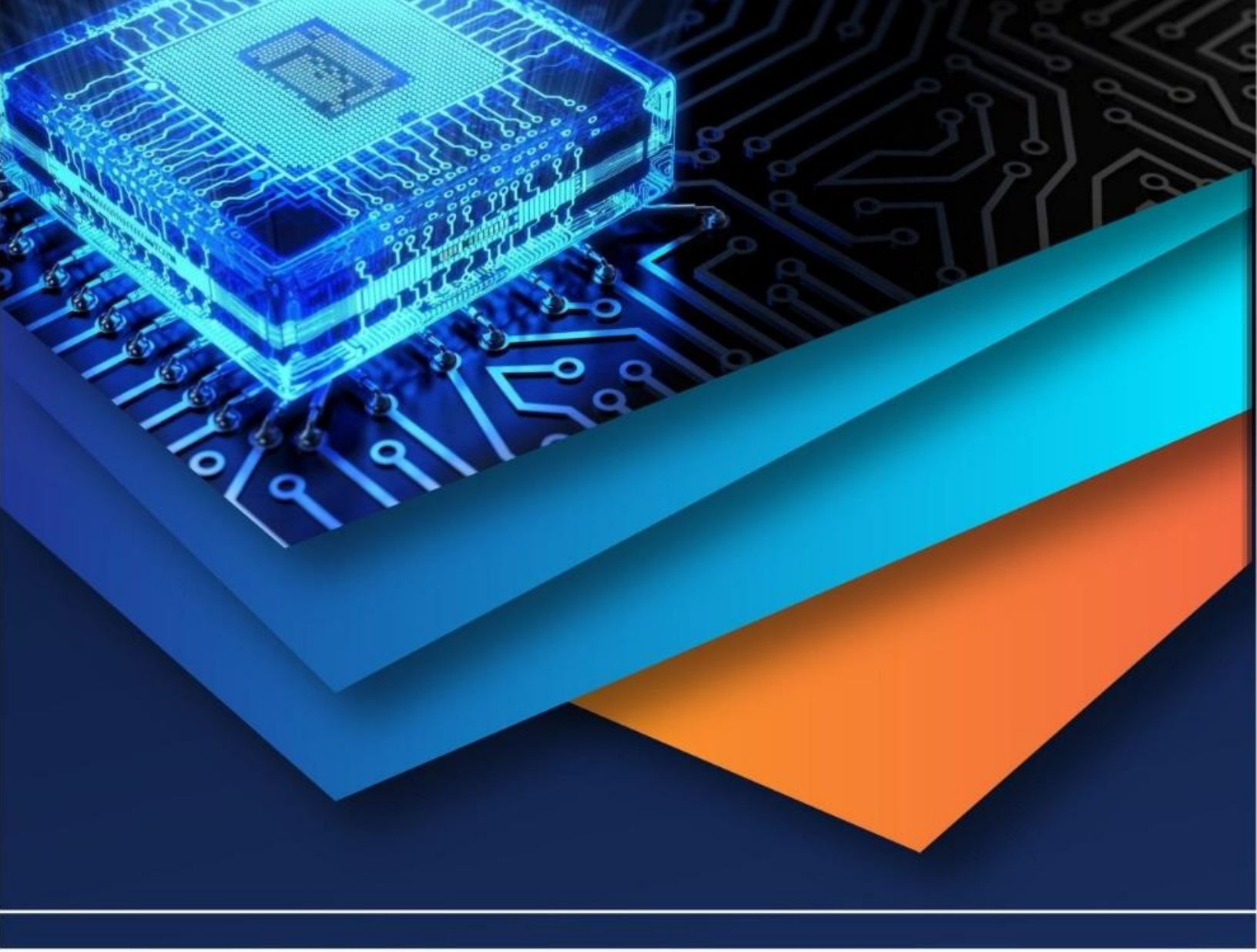

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