<p style="text-align:center; color:red;">Template for two page research proposal</p>

1 Title: Deep Learning-Based Plant Disease Detection for Precision Farming

R. Eswar Reddy, eswarreddy1992@outlook.in

2 Area of research & Domain of research

Precision Farming & Data Analytics

3 Objective of the proposal

Plant phenotyping and precision agriculture are information technology-oriented fields with specific challenges and demands for the detection and diagnosis of plant disease. Precision agriculture can be referred to as a crop management method related to the spatial and temporal variability in soil and crop factors within a field. Accurate and early diagnosis and detection of plant diseases were important variables in plant production and reducing quantitative and qualitative losses in crop yield. The advancement of automatic disease detection and classification systems has been explored significantly in precision agriculture. In recent years, researchers have looked into a variety of cultures using different plant parts. This article develops a new deep learning-based automated plant disease detection and classification model for precision agriculture. The presented DL algorithm concentrates on the recognition and classification of plant diseases in leaf and fruit regions. In the initial stage, the leaf and fruit regions are extracted using U2Net-based background removal. Next, the SqueezeNet model is exploited as a feature extractor, and the hyperparameters are tuned by the Adam optimizer. Finally, the extreme gradient boosting (XGBoost) classifier performs the classification of plant diseases. The experimental validation of the DL technique is tested on a benchmark plant disease dataset. The simulation values indicated the enhanced outcomes of the DL approach over other models.

4 Background/short description

1. Accurate and early diagnosis and detection of plant diseases were major factors in plant production and the reduction of quantitative and qualitative losses in crop yield. Advancement of automatic disease detection and classification system is significantly explored in precision agriculture

2. Deep Learning based Automated Plant Disease Detection and Classification Model for Precision Agriculture. The presented DL algorithm concentrates on the recognition and classification of plant diseases in leaf and fruit regions.

5 Expected results

An automated plant disease classification model, DL technique. It mainly focuses on the categorization of different plant diseases affected in the leaf and fruit regions. The enhanced outcomes of the DL models. The classification accuracy of the DL algorithm can be boosted by the DL classification techniques.

6 References

1. Upadhyay, S.K. and Kumar, A., 2022. A novel approach for rice plant diseases classification with deep convolutional neural network. International Journal of Information Technology, 14(1), pp.185-199.

2. Ashwinkumar, S., Rajagopal, S., Manimaran, V. and Jegajothi, B., 2022. Automated plant leaf disease detection and classification using optimal MobileNet based convolutional neural networks. Materials Today: Proceedings, 51, pp.480-487.

3. Vasavi, P., Punitha, A. and Rao, T.V.N., 2022. Crop leaf disease detection and classification using machine learning and deep learning algorithms by visual symptoms: A review. International Journal of Electrical and Computer Engineering, 12(2), p.2079.

4. Sharma, P., Hans, P. and Gupta, S.C., 2020, January. Classification of plant leaf diseases using machine learning and image preprocessing techniques. In 2020 10th international conference on cloud computing, data science & engineering (Confluence) (pp. 480-484). IEEE

5. Shruthi, U., Nagaveni, V. and Raghavendra, B.K., 2019, March. A review on machine learning classification techniques for plant disease detection. In 2019 5th International conference on advanced computing & communication systems (ICACCS) (pp. 281-284). IEEE.

6. Li, L., Zhang, S. and Wang, B., 2021. Plant disease detection and classification by deep learning—a review. IEEE Access, 9, pp.56683-56698.

7. Ramesh, S. and Vydeki, D., 2018, September. Rice blast disease detection and classification using machine learning algorithm. In 2018 2nd International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE) (pp. 255-259). IEEE.

8. Jasim, M.A. and Al-Tuwaijari, J.M., 2020, April. Plant leaf diseases detection and classification using image processing and deep learning techniques. In 2020 International Conference on Computer Science and Software Engineering (CSASE) (pp. 259-265). IEEE.