VMC ANALYTIKS

Lightweight CNN for Mobile-Based Detection of Fungal Disease in Onion Leaves

Arthur C. Aguilar, ORCID No. 0009-0005-1446-9517

Master of Science in Computer Engineering, Polytechnic University of the Philippines, Sta. Mesa, Manila, Philippines

REFERENCES

Abade, A., Ferreira, P. A. F., & De Barros Vidal, F. (2021). Plant Diseases Recognition on Images using Convolutional Neural Networks: A Systematic Review. *Computers and Electronics in Agriculture, 185*, 106125.

Al Sahili, Z., & Awad, M. (2022). *The Power of Transfer Learning in Agricultural Applications*: AgriNet.

Barbedo, J. G. A. (2018). Factors Influencing the use of Deep Learning for Plant Disease Recognition. *Biosystems Engineering, 172,* 84–91.

Chen, J., Chen, Z., Zhang, C., & Li, Y. (2020). Identifying Plant Diseases using Deep Transfer Learning and Convolutional Neural Networks. *Multimedia Tools and Applications*, 79, 26431–26449.

Cornell Vegetables, Cornell Cooperative Extension. (2025, March 15). *Standardized Scouting Protocols for Digital Agriculture*. Cornell University.

Das, R., & Choudhury, S. (2022). Deep learning Methodologies for Plant Disease Detection: A Systematic Review. *Precision Agriculture*, 23(3), 155–167.

Eunice, J., et al. (2022). Deep Learning-based Leaf Disease Detection in Crops: A Review and Comparative Analysis. *Agronomy, 12*(10), 2395.

Ferentinos, K. P. (2018). Deep Learning Models for Plant Disease Detection and Diagnosis. *Computers and Electronics in Agriculture*, 145, 311–318.

Han, K., Wang, Y., Tian, Q., Guo, J., Xu, C., & Xu, C. (2021). GhostNet: More Features from Cheap Operations. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)* (pp. 1580–1589).

Hossen, M. I., Awrangjeb, M., Pan, S., & Mamun, A. A. (2025). *Transfer Learning in Agriculture: A Review.* Artificial Intelligence Review.

Howard, A. G., Sandler, M., Chen, B., Wang, W., Chen, L.-C., Tan, M., Chu, G., Vasudevan, V., Zhu, Y., Pang, R., Adam, H., & Le, Q. V. (2018). MobileNetV2: Inverted Residuals and Linear Bottlenecks. *In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition* (pp. 4510–4520).

Howard, A. G., Sandler, M., Chu, G., Chen, L.-C., Chen, B., Tan, M., Wang, W., Zhu, Y., Pang, R., Vasudevan, V., Le, Q. V., & Adam, H. (2019). Searching for MobileNetV3. *In Proceedings of the IEEE/CVF International Conference on Computer Vision* (pp. 1314–1324).

Howard, A. G., Zhu, M., Chen, B., Kalenichenko, D., Wang, W., Weyand, T., Andreetto, M., & Adam, H. (2017). MobileNets: Efficient Convolutional Neural Networks for Mobile Vision Applications. *arXiv.*

https://doi.org/10.48550/arXiv.1704.04861

Islam, M. M., Rahman, M. A., Hossain, M. S., & Andersson, K. (2021). *A Deep Learning-based Framework for the Detection and Classification of Jute Leaf Diseases using Convolutional Neural Networks. Computers and Electronics in Agriculture*, 182, 106041.

Islam, M. Z., Ahamed, S., & Rahman, M. M. (2021). Hybrid Deep Learning Model for Rice Leaf Disease Detection using Convolutional Neural Networks. *Computers and Electronics in Agriculture, 187*, 106265.

Kamilaris, A., & Prenafeta-Boldú, F. X. (2018). Deep Learning in Agriculture: A Survey. *Computers and Electronics in Agriculture*, 147, 70–90.

Kumar, N., & Shah, V. (2024). *Dataset labeling Accuracy and its Impact on CNN Performance in Onion Disease Classification*. Journal of Agricultural Data Science, 9(1), 15–25.

Liu, J., & Wang, X. (2021). *Plant Diseases and Pests' Detection based on Deep Learning: A Review. Plant Methods*, 17, Article 22.

Ma, N., Zhang, X., Zheng, H.-T., & Sun, J. (2018). *ShuffleNet V2: Practical Guidelines for Efficient CNN Architecture Design. In Proceedings of the European Conference on Computer Vision (ECCV)* (pp. 116–131).

Mohanty, S. P., Hughes, D. P., & Salathé, M. (2016). *Using Deep Learning for Image-Based Plant Disease Detection*. Frontiers in Plant Science, 7, 1419.

Muhammad, M. B., Yeasin, M., & Tang, Y. (2020). Eigen-CAM: Class Activation Map using Principal Components. *arXiv.*

https://doi.org/10.48550/arXiv.2008.00299

Oerke, E.-C. (2006). Crop Losses to Pests. *The Journal of Agricultural Science, 144*(1), 31–43.

Picon, A., Alvarez-Gila, A., Seitz, M., Ortiz, L., & Echazarra, J. (2019). Deep Convolutional Neural Networks for Mobile Capture Device-Based Crop Disease Classification in the Wild. *Computers and Electronics in Agriculture, 161,* 280–290.

Ramcharan, A., McCloskey, P., Baranowski, K., McKenna, B., Leeson, A., & Hughes, D. P. (2019). A Mobile-Based Deep Learning Model for Cassava Disease Diagnosis. *Frontiers in Plant Science, 10*, 272.

Ramesh, S., Vydeki, D., & Karthikeyan, M. (2021). Plant Disease Detection using Deep Learning and Mobile Applications: A Review. *Computers and Electronics in Agriculture, 178,* 105761.

Rezaei, M., et al. (2024). Plant Disease Recognition in a Low Data Scenario using Few-Shot Learning. *Computers and Electronics in Agriculture, 219.* https://doi.org/10.1016/j.compag.2024.108812

Selvaraju, R. R., Cogswell, M., Das, A., Vedantam, R., Parikh, D., & Batra, D. (2017). Grad-CAM: Visual Explanations from Deep Networks via Gradient-Based Localization. *In Proceedings of the IEEE International Conference on Computer Vision* (pp. 618–626).

Sharma, V., Patel, A., & Gupta, S. (2021). Market Implications of Onion Disease Outbreaks. *Journal of Agribusiness Economics, 15*(3), 90-102.

Shoaib M, Sadeghi-Niaraki A, Ali F, Hussain I and Khalid S (2025) Leveraging deep learning for plant disease and pest

_____

detection: a comprehensive review and future directions. *Front. Plant Sci. 16*:1538163. doi: 10.3389/fpls.2025.1538163

Shorten, C., & Khoshgoftaar, T. M. (2019). A Survey on Image Data Augmentation for Deep Learning. *Journal of Big Data, 6*(1), 60.

Strange, R. N., & Scott, P. R. (2005). Plant Disease: A Threat to Global Food Security. *Annual Review of Phytopathology, 43,* 83–116.

Sulaiya, N., & Banerjee, S. (2025). A Review of Plant Leaf Disease Detection using CNN Deep Learning Models. *International Journal of Advanced Research and Multidisciplinary Trends, 2*(1), 642–653.

Szegedy, C., Vanhoucke, V., Ioffe, S., Shlens, J., & Wojna, Z. (2016). Rethinking the Inception Architecture for Computer Vision. *In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition* (pp. 2818–2826).

Tan, M., & Le, Q. V. (2019). EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks. *In Proceedings of the 36th International Conference on Machine Learning* (pp. 6105–6114). PMLR

Tan, M., Chen, B., Pang, R., Vasudevan, V., Sandler, M., Howard, A., & Le, Q. V. (2019). MnasNet: Platform-Aware Neural Architecture Search for Mobile. *In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (pp. 2820–2828).

Too, E. C., Yujian, L., Njuki, S., & Yingchun, L. (2019). A Comparative Study of Fine-Tuning Deep Learning Models for Plant Disease Identification. *Computers and Electronics in Agriculture, 161*, 272–279.

Trockman, A., & Kolter, J. Z. (2022). Patches are all you need? *In Proceedings of the International Conference on Learning Representations (ICLR).*

Tugrul, B., et al. (2022). Convolutional Neural Networks in Detection of Plant Leaf Diseases: A Review of Recent Research. *Agriculture, 12*(8), 1192.

Zhang, C., Zhou, Y., & He, Y. (2022). Semi-Supervised Deep Learning for Plant Disease Recognition with Limited Labeled Data. *Computers and Electronics in Agriculture, 195,* 106816.

Zhang, S., Zhang, S., Zhang, C., Wang, X., & Shi, Y. (2021). Cucumber Leaf Disease Identification with Attention-Based Convolutional Neural Network. *Computers and Electronics in Agriculture, 185,* 106148.

Zhang, Y., Bao, R., Guan, M., et al. (2025). A Lightweight Deep Convolutional Neural Network for Soybean Crop Disease Recognition. *Frontiers in Plant Science, 16*, 1655564.