Histogram Equalisation (HE), K-means clustering, and contour tracing. Feature extraction methods that are renowned for their capacity to extract useful features are applied to the leaf samples. These methods include the Discrete Wavelet Transform, Principal Component Analysis, and the Generalised Linear Model. To distinguish between healthy and diseased leaves, researchers use machine learning methods including Support Vector Machines (SVM), K-Nearest Neighbours (K-NN), and Convolutional Neural Networks (CNN). The proposed model has been shown to be suitable for the CNN machine learning classification methodology, with its recommended degree of accuracy when compared to other modern methods. Using fusion approaches to extract significant characteristics and testing the model on more leaf sample datasets might improve future research.

References

[1] M. E.H. Chowdhury et al., 'Tomato Leaf Diseases Detection Using Deep Learning Technique', Technology in Agriculture. IntechOpen, Oct. 13, 2021. doi: 10.5772/intechopen.97319.

[2] Bhandari, M.; Shahi, T.B.; Neupane, A.; Walsh, K.B. BotanicX-AI: Identification of Tomato Leaf Diseases Using an Explanation-Driven Deep-Learning Model. J. Imaging 2023, 9, 53. https://doi.org/10.3390/jimaging9020053

[3] Trivedi, Naresh & Gautam, Vinay & Anand, Abhineet & Aljahdali, Hani & Gracia Villar, Santos & Anand, Divya & Goyal, Nitin & Kadry, Seifedine. (2021). Early Detection and Classification of Tomato Leaf Disease Using High-Performance Deep Neural Network. Sensors. 21. 7987. 10.3390/s21237987.

[4] Brahimi, Mohammed & Kamel, Boukhalfa & Moussaoui, Abdelouahab. (2017). Deep Learning for Tomato Diseases: Classification and Symptoms Visualization. Applied Artificial Intelligence. 31. 1-17. 10.1080/08839514.2017.1315516.

[5] Mohanty Sharada P., Hughes David P., Salathé Marcel, Using Deep Learning for Image-Based Plant Disease Detection, Frontiers in Plant Science, VOLUME 7, 2016, https://www.frontiersin.org/articles/10.3389/fpls.2016.01419, 10.3389/fpls.2016.01419

[6] Qimei Wang, Feng Qi, Minghe Sun, Jianhua Qu, Jie Xue, "Corrigendum to "Identification of Tomato Disease Types and Detection of Infected Areas Based on Deep Convolutional Neural Networks and Object Detection Techniques"", Computational Intelligence and Neuroscience, vol. 2021, Article ID 3751479, 1 pages, 2021. https://doi.org/10.1155/2021/3751479

[7] S. Khatoon, M. Maruf Hasan, A. Asif, M. Alshmari and Y. Yap, "Image-based automatic diagnostic system for tomato plants using deep learning," Computers, Materials & Continua, vol. 67, no.1, pp. 595–612, 2021.

[8] Jasim, Y. A. (2021). High-Performance Deep learning to Detection and Tracking Tomato Plant Leaf Predict Disease and Expert Systems. ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal, 10(2). https://doi.org/10.14201/ADCAIJ202110297122

[9] Liu, J., Wang, X. Early recognition of tomato gray leaf spot disease based on MobileNetv2-YOLOv3 model. Plant Methods 16, 83 (2020). https://doi.org/10.1186/s13007-020-00624-2

[10] Patnayakuni, S. P. . (2022). Tomato: Different Leaf Disease Detection Using Transfer Learning Based Network. Journal of Mobile Multimedia, 18(03), 743–756. https://doi.org/10.13052/jmm1550-4646.18313

[11] Bayram, H.Y., Bingol, H., Alatas, B. (2022). Hybrid deep model for automated detection of tomato leaf diseases. Traitement du Signal, Vol. 39, No. 5, pp. 1781-1787. https://doi.org/10.18280/ts.390537

[12] Tian, K., Zeng, J., Song, T., Li, Z., Evans, A. and Li, J. (2022) "Tomato leaf diseases recognition based on deep convolutional neural networks", Journal of Agricultural Engineering, 54(1). doi: 10.4081/jae.2022.1432.

[13] Singh, Ganesh Bahadur, et al. "Identification of Tomato Leaf Diseases Using Deep Convolutional Neural Networks." IJAEIS vol.12, no.4 2021: pp.1-22. http://doi.org/10.4018/IJAEIS.20211001.oa3

[14] Nawaz, M., Nazir, T., Javed, A. et al. A robust deep learning approach for tomato plant leaf disease localization and classification. Sci Rep 12, 18568 (2022). https://doi.org/10.1038/s41598-022-21498-5

[15] Keke Zhang, Qiufeng Wu, Anwang Liu, Xiangyan Meng, "Can Deep Learning Identify Tomato Leaf Disease?", Advances in Multimedia, vol. 2018, Article ID 6710865, 10 pages, 2018. https://doi.org/10.1155/2018/6710865

[16] Gayathri, S., et al. "Image analysis and detection of tea leaf disease using deep learning." 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC). IEEE, 2020.

[17] Sladojevic, Srdjan, et al. "Deep neural networks based recognition of plant diseases by leaf image classification." Computational intelligence and neuroscience 2016 (2016).

[18] Amara, Jihen, Bassem Bouaziz, and Alsayed Algergawy. "A deep learning-based approach for banana leaf diseases classification." Datenbanksysteme für Business, Technologie und Web (BTW 2017)-Workshopband (2017).

[19] Amara, Jihen, Bassem Bouaziz, and Alsayed Algergawy. "A deep learning-based approach for banana leaf diseases classification." Datenbanksysteme für Business, Technologie und Web (BTW 2017)-Workshopband (2017).

[20] Tiwari, Divyansh, et al. "Potato leaf diseases detection using deep learning." 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS). IEEE, 2020.

[21] Panigrahi, Kshyanaprava Panda, et al. "Maize leaf disease detection and classification using machine learning algorithms." Progress in Computing, Analytics and Networking: Proceedings of ICCAN 2019. Springer Singapore, 2020.

[22] Sujatha, Radhakrishnan, et al. "Performance of deep learning vs machine learning in plant leaf disease detection." Microprocessors and Microsystems 80 (2021): 103615.

[23] Atila, Ümit, et al. "Plant leaf disease classification using EfficientNet deep learning model." Ecological Informatics 61 (2021): 101182.

[24] Ramesh, Shima, et al. "Plant disease detection using machine learning." 2018 International conference on design innovations for 3Cs compute communicate control (ICDI3C). IEEE, 2018.