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| **Title:** | Potato Diseases detection using Inception-BiT with Explainable AI | | |
| **Author(s) Name:** | Kabir, Md. Sayem; Nadim, Md Nure Alam; Tanim, Sharia Arfin; Sintheia, Tasnim Sultana; Tanvir, Kazi; Bhuyan, Muhibul Haque | | |
| **Contact Email(s):** | muhibulhb@aiub.edu | | |
| **Published Journal Name:** | Proceedings of the 3rd International Conference on Computing Advancements (ICCA’24) | | |
| **Type of Publication:** | Conference Proceedings | | |
| **Volume:** | 3 | Issue | - |
| **Publisher:** | Association for Computing Machinery (ACM), New York, USA. | | |
| **Publication Date:** | 06 June 2025. | | |
| **ISSN:** | - | | |
| **DOI:** | https://doi.org/10.1145/3723178.3723294 | | |
| **URL:** | https://dl.acm.org/doi/10.1145/3723178.3723294 | | |
| **Other Related Info.:** | ISBN: 979-8-4007-1382-8. Place: FSIT, AIUB, pp. 874-881, Conference Date: 17-18 October 2024, URL: https://icca.aiub.edu/. | | |
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| **Abstract:** |  |
| Abstract— The world’s fourth-biggest food crop, potatoes, are vulnerable to diseases that may ruin harvests and food security. Without effective management, potato leaf diseases may cause 100% crop losses, costing over six billion USD annually. Pathogens, environmental variables, and bad agricultural methods may cause potato diseases which result in poor crop quality, food security, and ecological problems. Researching potato diseases improves crop yields, food security, farmer income, potato quality, and sustainable farming methods with fewer impacts on the environment. Our process uses deep learning and the Inception-BiT model to identify potato illnesses early, improving disease control, crop yields, and economic losses. Our suggested model detected potato illnesses with 98.45% accuracy on the testing dataset, possibly revolutionizing early disease detection in potato cultivation. Our lightweight, versatile model integrates seamlessly, allowing both experienced and inexperienced farmers to use innovative technology to identify potato diseases swiftly and effectively. Our model may not detect all potato diseases. Still, its accuracy in identifying specific ones makes it effective in managing them, helping farmers address common potato crop threats with precision and reliability. | |