

Title: A Fuzzy-Based Vision Transformer Model for Tea Leaf Disease Detection

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Abstract: Recently, vision transformer has gained significant attention in the field of precision agriculture for its ability to transfer knowledge from pre-trained deep models. However, very small studies shed light on the capabilities of ViT on tea leaf disease detection. Early diagnosis and detection of tea leaf diseases are crucial for ensuring tea plant health and preventing yield and quality reductions in the tea industry. The existing research in tea leaf disease detection could not achieve better accuracy using different models in publicly available datasets. This study fills this gap by implementing vision transformer (ViT) to diagnose tea leaf diseases. Our primary dataset, drawn from two prominent Bangladeshi tea estates, includes five diseased classes and one healthy class. After in-depth training, our model showcased an exceptional testing accuracy rate of 99.53% in 292 s using (Image $[56 \times 56]$, patch 7). As all countries aim to enhance their position in the global tea market for a sustainable economy, tea plant production is important. Our research can be a foundational tool for increasing the quantity of tea production by early detection of tea leaf diseases.

Keywords: Tea leaf disease detection Vision Transformer (ViT) Precision agriculture Transfer learning Plant disease classification

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