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# YOLO-Based Automated Detection of Tomato Leaf Diseases

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## Abstract

Tomato plants are highly susceptible to various leaf diseases that threaten both crop yield and quality. Traditional disease detection methods rely on manual inspection, which is time-consuming, labour-intensive, error-prone, and impractical for large-scale agricultural use. This article presents a simplified, yet comprehensive overview of an intelligent system developed to automatically detect tomato leaf diseases using YOLOv8, a state-of-the-art deep learning object detection model. The system was trained on a well-annotated and augmented dataset covering eight distinct tomato leaf conditions, including Leaf Mold, Bacterial Spot, Septoria Leaf Spot, and healthy leaves. The trained model achieved a high detection accuracy of 99.3%, outperforming several previous approaches reported in the literature. A user-friendly web-based interface was also created using Gradio to facilitate real-world adoption, allowing farmers and agricultural practitioners to upload leaf images and receive instant, reliable visual predictions. The promising results demonstrate the model's effectiveness, scalability, and potential for deployment in precision agriculture to reduce crop losses and promote sustainable farming practices. © 2025 IEEE.

## Author keywords

Gradio; leaf; Tomato; YOLOv8

## Indexed keywords

### Engineering controlled terms

Crops; Diseases; Intelligent systems; Plant diseases; Plants (botany); Precision agriculture; Smart agriculture

### Engineering uncontrolled terms

Automated detection; Crop quality; Crop yield; Gradio; Leaf; Leaf disease; Tomato; Tomato leaf; Tomato plants; YOLOv8

### Engineering main heading

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