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Automated Pest Detection in Agriculture Using Deep Learning Techniques

Sakshi Mahajan¹, Vinay Kamble², Shubham Gawade³, Princy Patel⁴, and Vaibhav Suryawanshi⁵

Department of CSE(Artificial Intelligence)¹⁻⁵ Nutan College of Engineering and Research, Pune, India princypatel9121@gmail.com

Abstract: Timely and precise identification of pests is essential in agriculture, as it significantly affects crop productivity and sustainability. Conventional techniques, such as manual inspection, are often slow, inconsistent, and labor-intensive. This research introduces an artificial intelligence-based pest detection framework utilizing Convolutional Neural Networks (CNNs) to automatically recognize pests in crop images. The system is trained using a di-verse dataset under various environmental conditions to enhance its accuracy and generalization. Key techniques such as data augmentation and model optimization are employed to ensure the solution is suitable for real-world deployment, including on mobile and edge devices. By reducing the overuse of pesticides and sup- porting informed decision-making, the proposed method advances the goals of precision agriculture and contributes to more sustainable farming practices.

Keywords: Pest Identification, Deep Learning, CNN, Smart Farming, Image-Based Detection, Sustainable Agriculture



