Project ID: 001

Project Title: Insect pest specifies identification.

Area of Research: Computer Vision

Problem Statement: Insect pest classification plays a crucial role in various domains, including agriculture, pest control, and ecological research. Rapid and accurate identification of insect pests is essential for effective pest management strategies, early detection of invasive species, and preservation of crop yield and quality. However, manual classification of insects based on visual inspection can be time-consuming, error-prone, and challenging, particularly when dealing with conditions in the wild. The goal of this project is to correctly identify the species of insects in an automated manner using advanced artificial intelligence algorithms which has high accuracy, robust to varying environmental conditions, appearance, and deploying these algorithms for real-time monitoring.

Dataset:

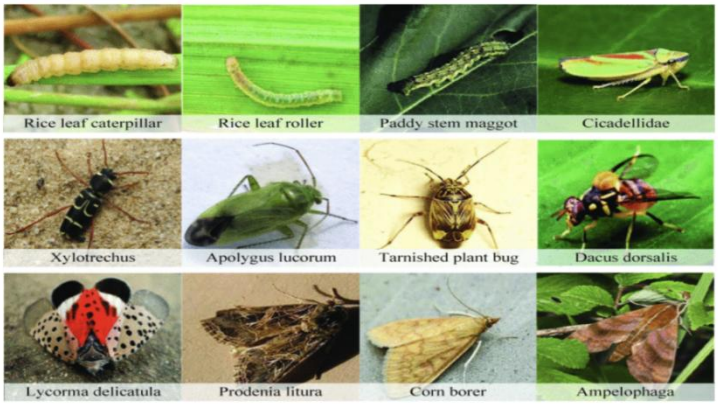

Figure 1. Example images of the IP102 dataset. Each image belongs to a different species of insect pests.

The IP102 dataset [1] is a benchmark dataset for insect pests. The details about the dataset can be found in [1] and be downloaded from the URL given below:

Dataset URL: https://github.com/xpwu95/IP102/tree/master

Task: To develop an automatic insect recognition system using neural networks and deep learning which provides high accuracy, robust to varying appearance and similarity between different insect species, and faster so that it can be deployed in the real world.

Relevant Papers

[1]. X. Wu, C. Zhan, Y. -K. Lai, M. -M. Cheng and J. Yang, "IP102: A Large-Scale Benchmark Dataset for Insect Pest Recognition," *2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, Long Beach, CA, USA, 2019, pp. 8779-8788, doi: 10.1109/CVPR.2019.00899.
https://ieeexplore.ieee.org/document/8954351
https://openaccess.thecvf.com/content_CVPR_2019/papers/Wu_IP102_A_Large-Scale_Benchmark_Dataset_for_Insect_Pest_Recognition_CVPR_2019_paper.pdf

[2]. A. Setiawan, N Yudistira, and R.C. Wihandika, “Large scale pest classification using efficient Convolutional Neural Network with augmentation and regularizers”, Computers and Electronics in Agriculture, Vol. 200, Sept 2022.
https://www.sciencedirect.com/science/article/pii/S0168169922005191

[3]. W. Linfeng, L. Yong, L. Jiayao, W. Yunsheng, and X. Shipu, “Based on the multi-scale information sharing network of fine-grained attention for agricultural pest detection”, PLOS ONE 18(10):e0286732.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0286732

[4]. An J, Du Y, Hong P, Zhang L, Weng X., “Insect recognition based on complementary features from multiple views”, Scientific Reports. 2023 Feb;13(1):2966. DOI: 10.1038/s41598-023-29600-1.
https://europepmc.org/article/pmc/pmc9940688

[5]. S. Kar, J. Nagasubramanian, D. Elango, M. E. Carroll, C. A. Abel, A. Nair, D.S. Mueller, M. E. O’Neal, A. K. Singh, S. Sarkar, B. Ganapathysubramanian, A. Singh, “Self-supervised learning improves classification of agriculturally important insect pests in plants”, The Plant Phenome Journal, 6, e20079.
https://acsess.onlinelibrary.wiley.com/doi/full/10.1002/ppj2.20079