IP102: A Large-Scale Benchmark Dataset for Insect Pest Recognition

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Introduction

- Highlights
  - The largest public dataset for insect pest recognition. This dataset contains 102 insect pests, including 75,222 images with category labels and 18,976 images with bounding boxes.
  - Extensive experiments on the proposed dataset.

- Motivation
  - Insect pest is one of the main factors affecting agricultural product yield. Accurate recognition of insect pests facilitates timely preventive measures to avoid economic losses.
  - Existing small-scale insect pest datasets cannot well satisfy the requirement of deep technology.

- Data Collection & Annotations
  - (1) Taxonomic system establishment
  - (2) Image collection
  - (3) Preliminary data filtering
  - (4) Professional data annotation

- Comparison to Previous Datasets
  - More samples
  - More classes
  - In the wild
  - Publicly available

IP102 Dataset

- Hierarchical Taxonomy System
  - Each insect pest is assigned an upper-level class based on the crop that the insect pest class mainly damages.
  - FC: Field crops; EC: Economic crops

- Statistical Information

Benchmark Experiments

- Classification Task
  - ① Classification performance of handcrafted and deep features

- Detection Task
  - Method: Backbone AP AP50 AP75
  - FRCNN: VGG-16 21.05 47.87 15.23
  - FPN: ResNet-50 28.10 54.93 23.30
  - SSD300: VGG-16 21.49 47.21 16.57
  - RetiNeDet: VGG-16 22.84 49.01 16.82
  - YOLOv3: DarkNet-53 25.67 50.64 21.79

Motivation

Data Collection & Annotations

Comparison to Previous Datasets

Challenges

(1) Imbalanced distribution

(2) Intra- & inter-class variance