



Srivatsa Kundurthy – *The Academy for Mathematics, Science and Engineering*  
<https://arxiv.org/abs/2205.06397>

## Problem

- The Spotted Lanternfly (SLF) is an invasive planthopper that threatens biodiversity and the agricultural economy.
- There is currently no publicly available dataset of SLF images.
- Thus, there is an inability to develop computer vision methods such as pose estimation, detection, and accurate identification to help mitigate the invasive SLF.

## Contribution

- LANTERN-RD – a novel image dataset of the invasive SLF and look-alikes.
- Baseline convolutional neural network validating dataset.
- Mobile Application Framework for identification of SLF against visually similar species.



Figure 1. The SLF and its look-alikes. Similar body-shape, color, and the presence of a bright pink, orange, or red underwing contribute to the visual similarity of these insects.

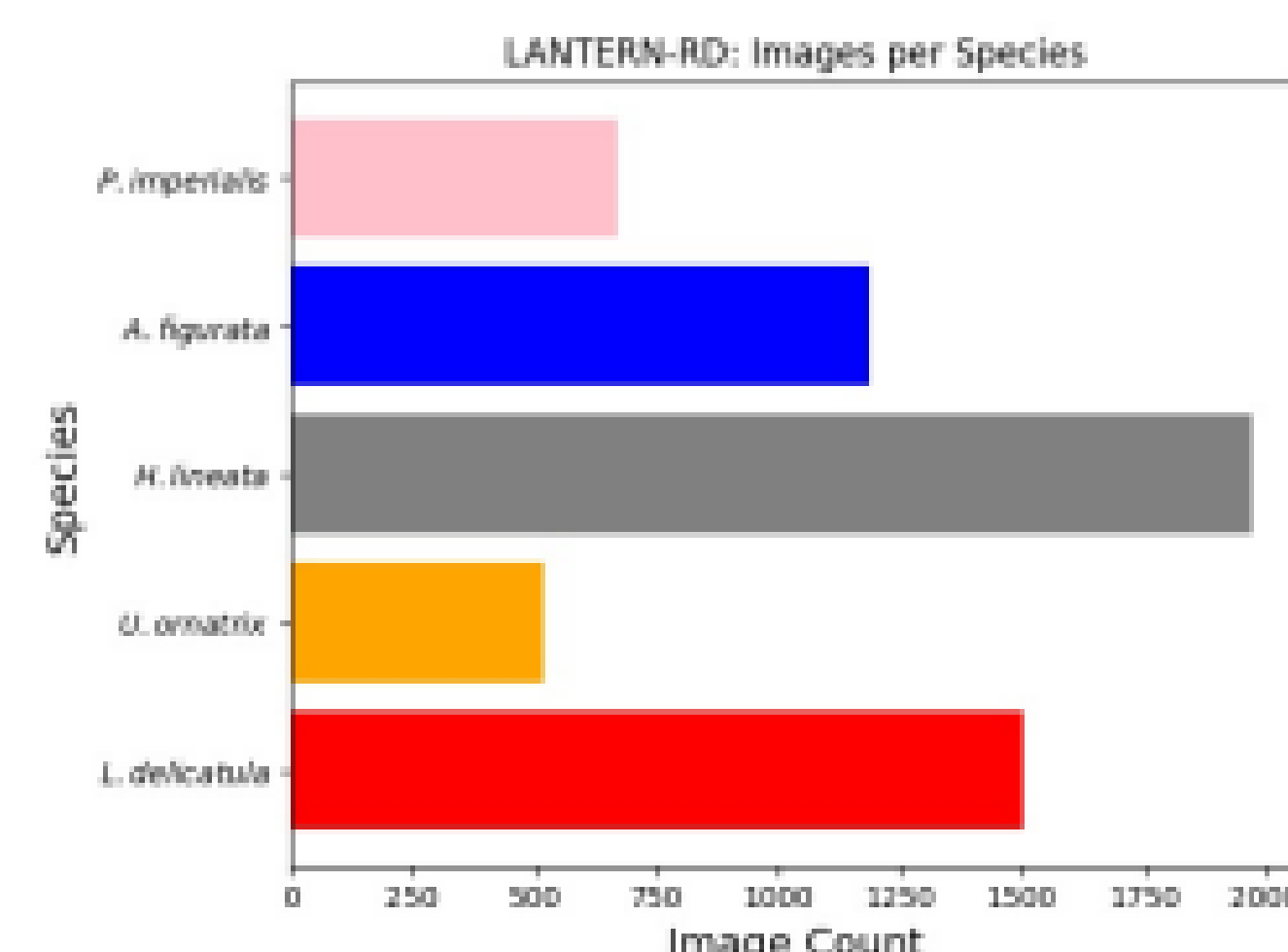


Figure 2. Distribution of Images Per Species.

**5**  
Classes  
**5850**  
Images

- URL-form
- Varied poses, lighting conditions, backgrounds

## Baseline CNN

- VGG-16 Architecture
- 60-20-20 split
- 50 epochs at rate 1e-3

Species	F1 Score
<i>L. delicatula</i> (Spotted Lanternfly)	0.983
<i>A. figurata</i> (Tiger Moth)	0.946
<i>P. imperialis</i> (Pink Underwing)	0.935
<i>U. ornatix</i> (Bella Moth)	0.984
<i>H. lineata</i> (White-Lined Sphinx Moth)	0.989

**97.20%** Test Accuracy

## Mobile Application Framework

- Media Sensationalization of the SLF problem.
- Citizen Action: “Stomp It Out!”.
- An identification framework is necessary to prevent wildlife damage.

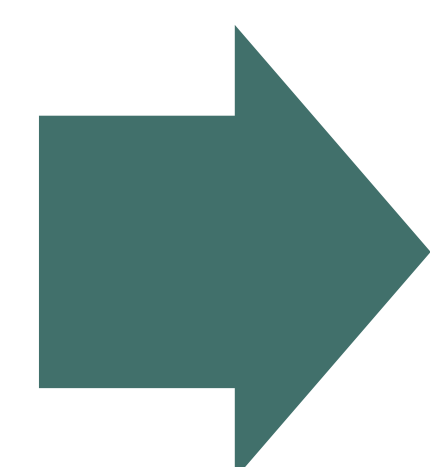
## Conclusion

- Introducing LANTERN-RD, a curated dataset of images of the invasive SLF and look-alikes to enable downstream CV applications.
- 5 Classes and 5850 images.
- Baseline Classifier achieves 97.20% Accuracy.
- Performance validates potential of dataset.
- App framework proposal for public and researchers involved in mitigation.
- Future: Community submissions.

## Curation

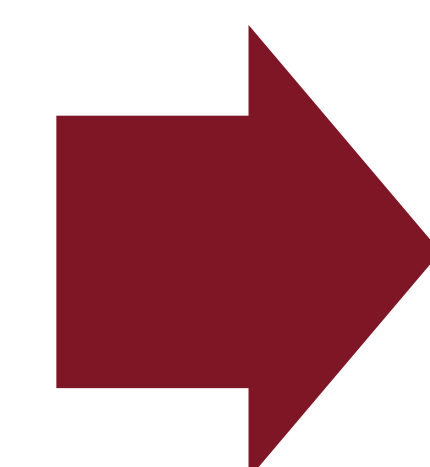
### Extraction

- Sources: LAION, Bing
- Strategic queries to assemble initial uncured dataset



### Automated Filtration

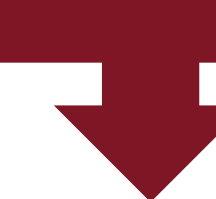
- Image Hashing to remove duplicates
- Caption-parsing for keywords



### Additional Filtration

- Manual Parsing for final dataset

Capture & Upload Image of Suspected SLF



Feed Into Baseline Classifier



Output Prediction of Insect Class