

- [27] T. Zamljen et al., “Apple fruit (*Malus domestica* Borkh.) metabolic response to infestation by invasive brown marmorated stink bug (*Halyomorpha halys* Stal.),” *Horticulturae*, vol. 7, no. 8, 2021, Art. no. 212.
- [28] D. Popescu et al., “New trends in detection of harmful insects and pests in modern agriculture using artificial neural networks. A review,” *Front. Plant Sci.*, vol. 14, 2023, Art. no. 1268167.
- [29] L. Liu, R. Wang, C. Xie, R. Li, F. Wang, and L. Qi, “A global activated feature pyramid network for tiny pest detection in the wild,” *Mach. Vis. Appl.*, vol. 33, no. 5, 2022, Art. no. 76.
- [30] K. Simonyan and A. Zisserman, “Very deep convolutional networks for large-scale image recognition,” 2014, *arXiv:1409.1556*.
- [31] S.-H. Kang and J.-S. Park, “Aligned matching: Improving small object detection in SSD,” *Sensors*, vol. 23, no. 5, 2023, Art. no. 2589.
- [32] N. Carion et al., “End-to-end object detection with transformers,” in *Proc. Eur. Conf. Comput. Vis.*, 2020, pp. 213–229.
- [33] T. Lin et al., “Microsoft COCO: Common objects in context,” *Comput. Vis. ECCV 2014. Lecture Notes Comput. Sci.*, D. Fleet, T. Pajdla, B. Schiele, T. Tuytelaars, Eds., Springer, Cham, vol. 8693, 2014. [Online]. Available: https://doi.org/10.1007/978-3-319-10602-1_48
- [34] C.-Y. Wang, I.-H. Yeh, and H.-Y. M. Liao, “YOLOv9: Learning what you want to learn using programmable gradient information,” 2024, *arXiv:2402.13616*.
- [35] A. Wang et al., “YOLOv10: Real-time end-to-end object detection,” 2024, *arXiv:2405.14458*.
- [36] V. Ferrari et al., “Evaluation of the potential of near infrared hyperspectral imaging for monitoring the invasive brown marmorated stink bug,” *Chemometrics Intell. Lab. Sys.*, vol. 234, 2023, Art. no. 104751.
- [37] R. W. Kennard and L. A. Stone, “Computer aided design of experiments,” *Technometrics*, vol. 11, no. 1, pp. 137–148, 1969.
- [38] R. Calvini et al., “Development of a classification algorithm for efficient handling of multiple classes in sorting systems based on hyperspectral imaging,” *J. Spectral Imag.*, vol. 7, pp. 1–15, 2018.
- [39] S. Liu, J. Cheng, L. Liang, H. Bai, and W. Dang, “Light-weight semantic segmentation network for UAV remote sensing images,” *IEEE J. Sel. Topics Appl. Earth Observ. Remote Sens.*, vol. 14, pp. 8287–8296, Aug. 2021.
- [40] P. Gonzalez et al., “An extremely compact and high-speed line-scan hyperspectral imager covering the SWIR range,” in *Image Sensing Technologies: Materials, Devices, Systems, and Applications V*, vol. 10656. Bellingham, WA, USA: SPIE, 2018, pp. 118–126.
- [41] R. Faster, “Towards real-time object detection with region proposal networks,” in *Proc. Adv. Neural Inf. Process. Syst.*, 2015, pp. 2969239–2969250.
- [42] T.-Y. Ross and G. Dollár, “Focal loss for dense object detection,” in *Proc. IEEE Conf. Comput. Vis. Pattern Recognit.*, 2017, pp. 2980–2988.
- [43] A. Kargar, M. P. Wilk, D. Zorbas, M. T. Gaffney, and B. Q’Flynn, “A novel resource-constrained insect monitoring system based on machine vision with edge AI,” in *Proc. 5th Int. Conf. Image Process. Appl. Syst. (IPAS)*, 2022, pp. 1–6.
- [44] A. Kargar et al., “Detecting *Halyomorpha halys* using a low-power edge-based monitoring system,” *Comput. Electron. Agriculture*, vol. 221, 2024, Art. no. 108935.
- [45] N. Mamdouh and A. Khattab, “YOLO-based deep learning framework for olive fruit fly detection and counting,” *IEEE Access*, vol. 9, pp. 84252–84262, 2021.
- [46] Q. Guo, C. Wang, D. Xiao, and Q. Huang, “Automatic monitoring of flying vegetable insect pests using an RGB camera and YOLO-SIP detector,” *Precis. Agriculture*, vol. 24, no. 2, pp. 436–457, 2023.
- [47] M. Grinberg, *Flask Web Development: Developing Web Applications With Python*. Sebastopol, CA, USA: O’Reilly Media, 2018.
- [48] S. Imambi, K. B. Prakash, and G. Kanagachidambaresan, “PyTorch,” in *Programming With TensorFlow: Solution for Edge Computing Applications*, Berlin, Germany: Springer, 2021, pp. 87–104.
- [49] L. Maistrello et al., “Monitoring of the invasive *Halyomorpha halys*, a new key pest of fruit orchards in Northern Italy,” *J. Pest Sci.*, vol. 90, pp. 1231–1244, 2017.
- [50] J. C. Bergh et al., “Effect of pre-harvest exposures to adult *Halyomorpha halys* (Hemiptera: Pentatomidae) on feeding injury to apple cultivars at harvest and during post-harvest cold storage,” *Crop Protection*, vol. 124, 2019, Art. no. 104872.
- [51] R. Calvini, G. Foca, and A. Ulrici, “Data dimensionality reduction and data fusion for fast characterization of green coffee samples using hyperspectral sensors,” *Anal. Bioanalytical Chem.*, vol. 408, pp. 7351–7366, 2016.
- [52] L. Nørgaard et al., “Interval partial least-squares regression (i PLS): A comparative chemometric study with an example from near-infrared spectroscopy,” *Appl. Spectrosc.*, vol. 54, no. 3, pp. 413–419, 2000.
- [53] W.-H. Lee et al., “Hyperspectral near-infrared imaging for the detection of physical damages of pear,” *J. Food Eng.*, vol. 130, pp. 1–7, 2014.
- [54] Y. Li et al., “Exploring the limit of detection on early implicit bruised ‘Korla’ fragrant pears using hyperspectral imaging features and spectral variables,” *Posth. Biol. Tech.*, vol. 208, 2024, Art. no. 112668.

Open Access funding provided by ‘Università degli Studi di Firenze’ within the CRUI CARE Agreement