Pengyu Chu

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EDUCATION

Michigan State University **Aug. 2018 – Dec. 2023**
Ph.D. in Electrical and Computer Engineering *Lansing, MI*

Michigan State University **Dec. 2019 – Dec. 2020**
M.Sc. in Computer Science and Engineering *Lansing, MI*

Sichuan University **Sep. 2012 – Jun. 2016**
B.S. in Computer Science *Chengdu, China*

INTERESTS

deep learning, multimodal learning, computer vision, and robotic perception.

RESEARCH EXPERIENCE

Orchard Segmentation | Website **2023 - now**

- Developed panoptic segmentation models (Deeplabv3) to our orchard dataset and obtained an average accuracy of 82%.
- Designed skeleton-lead models for branch segmentation and improved F1-score from 58.4% to 70.4%
- Developed an efficient image annotation tool called PicA to reduce the data preparation time by more than 50%.

Apple Detection & Localization | Website **2020 - 2022**

- Designed a suppression mask R-CNN for apple detection and improved the F1-score from 82% to 86%.
- Designed occlusion-aware detection models for clustered apples and improved the F1-score from 82% to 88%.
- Developed a laser-based 3D fruit localization pipeline and its accuracy surpassed RealSense by 40% in orchards.

Traffic Anomalies Detection **2018 - 2019**

- Developed an traffic anomalies tracking model (using faster R-CNN and deepsort), and obtained an accuracy of 73.2%.

WORK EXPERIENCE

Software Engineer | *@ Guazi Inc. Beijing, China* **Dec. 2016 - Dec. 2017**

- Developed and maintained an car inspection app in Android, including UI components and video reading/writing.
- Designed and developed an instant messaging app from scratch in Android, including UI prototype, functionalities, and network communication.

AWARDS

ASABE: Rain Bird Engineering Concept of the Year Award 2023
Outstanding Bachelor's Thesis in Sichuan University 2016
1st Prize in The Eighth National Challenge Cup Mathematical Contest in Modeling 2015

PUBLICATIONS

[1] **Chu, P.**, Li, Z., Zhang, K., Chen, D., Lammers, K., and Lu, R. (2023). O2RNet: Occluder-occludee relational network for robust apple detection in clustered orchard environments. Smart Agricultural Technology, 5, pp.100284. **(SAT)**
[2] **Chu, P.**, Li, Z., Lammers, K., Lu, R. and Liu, X. (2021). Deep learning-based apple detection using a suppression mask R-CNN. Pattern Recognition Letters, 147, pp.206-211.**(Pattern Recognition)**
[3] Zhang, K., Lammers, K., **Chu, P.**, Dickinson, N., Li, Z. and Lu, R. (2022). Algorithm Design and Integration for a Robotic Apple Harvesting System. IEEE/RSJ International Conference on Intelligent Robots and Systems, Kyoto, Japan, 2022, pp. 9217-9224. **(IROS)**
[4] Zhang, K., Lammers, K., **Chu, P.**, Li, Z. and Lu, R. (2023). An Automated Apple Harvesting Robot – from System Design to Field Evaluation. Journal of Field Robotics. **(JFR)**
[5] Zhang, K., Lammers, K., **Chu, P.**, Li, Z. and Lu, R. (2021). System design and control of an apple harvesting robot. Mechatronics, 79, p.102644.

[6] Lu, R., Dickinson, N., Lammers, K., Zhang, K., **Chu, P.**, and Li, Z. (2022). Design and evaluation of end effectors for a vacuum-based robotic apple harvester. Journal of the ASABE, 0. **(ASABE)**

UNDER REVIEW

[1] **Chu, P.**, Li, Z., and Lu, R. (2023). Skeleton-lead Dispersion Segmentation for Branch Prediction in Orchards.
[2] **Chu, P.**, Li, Z., Zhang, K., Lammers, K., and Lu, R. (2023). High-Precision Fruit Localization Using Active Laser-Camera Scanning: Robust Laser Line Extraction for 2D-3D Transformation.
[3] Zhang, K., **Chu, P.**, Li, Z., Lammers, K., and Lu, R. (2023). Active Laser-Camera Scanning for High-Precision Fruit Localization in Robotic Harvesting: System Design and Calibration.

PATENT

Renfu Lu, Zhaojian Li, Kyle Lammers, Kaixiang Zhang and Pengyu Chu. FRUIT PERCEPTION SYSTEM FOR ROBOTIC HARVESTING. US Patent App (18/463,516), 2023.

SKILLS

Python, C/C++, SQL, Shell, LaTeX.
Pytorch, Keras, Scikit-learn, OpenCV, NumPy, SciPy, Matplotlib, Pandas, Anaconda, ROS, Git.