Pengyu Chu

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EDUCATION

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

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

INTERESTS

multimodal learning, visual reasoning, robotic perception and embodied AI.

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 Thesis Award, Sichuan University 2016
1st Prize in The Eighth National Challenge Cup Mathematical Contest in Modeling 2015
2nd Prize Scholarship, Sichuan University 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.