

Byron Zhang

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Education

Princeton University - B.S.E. in Computer Science

Princeton, NJ

Minors: Cognitive Science, Robotics, Statistics & Machine Learning

Sept 2019 - Current

- GPA: 4.00/4.00 (Departmental), 3.96/4.00 (Cumulative)
- Relevant Graduate Coursework: Recent Advances in Computer Vision, Theoretical Machine Learning, Advanced Computer Vision
- Relevant Undergraduate Coursework: Probabilistic Models of Cognition, Probability Theory, Robotics, Computational Biology & Genomics

Publications

Rethinking Out-of-Distribution Detection

Manuscript under Review in CVPR 2023

W. Yang*, B. Zhang*, O. Russakovsky

PandaSet: Advanced Sensor Suite Dataset for Autonomous Driving

IEEE Intelligent Transportation Systems Conference (ITSC)

P. Xiao, Z. Shao, S. Hao, Z. Zhang, X. Chai, J. Jiao, Z. Li, J. Wu, K. Sun, K. Jiang, Y. Wang and D. Yang

Research Experience

Princeton Visual AI Lab

Princeton, NJ

Research Assistant Advised by Prof. Olga Russakovsky

Sept 2021 - Present

- Rethinking Out-of-Distribution Detection: Proposed a new formulation of Out-of-Distribution (OOD) detection to safely account for overlooked prevalence of covariate distribution shifts; designed a benchmark to address the conflict between OOD detection and generalization, constructed a large-scale OOD detection dataset based on ImageNet hierarchy, and performed experiments that demonstrated reordering of the state-of-the-art for OOD detectors. **Paper submitted to CVPR 2023.**
- Score Calibration using Common Patterns in Object Detection: Executed year-long Junior Independent Work to investigate variables that influence confidence scores in object detectors. Built a suite of score calibration methods using object size, class imbalance, and contextual bias; achieved **+2.9% AP** on the LVIS Dataset and **+0.7% AP** on COCO.
- Geodiverse Dataset Collection: Investigated viability of foundation models (CLIP) on filtering and retrieving frames in newsroom videos from countries underrepresented in common computer vision datasets.

Meta AI Research - Perception & Action Team

Menlo Park, CA

Research Engineering Intern

May 2022 - Jul 2022

- Designed and implemented a pipeline for class-incremental continual learning in egocentric videos; established a benchmark and a baseline achieving **35% AP** for video detection performance on a challenging dataset containing 108 object instances.
- Analyzed the effect of false rejection from different Out-of-Distribution (OOD) detection algorithms on task performance of object detection and instance segmentation in egocentric videos; improved task performance of object detection by **+1.2% AP**.
- Collected dataset for egocentric vision with 20 videos of common daily activities.

Hesai Technology - Localization & Mapping Team

Remote

Research Intern

Aug 2020 - Jan 2021

- Implemented a suite of metrics for evaluating performance on 3D Multiple-Object Tracking and 3D Object Detection.
- Developed web application using Flask and React to generate evaluation reports on LIDAR point cloud-based object detection of autonomous driving scenes. Currently in use by Hesai research team.
- Co-authored one paper presenting the first open-source autonomous vehicle dataset available for both academic and commercial use.

Projects

Multimodal Serial Reproduction

2022 Probabilistic Models of Cognition Course Project (Ongoing)

- Conducted empirical experiments and mathematically model human behavior on telephone game involving both image and text.

TigerSnatch: Course Enrollment Subscription Service

2021 Advanced Programming Techniques Course Project

- Led team of 3 to develop web application that notifies students when a full course becomes available.
- 4400+ active users, growing daily; currently maintained by Princeton's Undergraduate Student Government.

Modeling McGurk Effect via Neural Networks

2021 Computational Modeling of Psychological Functions Course Project

- Designed neural networks to model the miscategorization of auditory cues when human subjects are given visual stimulus.

Differential Gene Analysis of Pediatric Septic Shock Patients

2021 Computational Biology Project

- Reproduced *Nature* paper to analyze novel genes and pathways in pediatric septic shock patients.

Small-Scale Automatic Image Colorization

2020 Computer Vision Course Project

- Analyzed effectiveness of different approaches to colorize small grayscale images; selected as outstanding course project.

Work Experience

Facebook - Instagram Direct Messaging

Remote

Software Engineering Intern

May 2021 - Aug 2021

- Devised a new pipeline for the send path of Direct Messaging in Instagram using Django and Hack; accelerated progress on unifying Messenger and Direct Messaging infrastructures.
- Launched the new pipeline to 100% of Instagram users; accumulated traffic of ~400K hits/day. Resolved all errors and inconsistencies between the legacy and the new send path.

BlockApps - Blockchain Platforms

Remote

Software Engineering Intern

May 2020 - Aug 2020

- Prototyped a system that enables clients to simulate a multi-node Blockchain network and to debug Ethereum Solidity Code using Haskell.
- Collaborated on building a Command-Line Interface that migrates execution Solidity code from a compiler to a parser.

Awards

2022 **Tau Beta Pi Engineering Honor Society**, Awarded to top 1/8 of junior class.

2022 **Friedland Endowed Fund**, \$1k Awarded to conduct Senior Thesis and Junior Independent Work research.

2021 **TigerApp**, 1 out of 21 web applications recognized by the Undergraduate Student Government.

Leadership & Teaching

Princeton AI4ALL

Remote

Instructor

Jul 2022 - Aug 2022

- Composed curriculum on machine learning and computer vision, co-teaching high school 7 high school juniors in three-week summer program.
- Advised three student projects on applications of computer vision in biodiversity.

Department of Computer Science, Princeton University

Princeton, NJ

Teaching Assistant, Grader

Feb 2020 - Dec 2021

- COS 429 (Computer Vision): Facilitated office hours and problem sessions, provided feedback to student assignments and final projects.
- COS 126 (Introduction to Computer Science): Attended 3-hour grading meeting for weekly assignments and debugged student code.

Princeton Outdoor Action Freshman Orientation

Princeton, NJ

Leader

Jan 2020 - May 2022

- Lead 5-day backpacking trip; teach backpacking, camping, and wilderness survival skills.
- Organize weekly local hiking trip for undergraduate and graduate students.

Interests

Mountaineering Expeditions in the Himalayas, Karakorams, and the Andes.

A Cappella Bass for the Princeton Footnotes, low-voice a cappella group founded in 1959. Led 8-day tour in SF Bay Area in Fall 2022.

Film Making Interested in producing dark comedy; proficient in screenwriting, camera operations, and editing in Adobe Premiere.

Languages

English Native proficiency

Chinese Native proficiency

French Intermediate proficiency