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: Probablistic 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 Assiatant 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*

Software 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 Probablistic 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): Faciliated 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