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), 3.97/4.00 (Cumulative)
- Relevant Graduate Coursework: Recent Advances in Computer Vision, Theoretical Machine Learning, Cryo-Electron Microscopy
- Relevant Undergraduate Coursework: Probablistic Models of Cognition, Probability Theory, Robotics, Computational Biology & Genomics

Publications

Rethinking Out-of-Distribution Detection: The Model Perspective

Manuscript under Review in ICCV 2023

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

PandaSet: Advanced Sensor Suite Dataset for Autonomous Driving

IEEE Intelligent Transportation Systems Conference (ITSC) 2021

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.
- *Score Calibration in Object Detection*: Executed Junior Independent Work to investigate variables that influence confidence scores in object detectors. Built a suite of confidence score calibration methods using object size, class imbalance, and contextual bias; achieved **+2.9% AP** on the LVIS Dataset and **+0.7% AP** on the MSCOCO Dataset.
- *Geodiverse Dataset Collection*: Investigated viability of foundation models (CLIP) on filtering and retrieving frames in newsroom videos from geographic regions 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 object 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

- Collaborate on team of 3 to develop web application that notifies students when a full course becomes available.
- 4900+ active users, 123K+ notifications sent, 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 of 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 **Best Apps for Princetonians**, 1 out of 21 web applications recognized by the 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.
- Prepared and gave daily lectures; led project sessions.
- 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.

Skills

Languages English (Native), Chinese (Native), French (Intermediate).

Programming Pytorch, Tensorflow, Django, MongoDB, NodeJS, ReactJS, Flask.

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.