Justin Yue

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EDUCATION

University of California, Irvine. <div align="right">Irvine, California</div>
Bachelor of Science in Computer Science. <div align="right">**GPA:** 3.88</div>

RESEARCH EXPERIENCE

Autonomous Smart System Guard Lab: Machine Learning Researcher <div align="right">Irvine, CA</div>
Python, C++, PyTorch, Computer Vision/ Perception <div align="right">May 2022 - Present</div>

- That Person Moves Like a Car: Evaluated potential vulnerabilities in a new LSTM-based, spatial-temporal defense for self-driving vehicles' perception suites.
- Intriguing Properties of Diffusion Models: Defined a new attack vector, using publicly available diffusion models, against object detection models. Found that this new attack vector, which manipulates objects' robust features, can trick Tesla's perception **without optimization**.
- Seeing Isn't Believing: Re-implemented an adversarial attack to produce embedded examples that cause object detection failures.

IoTSity REU: Undergraduate IoT Researcher <div align="right">Irvine, CA</div>
Python, Flask, PostgreSQL, Docker <div align="right">June 2021 - August 2021</div>

- **Designed an algorithm** that searches a shortest path for relevant smart bins while preserving users' privacy.
- Optimized **time series database** design by **reducing** redundancies in entities' relationships from 10 to 3.
- Served the novel algorithm & PostgreSQL database on a Python Flask server with HTTP endpoints.

PUBLICATIONS

Bolded names denote first authors.
- [AAAI 2024] **Takami Sato, Justin Yue, Nanze Chen**, Ningfei Wang, Qi Alfred Chen, Intriguing Properties of Diffusion Models: A Large-Scale Dataset for Evaluating Natural Attack Capability in Text-to-Image Generative Models, Association for the Advancement of Artificial Intelligence (AAAI) 2024. *Under submission to Conference, Passed 1st Round.*
- [IoTSity REU 2021] **Justin Yue**, Primal Pappachan, Sharad Mehrotra, Privacy Preserving Search Mechanism for Smart Waste-bins, Internet of Things University (IoTSity) REU 2021. *Poster Submission.*

WORK EXPERIENCE

NAV Robotics: Perception Software Engineer Intern <div align="right">Newport Beach, CA</div>
Python, C++, PyTorch, OpenCV, Numpy, ROS2, AWS <div align="right">September 2023 - Present</div>

- Wrote a ROS package to **perform proximity segmentation** and initiate emergency braking when close objects are detected.
- Built a dataset from scratch to train a YOLO variant model to **detect objects, lanes, and drivable surfaces in parallel**.
- Optimized the YOLO variant model with TensorRT to run locally on the NVIDIA Jetson Orin Nano.

Meta (formerly Facebook): Software Engineer Intern <div align="right">Seattle, WA</div>
Android, Kotlin/Java, Jetpack WindowManager, Dependency Injection, Mockito, GraphQL <div align="right">June 2022 - Sept 2022</div>

- Refactored user interfaces, leading to a **15% usage increase** across family of apps on large screen devices.
- Debugged and augmented new features to media sharing, **providing value** to strategic partners e.g. Microsoft.
- Validated new features with **90%+ test coverage** and A/B tests, finding **0 regressions** across core metrics.

PROJECTS

Multi-Object Tracking for Robotics & Augmented Reality <div align="right">July 2023 - August 2023</div>
Python, Numpy, OpenCV, PyTorch, Open3D, HoloLens 2 headset <div align="right">Computer Vision Project</div>

- Consulted literature to implement the **DeepSORT technique** in tracking multiple objects with the HoloLens2 sensors.
- Used the Mahalanobis distance and deep learning appearance descriptors to match detected objects with previous tracks, which **beats** Euclidean distance-based & IoU-based matching.
- Performed **high-fidelity** 3D reconstruction by filtering noisy 3D points and increasing the Poisson technique's depth.

Robot Arm Mainpulation - Pick & Place
C++, Drake Manipulator Library, Eigen, CMake

June 2023 - August 2023
Robotics Project

- Utilized Drake's simulator to build a virtual environment for testing a 7-joint KUKA robot arm's pick & place ability.
- **Calculated the trajectory** needed to pick an object and place at a target, using inverse kinematics to guide the arm's PID control.
- Converted the grasping problem to a quadratic program problem **to select the optimal surfaces** on an object to grasp.

Distributed SLAM for Swarm Robotics
C++, Eigen, GTSAM, OpenCV, Pangolin Visualization

April 2023 - June 2023
Computer Vision Project

- Devised a computer vision pipeline that to map an environment **using multiple agents**.
- Leveraged visual markers and the Perspective-n-Point technique to accurately estimate the camera pose in the world frame.
- Detected loop closures with the **Visual Bag of Words technique** to reduce the effect of sensor drift on camera pose accuracy.

Hit the Puck! - Teaching a Robot Air Hockey
Python, NumPy, PyTorch, Matplotlib, MushroomRL, Imitation Library

April 2023 - June 2023
Robotics/ Reinforcement Learning **(RL)** Project

- Trained a robot agent with RL techniques to beat a baseline agent that uses classical control.
- Kickstarted the agent's learning with imitation techniques, significantly enhancing the initial policy's performance compared to agents that did not imitate the baseline agent.
- Pre-computed the hockey puck's position in the world frame, streamlining training by removing complex calculations.
- Created visualizations to analyze the progress of training in comparison with the baseline agent.

CycleGAN: Neural Style Transfer Neural Network
Python, Pytorch, Matplotlib, Numpy, Generative Model

November 2022 - December 2022
Computer Vision Project

- Built a neural network model that can translate cloudy images to sunny images and vice versa.
- Trained the model to generate realistic, accurate images **while avoiding the common failure**, mode collapse.
- Applied loss criterions such as content similarity and identity loss **to improve the optimization process** during training.

3D Reconstruction Pipeline Project
Python, Numpy, OpenCV, Matplotlib

April 2022 - June 2022
Computer Vision Project

- Automated the multi-step process of calibrating cameras & defining the point clouds, reducing 8 steps to 1.
- Extracted smoother 3D surfaces with removal of outlier 3D points & averaging techniques.
- Achieved final reconstruction using the Poisson technique w/ minimal deviation from the ground truth.

DeepLabV3: Neural Network Image Segmentation
Python, PyTorch, TorchVision, PIL, Numpy, MatplotLib

April 2022 - June 2022
AI Project

- Implemented the DeepLabV3 architecture to **semantically segment objects** from the PASCAL VOC 2012 dataset.
- Utilized **dilated convolutions**, which results in a model with less parameters and more details captured at multiple contexts.
- Experimented between different backbone architectures and optimization strategies to achieve good performance.

Self-Driving Vehicle State Estimation w/ Probabilistic Graphical Models
Python, Numpy, Matplotlib

April 2022 - June 2022
Statistical Filtering Project

- Implemented the Kalman filter in estimating a vehicle's position with an average error of 0.55 meters.
- Improved the filter's estimation by removing more noise in post-processing, **decreasing the average error to 0.001 meters**.

AWARDS

- **UCI Dean's List 2020 - 2023:** Achieved ≥ 3.65 GPA while enrolled in ≥ 12 units.
- **UC Davis Big Bang! Competition 2022 Finalist**: Demonstrated strong entrepreneurial spirit in building and pitching a startup.
- **Adversarial ML Competition 2022 1st Place:**: Implemented the best defense against adversarial attacks.
- **Kaggle Competition 2021 2nd Place:** Scored 2nd highest AUC in predicting customer behavior with ensemble ML methods.
- **BeachHacks 2021 GCP 1st Place**: Acknowledged for best use of GCP technologies in Android app.
- **Congressional App Challenge 2019 Winner**: Created an accessible mobile app to help patients with physical therapy exercises.

TECHNICAL SKILLS

- **Programming Languages:** Python, C++, Java, Kotlin, Javscript/Typescript, SQL, NoSQL.
- **Technologies:** Git, Linux, AWS, GCP, ROS, Docker, CMake.
- **Graduate Coursework:** Image Understanding, Deep Generative Models, Light & Geometry in Computer Vision, Reinforcement Learning (Control Theory, ML, & AI).