Elias Oliver Chang

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Education

University of California Santa Cruz **Santa Cruz, CA**
Ph.D. & M.S. Computer Science and Engineering 3.90/4.00 GPA 09/2022 - 06/2027
Relevant courses: AI (graph search optimization), Deep learning (TensorFlow / PyTorch, NumPy, Pandas, Matplotlib), Computer Architecture (RISC-V, Assembly), Compiler Design (PLY, Regex, C++), Advanced Topics in NLP (HuggingFace, Transformers)

Pomona College **Claremont, CA**
B.A. Computer Science & Mathematics 3.62/4.00 GPA 09/2018 - 05/2022
Thesis: "Fast Matrix Multiplication: A Song of Mathematics and Computer Science"

Experience

Graduate Student Researcher **Santa Cruz, CA**
University of California Santa Cruz 09/2022 - Current

- Invented new transferable **reinforcement learning (RL)** algorithm for **continuous control tasks** using **PyTorch** and **soft actor-critic (SAC)** which gained a **67%** increase in rewards garnered against the baseline.
- Vectorized algorithm using **Torch Compile, Torch RL, and CUDA Graphs**, resulting in 5× speed up in evaluating **RL** algorithms across 500k timesteps.
- Developed a novel **SAC reward function** by using an **MTL-robustness** formulation to train an adversarial RL agent, successfully finding vulnerabilities in a **2 dimensional** search space instead of **1 dimension**.
- First-author paper to be submitted to **AAAI 2026**.

AI Program Coordinator Intern **San Jose, CA**
Lumentum 06/2024 - 09/2024

- Automated company-wide meeting summaries by developing an **Azure Function** app that retrieves Teams meeting transcripts via **Microsoft Graph API**, saving the company 90 hours of manual labor.
- Saved **$250,000/year** in liscensing fees by implementing summarizer with **OpenAI API (GPT-4o) and Azure Function**, eliminating the need for Microsoft Teams Premium for 4,500 employees.
- Wrote **Python** code to **Prompt Engineer** consistent summary generation, generate markdown, and distribute email meeting organizers, resulting in a **bitbucket** codebase that is used and maintained among 2 employee engineers.
- Improved model training workflows by implementing data integrity checks and handling compatibility with **DuckDB**, **AWS S3**, and **PyTests**, contributing to a **CNN (EfficientNetV2)** model achieving an **AUC of 0.97**.

Research Assistant **Claremont, CA**
Pomona College 05/2021 - 07/2022

- Programmatically collected data for a custom dataset by adding visual perturbations from a **Normal Distribution**, increasing domain adaptation across **convolutional neural network (CNN)** architectures by 7%.
- Visualized data results using **Seaborn** and statistical tests using **Scikit-learn**, revealing that **Recurrent Neural Networks (RNNs)** outperformed **ResNet** architectures by 9%.
- First-author conference paper published at **IEEE Symposium on Computational Intelligence 2021** [LINK].

Projects

Collaborative Embodied Reasoning in Autonomous Driving [LINK] **09/2023-08/2024**

- Improved autonomous vehicle decision-making in **CARLA** by using **LLMs (ChatGPT and LLaMA)** and **LLaVA** for embodied reasoning, passing **50** more tests than baseline.
- Fine-tuned **LLaVA** image descriptions by creating a dataset with 20,000 RGB-images, annotated with objects in **CARLA**, resulting in shortened and specialized image descriptions of driving scenes.
- Made a **Docker image** and **Kubernetes** deployment which is used by **6** other lab members to run **CARLA** in a remote server with a GUI desktop.

Foundation of Deep Learning Class Final Project [LINK] **09/2023-12/2023**

- Scored a 72% image classification accuracy on a custom dataset, which is composed of multiple datasets, by fine-tuning a **ResNet152** in **PyTorch**, using **SGD** and **Cross Entropy Loss**.
- Improved model performance by 15% by applying a **learning rate scheduler (Cosine Annealing)**, a tailored **weighted sampling distribution**, and **image augmentations** such as **resizing, transformations, and random erasing**.
- Model placed in the **75%** percentile in model accuracy among the entire class of 30 students in a **Kaggle competition**.

Publications

Conferences/Workshops

- Chang O., Kamat A. A., Self W. "Collaborative Embodied Reasoning in Autonomous Driving". Training Agents with Foundation Models workshop at RLC 2024
- Chang, O. "Solving Phase Ordering with Off-Policy Deep Reinforcement Learning Algorithms". EuroLLVM 2024. Abstract available at [LINK].
- Chang, O., Marchese, C., Mejia, J., and Clark, A. (2021) "Investigating Neural Network Architectures, Techniques, and Datasets for Autonomous Navigation" in Simulation" IEEE Symposium Series on Computational Intelligence. [LINK]
- Chang, O., Gilpin, L. "Applying Policy Gradient Methods to Image-Based Autonomous Vehicles". BayLearn 2023. Abstract available at [LINK].
- Chang, O. "Fast Matrix Multiplication: A Song of Mathematics and Computer Science". Pomona College Mathematics Thesis Presentation 2022. [LINK]
- Roberto C., Chang O., Gilpin H., La Rosa B., Proietti M., Ragno A. "eXplainable AI approaches for deep reinforcement learning." AAAI 2024. Topics include but are not limited to XAI methods for deep learning, evaluation of XAI methods, and self-explainable deep reinforcement learning. [LINK].