

Allan Zhang

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Skills

Programming Languages and Frameworks: Python, PyTorch, NumPy, Matplotlib, OpenCV, YOLO, Jax, Hugging Face, L^AT_EX, C++

Languages: English, Korean

Experience

Undergraduate Research Assistant | BigML
UCLA

Los Angeles, CA
Nov 2024 – Present

- Aided PhD student in developing pipelines to train and evaluate custom, lightweight VLMs on spatial reasoning tasks, attempting to understand where and why model fails. Findings allow us to work on creating optimal, high-quality datasets to improve performance
- Wrote functions to create highly modular datasets, testing the effects of modality mismatch, spurious correlations, alignment between visual and textual context, and number of unique images per class on model's performance
- Utilizing mechanistic interpretability techniques, used hooks to extract each layer's activation patterns, as well as the model's predictions during each layer. Created heatmaps using Seaborn to visualize how data is processed throughout the model
- Used custom linear probes to determine if tensors passed through model still retained spatial information, specifically testing the tensors passed through the multimodal projector

Projects

Doodle Guesser

[MyOwnDoodleGuesser](#) 

- Using a vision transformer (OpenAI's CLIP-Vit-Large-Patch-14), downstreamed model to predict animal drawings created by users. Collected and processed 1,000,000+ images from 6 classes to create dataset to fine-tune model on. Improved model's accuracy from 54% to 87% after fine-tuning
- Also created CLIP model from scratch using PyTorch. Wrote custom tokenizer and encoders to embed input labels and images into multi-dimensional vectors. Achieved 70% accuracy after being trained on subset of previous dataset, only using 200,000 images.
- Both models used to create game similar to Google Doodle where users draw animals from 6 specified classes and model guesses what animal was drawn. Users' drawings converted into 28x28 tensor consisting of 0s and 1s, fed into model for prediction
- Tools Used: Python, PyTorch, Pygame, Hugging Face, NumPy

UCLA Dining Assistant

[What2Eat@UCLA](#) 

- Using Deepseek API and online data, created chatbot to help students decide where to eat at UCLA
- Created pipeline to scrape UCLA's dining hall menus and extract menu items, descriptions, and ingredients for each dining hall. Used BeautifulSoup to access raw HTML files, wrote functions to extract and clean data, and stored it to readable .txt file.
- Provided Deepseek-chat with data about each dining hall, allowing users to ask chatbot for suggestions based on their preferences. Bot can take into account flavor/cuisine preferences, allergens, dietary restrictions, as well as any other criteria for choosing where to eat.
- Currently implementing small, lightweight open source model, encoders, and cosine similarity functions to replicate Deepseek's functionality.
- Tools Used: Python, bs4, openai, Transformers

Efficient Finetuning Pipeline

Fine-Tuning Functions [↗](#)

- Wrote functions to efficiently fine-tune and evaluate models on weak GPUs or CPU. Functions focused on batching images fed into model to reduce VRAM requirements and preventing Google Colab from crashing
- Tested on OpenAI's CLIP-Vit-Large-Patch-14 model using CIFAR-10 dataset. Using built-in training functions from Hugging Face caused Google Colab to crash, custom functions did not. Saw 5% improvement in accuracy (91% → 96%) with limited training data, computational power, and time. To prevent overfitting, wrote new function to shuffle training dataset for every epoch
- Tools Used: Python, PyTorch, Google Colab, Hugging Face

Self Published Novel

2020 - 2021

- Wrote a 45,000 word novel, published it online. Amassed 272,000 reads, 7,000 comments, and 6,200 reviews. Reviewed other authors' works, providing grammatical advice

Education

University of California, Los Angeles

Sept 2024 – June 2028

BS in Applied Mathematics

- **GPA:** 4.00
- **Relevant Coursework:** Multivariable Calculus, Linear Algebra, Discrete Structures, Computer Science (Math 32A, Math 32B, Math 33A, Math 61A, CS 31)