Kuan Heng (Jordan) Lin

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Education

Computer Science B.S., minor in Mathematics *September 2021–Present*
University of California, Los Angeles (GPA: 4.0, Dean's Honor List, Upsilon Pi Epsilon)
Coursework: Computer Vision, Graphics, Deep Learning, Algorithms & Data Structures, Imaging, Programming Languages, Software Construction, Quantum Computing, Systems, Theory, Logic Design, Linear Algebra, Analysis, Probability, Statistics, and more

Computer Science Intensive Studies | Stanford University (GPA: 4.0) *June–August 2020*
Coursework: Mathematical Foundations of Computing, Programming Abstractions

Publications

[1] Sicheng Mo, Fangzhou Mu, Kuan Heng Lin, Yanli Liu, Bochen Guan, Yin Li, and Bolei Zhou. *FreeControl: Training-Free Spatial Control of Any Text-to-Image Diffusion Model with Any Condition*. 2023. arXiv: 2312.07536 [cs.CV]. URL: https://genforce.github.io/freecontrol/.

Research

Undergraduate Researcher | Zhou Lab at UCLA *March 2023–Present*

- Inject temporal and instance consistency to Stable Diffusion and ControlNet vision models with inter-frame attention, simulation-in-the-loop conditioning, and NeRF 3D consistency for video generation and realistic rendering of autonomous driving simulations.
- Implement training-free methods for grounded & image-conditioned generation, extending to `SDXL` and video generation.
- Port and combine large research and benchmark `Python` + `PyTorch` repositories as research baseline, cross-referencing papers and different repository APIs to develop general-purpose grounded & interactive generation modules based on `Diffusers`.
- Develop novel methods for semantic latent space manipulation of diffusion models with deterministic and stochastic sampling, leveraging inversion to perform direct real-image editing and visualize diffusion latent guidance to measure dataset and model bias.
- Propose novel training-free controllable and image-to-image generation for any text-to-image model via principal component extraction of seed images and diffusion guidance optimization with arbitrary condition images (e.g., depth maps, line art, mesh previews).

URC-Sciences Summer Program Scholarship Researcher | Zhou Lab at UCLA *June 2023–September 2023*

- Design first ever open-source human-in-the-loop video generator by extending Stable Diffusion with video guidance. *Ongoing.*

Undergraduate Researcher | The Ozcan Research Group (HHMI Program) *October 2022–Present*

- Design Fourier residual and attention blocks for diffusion autoencoders and generative adversarial networks for accurate and disentangled hologram reconstruction, super-resolution, and axial distance prediction at reduced network sizes.
- Adapt existing ResNet and ResNeXt architectures with Fourier residual networks to learn image features in both the discrete and frequency domain, achieving state-of-the-art accuracy with fewer parameters.
- Design and optimize novel Fourier-based models for biomedical imaging, image classification, and generative vision.

Student Researcher | The Bouchard Lab at UCLA *April 2022–January 2023*

- Design and implement novel Levenberg–Marquardt optimizer for via Hessian-free and Accelerated methods (e.g., Gauss–Newton, Approximate Gradient Descent, Hessian-free, Curveball) in both `TensorFlow` and `PyTorch` with `CUDA` on distributive networks.
- Develop multi-stage training methods that incorporate optimization and regularization techniques for image classification with distributed and parallel computing to achieve state-of-the-art accuracies at reduced computational costs.

Conference Paper Co-author, Presenter *April–September 2020*
3rd International Conference on Artificial Intelligence and Pattern Recognition (AIPR 2020)

- Published and presented a conference paper examining textual political bias of online news articles via social network extraction (network features) with named entity recognition using `spaCy`, advocating for further research in textual characteristics.
- Mentored by Dr. Chih Ming Tsai to conduct web corpora scraping and statistical modeling, finding that network features have little correlation with Liberal or Conservative bias, but bias and neutrality.

Interests & Skills

Research: Generative AI, computer vision, machine learning, optimization, explainability, image processing, natural language processing
Programming: `Python` (`PyTorch`, `TensorFlow`, `JAX`), `C++`, `C`, `Assembly`, `R`, `MATLAB`, `Rust`, `Haskell`, `React`, `Flask`, `JavaScript`, `HTML/CSS`
Miscellaneous: Pedagogy, science communication, filmmaking, photography, video editing, content creation, music composition
Languages: English (fluent), Chinese (native)

Work Experiences

Program Development Team | UCLA CS, UCLA CAE, Learning Assistant Program *June 2023–Present*

- Optimize & automate LA application and review with Airtable `JavaScript` and Gmail scripting for 600+ applicants supporting 14000+ students in UCLA STEM courses, streamlining applicant review and communication for a downsized (33%) PDT team.
- Advertise the LA program to increase applicants for key CS courses by 300% and communicate with professors & administrators for high-demand courses to be supported by the program, empowering more students through collaborative and inclusive teaching.

Head Learning Assistant | UCLA Computer Science, Learning Assistant Program *March 2022–June 2023*

- Lead weekly discussions and bi-weekly workshops for COM SCI 33: Computer Organization to review material and lead worksheets for 400+ students. Reviewed very positively, notably my willingness to help, clarity of explanations, and passion for teaching.
- Organize meetings, plan pedagogy activities and workshops, and host content meetings to facilitate and mentor CS 33 LAs.

Projects & Experiences

Co-President, Workshops Officer | ACM Student Chapter at UCLA, AI Committee *May 2022–Present*

- Host weekly reading groups that meet and discuss recent ML papers, such as deep generative vision, modern reinforcement learning, and federated learning, culminating in project and event ideas for general members such as the adversarial AI competition.
- Spearhead general member programs (e.g., special topics discussions) and bold initiatives (e.g., AI hackathons, research team, shared compute, inter-comittee collaborations) which drastically improved member retention, officer burnout, and club exposure.
- Revamp beginner track and advanced track workshop topics on machine learning topics such as gradient descent, automatic differentiation, `Python` package management, and utilizing `Python` notebooks, improving retention by 100%.

Machine Learning Engineer | people2vec, LA Hacks 2023: Overall Third Place *April 2023*

- Created the social media platform, people2vec, powered by large language models and vision models and YouTube watch histories that matches people with others near them of similar media interests to form genuine, authentic connections.
- Integrated Co:here sentence embeddings and pretrained `Inception V3` feature maps to perform distribution analysis inspired by Frechét Inception Distance to compute similarity scores between YouTube titles and thumbnails using `PyTorch`.
- Visualize matched user data with principal component analysis to convey interest information while preserving privacy.

Full-stack Developer | Wikisafe, HackMIT 2022: Blockchain for Society Second Prize *October 2022*

- Created a crowd-sourced knowledge database powered by machine learning and blockchain for secure version management.
- Integrated fine-tuned text summarization, caption generation, and generative imagery `PyTorch` models and `Solidity` smart contracts on the Ethereum blockchain with `Web3.js` in a full-stack web application with an intuitive user interface.

Full-stack Developer | T-Eggletop Map Creator *January 2022–Present*

- Created an online homebrew tabletop RPG map designer that makes campaign design easier, faster, and more accessible for game master of all levels, collaborating in a team of five with `Git` and handled operations & version control.
- Implemented and built efficient full-stack APIs (`MongoDB`, `Express.js`, `React.js`, `Node.js`), user authentication and profile modifications, map structures, `MongoDB` database communication, frontend interfaces, map builder, and deployment.

Assistant Managing Editor of Review | UCLA Undergraduate Science Journal *January 2022–Present*

- Draft and polish letters to authors which succinctly culminate and summarize all reviewer reviews, provide constructive and detailed feedback for authors, and prepare comprehensive reports for the editorial board for further communication.
- Lead small teams of reviewers to set rigorous benchmarks and helpful guidelines for reviewing papers.

Cinematographer, Editor, Composer | UCLA Film & Photography Society Production *September 2021–Present*

- *Manic Pixie Vending Machine* (cinematographer, colorist, assistant editor), *Fear No Evil* (cinematographer, colorist, assistant editor), *On Her Time* (cinematographer, colorist, assistant editor, composer), *Doldrums* (behind-the-scenes cinematographer).
- Lead large camera & lighting teams to set up lighting, camera equipment, and sets to create stunning visuals from little budget.
- Work with directors during pre-production, production, and post-production to realize their creative vision.
- Used professional cameras, gimbals, and sliders, colorgraded and edited Adobe Premiere projects with sound mixing and composition.

Machine Learning Engineer | Re (Recycling Elevated), LA Hacks 2022 *April 2022*

- Constructed a real-time garbage classifier model (for garbage type and category) with `PyTorch`, `ResNet` and `MaskRNN` that guides, simplifies, and gamifies the recycling process, deploying a mobile web application with a `React.js` frontend and `Flask` backend.

Research & Project Lead | Data Science Union at UCLA *October 2021–Present*

- Lead passionate student to conduct independent research and experimentation on generative models, including generative adversarial networks, diffusion models, and autoencoders, with a focus on exploring the explainability of latent spaces.
- Constructed neural network models with `PyTorch`, `Doc2Vec`, and `BERT` that predict tweet hashtags, stance, and sentiment.

Student Researcher | DataRes at UCLA, Research Team *March 2022–December 2022*

- Design and fine-tune BERT-based transformer models for adaptive and controllable natural language and music generation.
- Trained and presented graph convolutional networks (ICLR 2017) for semi-supervised node classification and regression tasks, including affiliation prediction with social networks and city GPS coordinate prediction/regression with *Wikipedia* page hyperlinks via latent space interpretation of graph convolution and embedding outputs.
- Integrated the `PyTorch DGL` framework with `Neo4j DBMS` to train with large datasets and visualizations.

Physics Engine Developer | Lofi Beats to Scale and Rotate to *April–June 2022*

- Developed and maintained a physics engine from scratch, complete with linear and angular collision detection and resolution, with `JavaScript`, `tiny-graphics.js`, and `OpenGL` to create a robust sandbox with user interaction.
- Implemented real-time shadowing with `OpenGL` from scratch via light-view texture maps.

Awards & Honors

URC-Sciences Summer Program Scholarship *June 2023*
UCLA Dean's Honor List *Fall 2021–Spring 2023*
LA Hacks Third Place *April 2023*
Upsilon Pi Epsilon Honor Society *November 2022*
HackMIT Blockchain for Society Second Place *October 2022*
QWER Hacks Community & Connection First Place *January 2022*
XIS Headmaster's List *2018–2021*