Arjun Subramonian (they/them)

Computer Science Department

University of California, Los Angeles
405 Hilgard Ave
Los Angeles, CA 90095 USA
Phone: 408-859-2148

Email: arjunsub@ucla.edu
Website: arjunsubramonian.github.io
Google Scholar: publications
LinkedIn: linkedin.com/in/arjuns22
Medium: medium.com/@arjunsuboo
GitHub: github.com/ArjunSubramonian
Semantic Scholar: publications

Research Interests

graph representation learning, self-supervised learning, fairness

Education

PhD in Computer Science; University of California, Los Angeles (2021-), *Advisor:* Yizhou Sun
BS in Computer Science; University of California, Los Angeles (2018-2021), *GPA:* 3.927, Summa Cum Laude

Work Experience

Researcher, UCLA Scalable Analytics Institute (2019-)
Location: Los Angeles, California
Description: Please consult Research Projects section below for further details.

Researcher, UCLA NLP (2020-)
Location: Los Angeles, California
Description: Please consult Research Projects section below for further details.

Incoming Software Engineering Intern, Snap, Inc. (2021)
Location: Los Angeles, California
Description: I will build machine learning models as part of the Snap Monetization team.

Research Engineering Intern, AllenNLP, Allen Institute for Artificial Intelligence (2021)
Location: Seattle, Washington
Description: Please consult Research Projects section below for further details.

Software Engineering Intern, Microsoft Corporation (2020)
Location: Sunnyvale, California
Description: I crafted a peer-to-peer-anonymous, secure backend technical design for a feature to report harassment on Microsoft Teams.

Software Engineering Intern, Get Heal, Inc. (2019)
Location: Los Angeles, California
Description: I engineered full-stack integrations of mechanisms used every day at Heal that enhance the automated routing of medical providers, like automated triaging, doctor-assistant match prevention, and phone number verification. I also adapted Heal's automated routing algorithm to optimally schedule telemedicine visits, which greatly benefits patients during the COVID-19 pandemic.

Deep Learning Engineer, Sike AI (2018-2019)
Location: Los Angeles, California
Description: I designed and implemented the in-house deep learning model for working style-analysis from video with TensorFlow.

Publications

Zhang, Shichang, Ziniu Hu, **Arjun Subramonian**, and Yizhou Sun. "**Motif-Driven Contrastive Learning of Graph Representations**." Accepted at **SSL@WWW2021**, submitted to **ICML 2021**.

Subramonian, Arjun. "**MOTIF-Driven Contrastive Learning of Graph Representations**." Accepted to **Undergraduate Consortium @ AAAI 2021**.

Brown, Calvin, Derek Tseng, Paige M. K. Larkin, Susan Realegeno, Leanne Mortimer, **Arjun Subramonian**, Dino Di Carlo, Omai B. Garner, and Aydogan Ozcan. "**Automated, Cost-Effective Optical System for Accelerated Antimicrobial Susceptibility Testing (AST) Using Deep Learning**." **ACS Photonics 2020** 7 (9), 2527-2538 DOI: 10.1021/acsphotonics.0c00841

Crandall, Sara, Graeme H. Smith, **Arjun Subramonian**, Kelly Ho, and Evelyn M. Cochrane, "**Estimating the Ages of FGK Dwarf Stars Through the Use of GALEX FUV Magnitudes**." **Astronomical Journal 2020** 160, 217, DOI: https://doi.org/10.3847/1538-3881/abb77d

Subramonian, Arjun. "**Queer | Inclusive | Badass**." Accepted to **Resistance AI Workshop @ NeurIPS 2020**.

Talks

2021 - Queer in AI Panel, UCLA
2021 - Introduction to Probabilistic Graphical Models, **UCLA Scalable Analytics Institute**
2020 - Spectral Graph Sparsification, **UCLA Scalable Analytics Institute**
2020 - "MONET: Debiasing Graph Embeddings via the Metadata-Orthogonal Training Unit," **Microsoft Research Cambridge Paper Reading Group**
2020 - Fair Machine Learning, **Microsoft Garage Brown-Bag**
2019 - An Automated and Cost-Effective System for Early Antimicrobial Susceptibility Testing Using Optical Fibers and Deep Learning, **UCLA HHMI Day 2019**

Honors and Awards

2021 - Eugene V. Cota-Robles Fellowship, UCLA
2021 - Graduate Research Assistantship, UCLA
2021 - Boeing Company Scholarship, UCLA
2021 - Brian J. Lewis Endowment, UCLA
2020 - Computing Research Association Outstanding Undergraduate Researcher Honorable Mention
2020 - AAAI Undergraduate Consortium (1 of 14 accepted out of 82 applicants)
2020 - IBM Quantum Challenge (1 of 574 winners out of 1745 participants)
2020 - Out for Undergrad Tech Conference (1 of 300 accepted applicants)
2020 - Google Queer Tech Voices Conference (1 of 32 accepted out of hundreds of applicants)
2019 - 3rd Place Award for Best Hack @ Rose Hack, Major League Hacking
2018-2021 - Dean's Honors List
2017 - Siemens Competition Regional Finalist (1 of 101 finalists selected from 4092 entrants)
2016 - Award of Achievement, Association for Computing Machinery, San Francisco Bay Area Professional Chapter

Research Projects

AllenNLP Fairness Library (2021)
Mentors: Akshita Bhagia, Evan Pete Walsh
Location: Allen Institute for Artificial Intelligence

Description: I am developing AllenNLP's fairness library, which makes fairness metrics, training-time fairness algorithms, bias mitigation algorithms, and bias metrics accessible to researchers and practitioners of all levels. I will apply the bias mitigation algorithms to AllenNLP's Masked Language Model to make it less gender-biased, apply training-time fairness algorithms to Textual Entailment and Sentiment Analysis models, and evaluate the fairness of and measure the biases in the representations learned by the aforementioned models. I will also write a blog post detailing my work.

Harms and Challenges Associated with Treatment of Non-Binary Gender in Language Technologies (2021)
Research Mentors: Dr. Sunipa Dev, Professor Kai-Wei Chang
Location: UCLA NLP
Description: We study the representational and allocational harms of treating gender as binary in English language technologies, and the related challenges that need to be addressed. We do so via a survey of non-binary folks with familiarity with AI and our own experiments.

Expressive Graph Transformers (2020-)
Research Mentors: Professor Yizhou Sun
Location: UCLA Scalable Analytics Institute
Description: I'm empirically and theoretically studying the effect of different types of handcrafted and adaptive relational information for relation-aware self-attention on improving the expressiveness and performance of graph Transformers. As part of this project, I implemented and train a multi-GPU graph Transformer model using PyTorch.

Motif-Driven Contrastive Learning of Graph Representations (2020)
Research Mentors: Shichang Zhang, Ziniu Hu, Professor Yizhou Sun
Location: UCLA Scalable Analytics Institute
Description: We propose MICRO-Graph to: 1) pre-train Graph Neural Networks (GNNs) in a self-supervised manner to automatically extract graph motifs from large graph datasets; 2) leverage learned motifs to guide the contrastive learning of graph representations, which further benefit various graph downstream tasks.

Heterogeneous Graph Transformer (2019-2020)
Research Mentors: Ziniu Hu, Professor Yizhou Sun
Location: UCLA Scalable Analytics Institute
Description: I adapted the implementation of the Heterogeneous Graph Transformer (HGT) to efficiently embed web-scale knowledge graphs (e.g. YAGO, DBpedia) for link prediction and ran R-GCN baselines. Additionally, I prepared an OGB leaderboard submission in which I applied HGT to the ogbl-ppa dataset.

Automated, Cost-Effective Optical System for Accelerated Antimicrobial Susceptibility Testing (AST) Using Deep Learning (2018-2019)
Research Mentors: Calvin Brown, Professor Aydogan Ozcan
Location: UCLA Ozcan Research Group
Description: I designed a neural network that inexpensively and automatically detects bacterial resistance to antibiotics, which shortens the timeline of prescribing antibiotics to patients in resource-limited settings by about 60%, helping to mitigate the rise of global antimicrobial resistance. I implemented and trained the neural network with Python and Keras, tuning hyperparameters and visualizing learning curves, weights, and hidden-layer activations, achieving FDA essential agreement for 99.5% of drugs.

Estimating the Ages of FGK Dwarf Stars Through the Use of GALEX FUV Magnitudes (2017)
Research Mentors: Professor Graeme Smith, Sara Crandall
Location: University of California, Santa Cruz, Smith Lab
Description: I applied machine learning and statistics to discover a novel method for estimating the age of FGK dward stars using GALEX far-ultraviolet (FUV) magnitudes that is more cost and time-efficient, as well as more accessible, than existing methods.

An Empirical Characterization Of Internet Round-Trip Times (2016)
Research Mentor: Daniel S.F. Alves

Location: University of California, Santa Cruz, Internetworking Research Group (i-NRG)
Description: I applied machine learning to develop an RTT boundary prediction algorithm which employs online linear regression to predict future RTTs, thereby reducing unnecessary packet retransmissions, delays in retransmission, and overall network congestion.

Course Projects

Robust Model-Agnostic Meta-Learning for Binary Content Moderation Tasks in Natural Language Processing (2020)
Research Mentor: Professor Kai-Wei Chang
Location: University of California, Los Angeles
Description: We investigated applying Model-Agnostic Meta-Learning (MAML) to boost performance on binary content moderation tasks in low-resource contexts. Using PyTorch, we compared the ability of a model pre-trained with MAML to adapt to unseen binary content moderation tasks to those of a model pre-trained using traditional transfer learning approaches and a model trained from scratch.
Notes: **Report**

On the Complexity and Convergence of Approximate Policy Iteration Schemes (2020)
Research Mentor: Professor Lin Yang
Location: University of California, Los Angeles
Description: We surveyed relevant literature in approximate policy iteration, and provided theoretical proof sketches involved in the analysis of the complexity bounds, convergence guarantees, and rates of convergence for various approximate policy iteration algorithms.
Notes: **Report**, **Poster**

Model-Agnostic Meta-Learning for a Policy Gradient Approach to MuJoCo Continuous Control Tasks (2020)
Research Mentor: Professor Jonathan Kao
Location: University of California, Los Angeles
Description: We investigated the adaptive power of Model Agnostic Meta-Learning on a policy gradient approach to MuJoCo continuous control tasks.
Notes: **Report**

Quantum Programming Algorithms (2020)
Research Mentor: Professor Jens Palsberg
Location: University of California, Los Angeles
Description: We implemented Deutsch-Jozsa, Bernstein-Vazirani, Grover's algorithm, and Simon's algorithm using PyQuil and Qiskit. We then evaluated the implementations and modern quantum compile and runtime capabilities using the Rigetti and IBM quantum simulators and IBMQX quantum devices.
Notes: **PyQuil Report**, **Qiskit Report 1**, **Qiskit Report 2**

MovieLens Recommender System (2019)
Research Mentors: Jyun-Yu Jiang, Professor Wei Wang
Location: University of California, Los Angeles
Description: We created a recommender system to predict the binary rating for 4M unseen UserID-MovieID pairs in the MovieLens dataset. We surveyed the performance of content-based (e.g. TF-IDF, genre-based decision tree, etc.) and collaborative filtering (e.g. SVM, SVD, element-wise matrix factorization, tabular matrix factorization, hybrid matrix factorization, etc.) methods. **We achieved the third highest ROC-AUC on the test set in our data mining class.**
Notes: **Report**

Service

Core Organizer, Queer in AI (2021-)
Location: Virtual
Description: I organize socials and workshops at AI conferences (e.g. AAAI-21, ICML '21), as well as the undergraduate mentoring pro-

gram, which gets junior queer and trans folks involved with AI research. Additionally, I advise AI conferences on diversity and inclusion and accessibility issues. Finally, I meet weekly to discuss administrative issues.

Organizer, UCLA Computer Science Summer Institute (2021)
Location: Los Angeles, California
Description: I recruited and interviewed diverse Undergraduate Tutors for the inaugural UCLA Computer Science Summer Institute (CSSI) to lead interactive coding and problem-solving sessions with the high school students for both the Introductory and Intermediate tracks. I am working with Professor Yizhou Sun and Professor Parvaneh Ghaforyfard to onboard the selected Undergraduate Tutors, organizing pedagogy and technical knowledge preparation sessions. Additionally, I advertised UCLA CSSI to ACM Teach LA at UCLA's partner schools, encouraging minoritized students to apply.

Outreach Director, ACM AI at UCLA (2019-2021)
Location: Los Angeles, California
Description: I strive to make an AI education accessible to everyone. I co-founded, led, and taught an open-source, accessible machine learning and fairness course at underserved schools in LA. I led the development of interactive, online learning modules (e.g. gradient descent, mean-squared error, convolutional filters, biases in machine learning, etc.) I also created and produced the "You Belong in AI!" podcast, which empowers underrepresented youth to pursue AI opportunities through inspiring interviews with researchers. Lastly, I organized events for diverse students to access AI research opportunities.

Co-Founder and Organizer, QWER Hacks (2019-2021)
Location: Los Angeles, California
Description: I co-founded and organized Major League Hacking's first-ever LGBTQIA+ event and the first collegiate LGBTQIA+ hackathon in the US.

Undergraduate Learning Assistant (2018)
Location: Los Angeles, California
Description: I led weekly recitation sections of 20 students for the introductory computer science class (programming in C++), walking through practice problems and actively applying pedagogy techniques (e.g. open questioning, inclusion of all perspectives, etc.)

Coursework and Skills

Graduate-level Coursework: Fairness, Ethics, Accountability and Transparency in Natural Language Processing; Neural Networks and Deep Learning; Reinforcement Learning Theory and Applications; Adversarial Robustness in Machine Learning; Quantum Programming
Relevant Skills: Python, PyTorch, PyTorch Geometric, shell scripting, LaTeX