YUFAN ZHUANG

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EDUCATION

University of California San Diego, La Jolla, CA Sep 2021 - Present
PhD in Computer Science, Department of Computer Science & Engineering, Advisor: Prof. Jingbo Shang
Research Interests: Natural Language Processing, Large Language Models, Meta Learning

Columbia University, New York, NY Aug 2018 - Dec 2019
MS in Data Science, Data Science Institute, GPA: 3.96 / 4.00
Coursework: Machine Learning, Deep Learning, Reinforcement Learning, Mathematical Analysis

Hong Kong Polytechnic University, Kowloon, HK Sep 2014 - May 2018
BSc (Hons) with First Class Honors in Applied Mathematics, Minor in Computer Science, GPA: 4.00 / 4.00

EMPLOYMENT

Research Scientist Intern Sep 2024 - Current
AMD GenAI *San Diego, CA*
· Developing better reasoning for LLMs

Research Scientist Intern June 2024 - Sep 2024
Meta - Reality Labs *Menlo Park, CA*
· Designed Vision-LLMs for image understanding and QA
· Researched on efficient multi-modality fusion for high definition images

PhD Research Intern June 2023 - Sep 2023
Microsoft Research - Deep Learning Group *Redmond, WA*
· Designed LLM for tabular datasets that can outperform optimal/classical decision tree algorithms
· Developed large-scale data collection and model pertaining pipeline
· Paper released on Arxiv

Graduate Research Assistant Sep 2022 - Current
UC San Diego, Department of Computer Science & Engineering, Advisor: Prof. Jingbo Shang *San Diego, CA*
· Generally interested in making LLMs more powerful
· Now is the best time to work on NLP!
· Developed method to teach transformers algorithms - MetaTree
· Developed framework to enhance Transformers by learning attention in adaptive wavelet space - WaveSpa

Research Software Engineer (Full-time) Jan 2020 - Sep 2021
IBM T. J. Watson Research Center, Supervisor: Dr. Alessandro Morari, Jim Laredo *New York, NY*
· Explored ways for neural methods to understand the logic structure of source code for better robustness and interpretability
· Researched novel graphical neural network architecture for vulnerability detection
· Published two papers & filed four patents (2 global patents, 2 US patents)

Graduate Research Intern May 2019 - August 2019
IBM T. J. Watson Research Center, Supervisor: Dr. Alessandro Morari, Jim Laredo *New York, NY*
· Designed and implemented framework for large scale data analysis on HPC
· Developed deep learning pipeline for vulnerability detection and localization

Graduate Research Assistant Jan 2019 - Dec 2019
Columbia University, Department of Computer Science, Advisor: Prof. Baishakhi Ray, Prof. Suman Jana *New York, NY*
· Worked on problems in software engineering that utilize NLP and deep learning, focusing on dataset bias analysis
· Developed models for automated vulnerability detection

Undergraduate Research Assistant Feb 2017 - Apr 2017 & Mar 2018 - Jul 2018
HKPU, Department of Applied Mathematics, Advisor: Prof. Xin Guo, Prof. Ting-kei Pong *Hong Kong*
· Built medical MRI demo using non-convex sparse optimization algorithm
· Conducted analysis of probabilistic as well as SVD-based topic modelling methods

PREPRINT & PUBLICATION

Yufan Zhuang, Chandan Singh, Liyuan Liu, Jingbo Shang, and Jianfeng Gao "Vector-ICL: In-context Learning with Continuous Vector Representations" *arXiv:2410.05629*, (2024).

Yufan Zhuang, Pierce Chuang, Yichao Lu, Abhay Harpale, Vikas Bhardwaj, and Jingbo Shang "Viper: Open Mamba-based Vision-Language Models" *https://huggingface.co/ViperVLM*, (2024).

Feng Yao*, **Yufan Zhuang***, Zihao Sun, Sunan Xu, Animesh Kumar, Jingbo Shang "Data Contamination Can Cross Language Barriers" *EMNLP'24*, (2024).

Yufan Zhuang, Liyuan Liu, Chandan Singh, Jingbo Shang, and Jianfeng Gao "Learning a Decision Tree Algorithm with Transformers" *Transactions on Machine Learning Research (TMLR)*, (2024).

Yufan Zhuang, Zihan Wang, Fangbo Tao, Jingbo Shang "WavSpA: Wavelet Space Attention for Boosting Transformers' Long Sequence Learning Ability" *NeurIPS UniReps: the First Workshop on Unifying Representations in Neural Models*, 2023

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Jim Laredo, Alessandro Morari, Udayan Khurana, "Incorporating Signal Awareness in Source Code Modeling: An Application to Vulnerability Detection" *ACM Transactions on Software Engineering and Methodology, Volume 32, Issue 6, Article No.: 145 pp 1–40*, 2023

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Jim Laredo, Alessandro Morari, Udayan Khurana, "Code Vulnerability Detection via Signal-Aware Learning" *IEEE 8th European Symposium on Security and Privacy (EuroS&P)*, 2023

Qiang Fu, **Yufan Zhuang**, Yushu Zhu, Xin Guo, "Sleeping Lion or Sick Man? Combining Computational Approaches to Deciphering Heterogeneous Images of Chinese in North America, 1978-2019." *Annals of the American Association of Geographers (IF: 4.683)*, 2022

Yufan Zhuang, Sahil Suneja, Veronika Thost, Giacomo Domeniconi, Alessandro Morari, Jim Laredo "Software Vulnerability Detection via Deep Learning over Disaggregated Code Graph Representation." *arXiv:2109.03341*, 2021

Sahil Suneja, Yunhui Zheng, **Yufan Zhuang**, Alessandro Morari, Jim Laredo "Towards Reliable AI for Source Code Understanding." *ACM Symposium on Cloud Computing (SOCC) Vision Track*, 2021

Sahil Suneja*, Yunhui Zheng*, **Yufan Zhuang*** *(equal contribution)*, Alessandro Morari, Jim Laredo "Probing Model Signal-Awareness via Prediction-Preserving Input Minimization." *ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (ESEC/FSE)*, 2021

Qiang Fu, **Yufan Zhuang**, Jiaxin Gu, Yushu Zhu, Xin Guo, "Agreeing to Disagree: Choosing among Topic-Modeling Methods." *Big Data Research (IF: 3.578)*, 2020

Luca Buratti, Saurabh Pujar, Mihaela Bornea, Scott McCarley, Yunhui Zheng, Gaetano Rossiello, Alessandro Morari, Jim Laredo, Veronika Thost, **Yufan Zhuang**, Giacomo Domeniconi, "Exploring Software Naturalness through Neural Language Models." *arXiv:2006.12641*, 2020

Sahil Suneja, Yunhui Zheng, **Yufan Zhuang**, Jim Laredo, Alessandro Morari, "Learning to map source code to software vulnerability using code-as-a-graph." *arXiv:2006.08614*, 2019

Qiang Fu, **Yufan Zhuang**, Jiaxin Gu, Yushu Zhu, Huihui Qin, Xin Guo, "Search for K: Assessing Five Topic-Modeling Approaches to 120,000 Canadian Articles." *BPOD workshop at IEEE International Conference on Big Data: 3640-3647, 2019*

PATENT

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Alessandro Morari, Jim Alain Laredo, "Artificial intelligence model learning introspection", US/WO Patent, No. US20230130781A1, 2023

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Alessandro Morari, Jim Alain Laredo, "Training data augmentation via program simplification", US/TW/WO Patent, No. US20230113733A1, 2023

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Alessandro Morari, Jim Alain Laredo, "Complexity based artificial intelligence model training", US/CN/JP Patent, No. US20230115723A1, 2023

Sahil Suneja, **Yufan Zhuang**, Yunhui Zheng, Alessandro Morari, Jim Alain Laredo, "Probing Model Signal Awareness", US Patent, No. US20220358400A1, 2023

RESEARCH PROJECTS

Transformer for Generating Explainable Decision Tree Jun 2023 - Feb 2024

Microsoft Research & UC San Diego, Advisor: Dr. Chandan Singh, Dr. Liyuan Liu, Prof. Jingbo Shang

- Training Transformers to generate optimal decision trees on tabular data
- Able to outperform optimal decision tree algorithms and regular decision tree algorithms.

· *Keywords: Meta learning, Tabular Dataset, Explainable Model*

Large Language Model and Social Constructs Jun 2023 - Present
University of British Columbia, Department of Sociology, Advisor: Prof. Qiang Fu
· LLM provides an innovative perspective on sociology, an ocular we have never had before
· We aim to study how media constructs our reality, using LLM as our powerful probe
· *Keywords: Large Language Model, Prompt Engineering, Computational Sociology*

Effective and Efficient Natural Language Processing Sep 2022 - June 2023
UC San Diego, Department of Computer Science & Engineering, Advisor: Prof. Jingbo Shang
· Solving challenges related to effectiveness and efficiency of current NLP models
· Thinking from both the model and data perspective
· *Keywords: efficient transformer, data concentration*

Topic Modelling and Sentiment Analysis of Newspaper Articles Sep 2017 - June 2023
University of British Columbia, Department of Sociology, Advisor: Prof. Qiang Fu
· Analyzed western media's sentiment of Chinese related articles by applying BERT and topic modeling
· Proposed a systematic way of comparing topic modeling methods, including both statistical and neural methods
· *Keywords: sentiment analysis, topic modelling, data mining*

Deep Learning for Software Vulnerability Analysis Jan 2020 - Sep 2021
IBM Research, Department of Hybrid Cloud, Supervisor: Dr. Alessandro Morari, Jim Laredo
· Probing how much do deep learning models' truly understand about learned software vulnerability
· Enhancing deep learning models' robustness/reliability with software engineering methods
· Explored how GNN can be utilized in fuzzing to reach pre-defined targets
· *Keywords: robustness & interpretability, adversarial learning, GNN, hybrid fuzzing*

Deep Learning for Software Vulnerability Detection Sep 2018 - Dec 2019
Columbia CS - Analytical Research in Software Engineering Lab, Advisor: Prof. Baishakhi Ray, Prof. Suman Jana
· Utilized deep learning models to discover data biases in current public datasets
· Proposed methodologies in measuring & categorizing the data biases, both quantitatively and qualitatively
· Collected real-world vulnerability data from Chrome Bugzilla and National Vulnerability Database (NVD)
· *Keywords: dataset bias, support vector machine, code normalization*

PROFESSIONAL ACTIVITIES

Reviewer: OOPSLA'20, TSE'21, AAAI'21, OOPSLA'21, NeurIPS'23 (UniReps), WWW'23, NeurIPS'24 (XAI), ICML'24, WWW'24, ICLR'25, TMLR

TA Experience: CSE 250A - Probabilistic Reason & Learning (Fall 2022, Fall 2023, Fall 2024), CSE 257 - Search and Optimization (Winter 2023), CSE 251A - Machine Learning: Learning Algorithms (Spring 2023), DSC 148 - Introduction to Data Mining (Winter 2024), DSC 258R - Natural Language Processing (Spring 2024)

Lab instructor of workshop, "An Introduction to Big Data and Automated Text Analysis for Social Scientists", University of British Columbia, June 7-8, 2019

SELECTED ACCOMPLISHMENTS AND AWARDS

Jacobs School of Engineering Fellowship	2021
Department of Applied Mathematics Scholarship for Hall Residents	2017/18
The Hong Kong Polytechnic University (Eastern Canada) Association Scholarship	2017/18
The Hong Kong Polytechnic University Scholarship	2016/17
Honorable Mention, The Mathematical Contest in Modeling	2016
HKSAR Government Scholarship - Reaching Out Award	2015/16
Dean's List	2014/15, 2016/17, 2017/18
Second Prize in National Olympiad in Informatics (Anhui Province)	2011