Tianyi Yang (Tim)

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About Me

I obtained my Ph.D. at the Chinese University of Hong Kong and developed interdisciplinary skillsets in both machine learning and system engineering. My current research focuses on using cutting-edge machine learning to model monitoring metrics and improve the reliability and performance of cloud computing systems. Till December 2022, I have published papers in top conferences, including ICSE, ASE, DSN, ICDCS, WWW, ISSRE, etc. Besides, I also spent time at Microsoft Research Asia, Huawei Cloud, and Ant Financial as a research intern/data analyst intern. Graduated in November 2022, I am open to full-time *Quantitative Researcher*/ *Applied Scientist* positions in Hong Kong now. I hold a valid IANG visa and can work in Hong Kong without visa sponsorship.

Education

- **The Chinese University of Hong Kong** — Hong Kong, China
  Ph.D. in Computer Science and Engineering; Supervisor: Prof. Michael R. Lyu — *Aug 2018 – Nov 2022*
- **Sun Yat-Sen University** — Guangzhou, China
  B.Eng. in Computer Science and Technology; GPA: 3.9/4.0; National Scholarship (Top 2%) — *Aug 2014 – June 2018*

Experience

- **Huawei Cloud** — Shenzhen, China
  Intern — *June 2020 - May 2022*
  - **Dependency Evaluation in Microservices**: Proposed a novel concept to model the state propagation between microservices (i.e., intensity of dependency), and an efficient heuristic algorithm to evaluate the intensity of dependency. Published a conference paper in ASE'2021.
  - **Evaluating the Quality of Alerts**: Proposed a learning-based framework to evaluate the Quality of Alerts (QoA) to achieve automatic alert governance in the cloud so as to accelerate the alert diagnosis of On-Call Engineers. Published a conference paper in DSN'2022.
  - **Multi-modal Learning for System Anomaly Detection**: Proposed a multi-modal deep learning model to detect system anomalies on multi-dimensional time series. Published a conference paper in ICSE'2023.
  - **Self-adaptive Resilience Testing**: Proposed a self-adaptive approach to automatically evaluate the resilience of microservice systems based on fault injection and multi-dimensional metric analysis. The paper is under review.
- **Data, Knowledge, Intelligence Group, Microsoft Research Asia (MSRA)** — Beijing, China
  Intern — *June 2019 - Aug 2019*
  - **Root Cause Diagnosis in Azure**: Identifying root causes of many incident storms of Azure's cloud services via a heuristic search algorithm in multi-variate incident tickets.
- **Shenzhen Research Institute, The Chinese University of Hong Kong** — Shenzhen, China
  Research Assistant — *March 2018 - June 2018*
  - **Aspect Sentiment Analysis for App Review**: Proposed a novel framework for analyzing user sentiment of app features captured from user reviews. Introduced a new methodology for measuring the sentiment of opinion words (*i.e.*, emotion words), and establishing their relations with corresponding app features. Published a conference paper in WWW'2021.
- **Institute of Software Engineering and Application, Sun Yat-Sen University** — Guangzhou, China
  Intern — *April 2016 - Feb 2018*
  - **Panther#**: Proposed an algorithm for node embedding in a homogenous network with a novel procedure of biased random walk, which efficiently explores neighborhood similarity and structural similarity even when two nodes are completely disconnected.
- **Alipay, Alibaba Group** — Hangzhou, China
  Algorithm Engineer Intern — *Jul 2017 - Oct 2017*
  - **Car Owner Prediction**: Core service for all systems in Ant Financial. Created a decision tree model that predicts with high accuracy whether a user has a car based on the user's behavior over a certain period of time. The model passed the internal review and was deployed in the production environment.
  - **Anti Cash-out Model**: Core risk management service for consumer finance. Utilized distance metric learning to automatically discover the most informative meta-path on heterogeneous information network and prevent cash-out.
- **South China Research Center of Statistical Science** — Guangzhou, China
  Intern — *Jan 2016 - June 2016*
  - **Diabetic Retinopathy Diagnostic System**: Implemented a retinal blood vessel segmentation algorithm based on line tracking. Also developed an auxiliary diagnostic system based on Caffe for diabetic retinopathy detection.

Publications

arXiv'23 **Tianyi Yang**, Cheryl Lee, Jiacheng Shen, Yuxin Su, Yongqiang Yang, and Michael R. Lyu. 2023. *AVERT: A Self-adaptive Resilience Testing Framework for Microservice Systems.* In Proceedings of ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, 2023. (Under review)

FAST'23 Jiacheng Shen, Pengfei Zuo, Xuchuan Luo, **Tianyi Yang**, Yuxin Su, Yangfan Zhou, and Michael R. Lyu. 2023. *FUSES: A Fully Memory-Disaggregated Key-Value Store.* In Proceedings of the 21st USENIX Conference on File and Storage Technologies.

ICSE'23 Cheryl Lee, **Tianyi Yang**, Zhuangbin Chen, Yuxin Su, and Michael R. Lyu. 2023. *Eadro: Integrating Anomaly Detection and Root Cause Localization on Multi-source Monitoring Data for Microservices.* In Proceedings of IEEE 45th International Conference on Software Engineering.

ICSE'23 Cheryl Lee, **Tianyi Yang**, Zhuangbin Chen, Yuxin Su, Yongqiang Yang, and Michael R. Lyu. 2023. *HADES: Heterogeneous Anomaly Detection for Software Systems via Attentive Multi-modal Learning.* In Proceedings of IEEE 45th International Conference on Software Engineering.

ISSRE'22 **Tianyi Yang**, Cheryl Lee, Jiacheng Shen, Yuxin Su, Yongqiang Yang, and Michael R. Lyu. 2022. *Managing Service Dependency for Cloud Reliability: The Industrial Practice.* In Proceedings of the 33rd IEEE International Symposium on Software Reliability Engineering.

DSN'22 **Tianyi Yang**, Jiacheng Shen, Yuxin Su, Xiaoxue Ren, Xiao Ling, Yongqiang Yang, and Michael R. Lyu. 2021. *Characterizing and Mitigating Anti-patterns of Alerts in Industrial Cloud Systems.* In Proceedings of the 52nd Annual IEEE/IFIP International Conference on Dependable Systems and Networks.

ASE'21 **Tianyi Yang**, Jiacheng Shen, Yuxin Su, Xiao Ling, Yongqiang Yang, and Michael R. Lyu. 2021. *AID: Efficient Prediction of Aggregated Intensity of Dependency in Large-scale Cloud Systems.* In Proceedings of the 36th IEEE/ACM International Conference on Automated Software Engineering.

WWW'21 **Tianyi Yang**, Cuiyun Gao, Jingya Zang, David Lo, and Michael R. Lyu. 2021. *TOUR: Dynamic Topic and Sentiment Analysis of User Reviews for Assisting App Release.* In Companion Proceedings of the Web Conference 2021.

ICDCS'21 Jiacheng Shen, **Tianyi Yang**, Yuxin Su, Yangfan Zhou, and Michael R. Lyu. 2021. *Defuse: A Dependency-Guided Function Scheduler to Mitigate Cold Starts on FaaS Platforms.* In Proceedings of the 41st IEEE International Conference on Distributed Computing Systems.

CSUR Shilin He, Pinjia He, Zhuangbin Chen, **Tianyi Yang**, Yuxin Su, and Michael R. Lyu. 2021. *A Survey on Automated Log Analysis for Reliability Engineering.* ACM Computing Survey, April 2021.

Patents

CN Patent **Tianyi Yang**, Hongliang Xiang, Zhuangbin Chen, Yongqiang Yang. *A technology for adaptive and automated resilience testing of microservice systems.* Chinese patent. Issued to Huawei Technologies.

CN Patent Michael R. Lyu, Baitong Li, **Tianyi Yang**, Zhuangbin Chen, Yuxin Su. *A microservice fault diagnosis method and system.* Chinese patent application no. 202211368449.4.

CN Patent Michael R. Lyu, Jinyang Liu, **Tianyi Yang**, Zhuangbin Chen, Yuxin Su. *Method and device for anomaly detection based on cloud service multivariate monitoring indicators* Chinese patent application no. 202211049895.9.

Honors

- **Awards**
  - **Postgraduate Studentship**, The Chinese University of Hong Kong *2018-2022*
  - **Outstanding Ph.D.**, The 20th Chinasoft Conference, Chongqing, China *2022*
- **Competitions**
  - **Meritorious Winner**, Mathematical Contest in Modeling *2017*
  - **First Prize**, Undergraduate Contest in Mathematical Modeling *2016*

Side Projects

- **File System for Block Storage Devices**: Implemented a user-space file system that supports common file-related system call for block device using FUSE. (https://github.com/yttty/isfs)
- **Assembler & CPU Simulator**: Implemented an assembler to compile assembly code and a CPU simulator to execute the machine code. (https://github.com/yttty/exp-isa)

Programming Skills

- **Languages**: Python, C++, SQL **Frameworks**: Kubernetes, Docker, PyTorch, Spark, FUSE