

Bingbing Rao (He/Him/His)

4000 Central Florida Blvd, Orlando, FL 32816

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Education

University of Central Florida

Ph.D. in Computer Science

Research Area: Big Data System Optimization and Application, Big Code Repair using Deep Learning

Orlando, FL, USA

Expected May 2022

University of Central Florida

M.S. in Computer Science

Orlando, FL, USA

May 2017

Wuhan University of Science and Technology

B.S. in Electrical & Information Engineering

Wuhan, Hubei, China

June 2012

Huazhong University of Science and Technology

B.A. in Public Administration (Minor)

Wuhan, Hubei, China

June 2012

Research and Work Experience

University of Central Florida

Graduate Research Assistant, Big Data Lab

Orlando, FL, USA

Aug. 2015 - Present

- Design dynamic network activity models to characterize temporal trends in a large social-media network
- Optimize performance and scalability of big data processing and parallel computing system
- Detect and fix performance issues in data-intensive applications using program analyses techniques
- Investigate the applicability of deep learning techniques comprehensively for repairing program bugs automatically

Key achievement: Published seven research papers and submitted two papers for peer review

System Engineer, Cyber Intelligence Lab

May 2019 - Aug. 2019

- Deployed Apache Spark, Hadoop clusters, and deep learning develop the environment
- Improved redundancy and efficiency of the cluster network by designing new topology and bonding interfaces
- Developed TF-IDF and other Spark data analytic applications for processing social media data (i.e. Twitter)

Key achievement: Provided systematic technical support for researchers to develop big data and deep learning algorithms

Unknot.id

Software Engineer Intern, AI Research

Orlando, FL, USA

July 2020 - July 2021

1. CTIN: A robust contextual Transformer network for Inertial Navigation:

- Innovated a robust Transformer-based model for inertial navigation using IMU measurements only
- Designed a ResNet-based encoder to exploit spatial knowledge of IMU observations by applying attention mechanism
- Extended Transformer decoder to capture temporal information within IMU observations
- Leveraged multi-task learning techniques to improve learning efficiency and to reduce the model's uncertainty

Key achievement: CTIN is submitted to AAAI-22 as a research paper due to its novelty and outperforming performance

2. An improved GAN model to synthesize tabular data without leaking any sensitive information:

- Designed a model-specific encoder to transform category and continuous data into vector representations
- Developed an enhanced GAN algorithm with information loss to learn data distribution
- Generated fake data for downstream tasks from the learned distribution without leaking any sensitive information
- Built a comprehensive evaluation tool to assess the performance in terms of data, utility, and privacy qualities

Key achievement: The developed GAN-based synthesizer has been adopted by multiple projects at Unknot.id

Elivebuy Co., Ltd.

Director, IT Department

Shenzhen, Guangdong, China

Mar. 2014 - Aug. 2015

- Analyzed requirements of all departments to improve their business processes and determine the technology needs
- Coordinated IT technicians to develop warehouse and finance management systems, a stock-keeping unit encoder, etc
- Provided training programs about IT resources and development support to all staffs

Key achievement: Received the outstanding staff award in 2014 for coordinating IT resources to increase employee efficiency

MacroSAN Technologies Co., Ltd.

Linux kernel developer, R & D Department

Shenzhen, Guangdong, China

Feb. 2012 - Mar. 2014

- Developed Linux kernel modules including direct memory access (DMA), general-purpose in/out, and network bonding
 - Participated in the project of trim and transplant Linux kernel to maintain all product-related driver modules
 - Worked with Linux kernel upstream to provide efficient solutions to problems and errors related to the kernel
- Key achievement:** Awarded 22nd R & D Honor due to developing a new DMA model and strong problem-solving skills

Wuhan University of Science and Technology

Undergraduate Research Assistant, Control Theory Laboratory

Wuhan, Hubei, China

Sep. 2010 - Jun. 2012

- Developed algorithms atop of microcontroller to generate arbitrary waveform using DDS chip
 - Designed FPGA algorithms to measure precise frequencies of input signals
 - Developed a digital storage oscilloscope (DSO) atop of FPGA to analyze input signals
 - Designed a digital circuit to perform Manchester decoding for encoded digital signals and tested transmission performance
- Key achievement:** Won the provincial third prize at 2011 National Undergraduate Electronics Design Contest

Leadership Experience

University of Central Florida

Graduate Teaching Assistant, COP4020: Functional Programming Languages

Orlando, FL, USA

Aug. 2017 - Dec. 2018

- Developed course materials including visual aids, answer keys, supplementary notes, and class projects
- Co-taught lectures and lab sessions
- Held office hours, led class discussions, and answered student questions to assist them with understanding complex concepts
- Evaluated student projects, homework, exams, and other assignments

Skills

Deep Learning: Transformer, RNN, ResNet (CNN), Generative Adversarial Network (GAN), Pytorch

Software Engineering: Parallel Computing, Apache Spark, Hadoop, HDFS, Amazon Web Services, MySQL, Jupyter

Programming Languages: Proficient in Python and Scala; project experience in C, Java, Assembly, R, and Shell

Publications

- [1] **Bingbing Rao**, Ehsan Kazemi, Yifan Ding, Devu M Shila, Frank M. Tucker, and Liqiang Wang. Ctin: Robust contextual transformer network for inertial navigation. In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2022 (Under Review).
- [2] **Bingbing Rao**, Jie Yao, Weiwei Xing, and Liqiang Wang. Bug2fix: An enhanced transformer model with context-aware alignment for automated program repair. In *IEEE International Conference on Software Testing, Verification and Validation (ICST)*, 2022 (Under Review).
- [3] **Bingbing Rao**, Zixia Liu, Hong Zhang, Siyang Lu, and Liqiang Wang. Soda: A semantics-aware optimization framework for data-intensive applications using hybrid program analysis. In *IEEE 14th International Conference on Cloud Computing (CLOUD)*, pages 433–444, 2021.
- [4] Wingyan Chung, **Bingbing Rao**, and Liqiang Wang. Interaction models for detecting nodal activities in temporal social media networks. *ACM Transactions on Management Information Systems (TMIS)*, 10(4):1–30, 2019.
- [5] Siyang Lu, Xiang Wei, **Bingbing Rao**, Byungchul Tak, Long Wang, and Liqiang Wang. Ladra: Log-based abnormal task detection and root-cause analysis in big data processing with spark. *Future Generation Computer Systems*, 95:392–403, 2019.
- [6] Zixia Liu, Hong Zhang, **Bingbing Rao**, and Liqiang Wang. A reinforcement learning based resource management approach for time-critical workloads in distributed computing environment. In *IEEE International Conference on Big Data (Big Data)*, pages 252–261, 2018.
- [7] **Bingbing Rao** and Liqiang Wang. A survey of semantics-aware performance optimization for data-intensive computing. In *IEEE 15th Intl Conf on Pervasive Intelligence and Computing (PiCom)*, pages 81–88, 2017.
- [8] Siyang Lu, **Bingbing Rao**, Xiang Wei, Byungchul Tak, Long Wang, and Liqiang Wang. Log-based abnormal task detection and root cause analysis for spark. In *IEEE International Conference on Web Services (ICWS)*, pages 389–396, 2017.
- [9] Wingyan Chung, **Bingbing Rao**, and Liqiang Wang. Dynamic trend detection in us border security social-media networks. In *Simulation and Education Conference (I/ITSEC), Interservice/Industry Training*, 2016.

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Company Recruitment team

Robinhood, Inc.
Menlo Park, CA

November 11, 2021

Dear Sir or Madam,

I am writing to apply for the Data Scientist (New Grad) position at Robinhood. I recently learned about this position from LinkedIn. I expect to receive my Ph.D. degree in Computer Science in May 2022 from the University of Central Florida. I am available to start working full-time immediately. I believe I would be a perfect fit for this position because of over ten years of working experience in software engineering and six years of research experience in big data systems and machine learning, strong communication ability and outstanding problem-solving mindset.

During my Ph.D. study, I have polished and demonstrated my high-level research capability, strong analytical and problem-solving skills through several research topics: 1) exploiting to characterize and model temporal trends in a large social-media network using big data techniques, 2) optimizing the performance and scalability of big data systems using program analysis, 3) detecting and repairing programming errors automatically leveraging deep learning techniques. Before my Ph.D. the roles of a Linux kernel developer in MacroSAN and a director of the IT department in Elivebuy give me an opportunity to enhance my industrial and management work experience. Specifically, I not only have extensive experience using Python, Scala and R to design and develop multiple Apache Spark and learning-based applications, but also have strong computer skills including Linux system management, MySQL, AWS, and Jupyter notebook. I am confident that these diverse research and work experiences have provided me with solid technical expertise and skills on data processing and analytics for this position.

Furthermore, I enjoy working in a team environment to compare notes and to hear the opinions of other professions, and I get along well with people. For example, I led and collaborated with three researchers to design and develop a Transformer-based neural network for inertial navigation, and published it as peer-reviewed research paper in AAAI-22 conference. However, I also have the ability to work alone and maintain efficiency. I am very creative with the ability to adapt quickly to changing environments and to stay updated with all new technology, changes, and discoveries affecting this industry. The attached resume will provide you with more in-depth information about what I have to offer if chosen for a position requiring my expertise.

I look forward to the opportunity to utilize and advance my expertise and skills in the Data Scientist position at Robinhood. Based on the job description, I think this position looks both fun and challenging and a great place for me to further my career. Thank you in advance for your consideration. I look forward to the opportunity to speak with you in person.

Sincerely,

Bingbing Rao

Ph.D. candidate

Department of Computer Science

University of Central Florida

robin.rao@knighst.ucf.edu