# Qing Wang

CS Ph.D.

## INTERESTS

#### Large-Scale Data Mining; Machine Learning; Bandits;

#### EXPERIENCE

#### Industry Experience

- 2021.12- Sr. Data Scientist, IBM GCDO Applied AI, San Jose, CA, USA.
- present Building both data-centric and model-centric intelligent models, and develop automation pipelines (MLOps) for Cognitive Enterprise Data Platform's data governance.
  - Building AI solutions for Chief Privacy Office (e.g., anomaly detection).
- 2019.3- Postdoctoral Researcher, IBM T.J Watson Research Center, New York, NY, USA.
- 2021.12 Facilitated problem diagnosis and determination, outage prediction, auto-resolution in complex IT environment by understanding the text description of IT ticket, identifying the temporal pattern from system events, and mining causality among system monitoring time series data.
  - IBM launched Watson AIOps at THINK 2020 with significant publicity through Forbes, TechCrunch, Bloomberg and other news outlets.

#### 2018.5- Research Intern, IBM T.J Watson Research Center, New York, NY, USA.

- 2018.7 Proposed and implemented an interactive framework using bandit models for AI skill Orchestration.
  - Developed a new reward mechanism and deep learning model of reinforcement learning based on natural machine translation to learn the logic forms from natural language.
    - published a patent related to neural-based anomaly detection.

#### 2017.5- Research Intern, IBM T.J Watson Research Center, New York, NY, USA.

- 2017.7 Proposed a new online learning algorithm, a hierarchical multi-armed bandit algorithm for the IT automation recommendation;
  - Implemented these online algorithms and conducted comparative experiments on a large-scale real ticket dataset collected from IBM Global Services.
  - Published the related work in the proceedings of SIAM International Conference on Data Mining, 2018.

#### 2016.6- Research Intern, IBM T.J Watson Research Center, New York, NY, USA.

- 2016.8 Proposed an integrated framework for the ticket resolution recommendation;
  - Constructed a domain knowledge base using ontology modeling techniques.
  - Published the related work in the proceedings of IEEE International Conference on Services Computing, 2017 (Best Student Paper)

# 2011.8- Software Engineer Intern, Collaboration And Deployment Services Team(CADS), IBM

#### 2012.5 **SPSS**, Xi'an, China.

- Designed and implemented an automatic testing framework for CADS platform using IBM Rational Functional Tester.
- Implemented a control locating component, an action verifying component, and the XML parser component.

#### Academic Experience

- 2015.8- Research Assistant, Knowledge Discovery Research Group, FIU, USA.
- 2018.12 Multi-Armed Bandit. Designed and implemented multi-armed bandit algorithms to address online interactive recommendation problem, where the interaction between users and items can be better tracked.
  - **Event Mining.** Designed and implemented a **frequent-itemset mining module** of the online Event Mining system. This module is able to discover some interesting frequent patterns from event data.

# PROGRAMMING SKILLS

Languages: Python, Java

Frameworks: TensorFlow, Apache Hadoop, Map Reduce, Tomcat, jQuery

# SELECTED PUBLICATIONS

## Selected Articles in Refereed Journals

- 1. Qing Wang, Chunqiu Zeng, Wubai Zhou, Tao Li, S. S. Iyengar, Larisa Shwartz, Genady Ya. Graharnik, "Online Interactive Collaborative Filtering Using Multi-armed Bandit with Dependent Arms", IEEE Transactions on Knowledge and Data Engineering (IEEE TKDE), 2018.
- Tao Li, Chunqiu Zeng, Wubai Zhou, Wei Xue, Yue Huang, Zheng Liu, Qifeng Zhou, Bin Xia, Qing Wang, Wentao Wang, Xiaolong Zhu, "FIU-Miner (a fast, integrated, and user-friendly system for data mining) and its applications", Knowledge and Information Systems (KIAS), 2016.
  Selected Conferences Proceedings Papers

## Selected Conferences Proceedings Papers

- 3. Qing Wang, Larisa Shwartz, Genady Ya. Grabarnik, Vijay Arya, Karthikeyan Shanmugam, "Detecting Causal Structure on Cloud Application Microservices Using Granger Causality Models", IEEE 14th International Conference on Cloud Computing (CLOUD 2021).
- 4. Jinho Hwang, Larisa Shwartz, **Qing Wang**, Raghav Batta, Harshit Kumar, Michael Nidd, "Fixme: Enhance software reliability with hybrid approaches in cloud", IEEE/ACM 43rd International Conference on Software Engineering: Software Engineering in Practice (ICSE-SEIP 2021).
- 5. Qing Wang, "The Use of Banidt Algorithms in Intelligent Interactive Recommender Systems", arXiv:2107.00161, 2021.
- 6. Qing Wang, Larisa Shwartz, Genady Ya. Graharnik, Michael Nidd, Jinho Hwang. "Leveraging AI in Service Automation Modeling: from Classical AI Through Deep Learning to Combination Models", International Conference on Service-Oriented Computing (ICSOC 2019). Springer, Toulouse, France, 2019.
- 7. Kaylin Hagopian, Qing Wang, Yupeng Gao, Tengfei Ma, Lingfei Wu. "Learning Logical Representations from Natural Languages with Weak Supervision and Back Translation", Knowledge Representation & Reasoning Meets Machine Learning Workshop at NeurIPS, Vancouver, Canada, 2019.
- 8. Qing Wang, Chunqiu Zeng, S. S. Iyengar, Tao Li, Larisa Shwartz, Genady Ya. Graharnik, "AISTAR: An Intelligent System for Online IT Ticket Automation Recommendation", IEEE International Conference on Big Data (IEEE BigData 2018), Seattle, Washington, USA, 2018.
- 9. Qing Wang, Tao Li, S. S. Iyengar, Larisa Shwartz, Genady Ya. Graharnik, "Online IT automation recommendation Using Hierarchical Multi-armed Bandit Algorithms", SIAM International Conference on Data Mining (SDM 2018), San Diego, California, USA, 2018.
- Qing Wang, Wubai Zhou, Chunqiu Zeng, Tao Li, Larisa Shwartz, Genady Ya. Graharnik, "Constructing the Knowledge Base for Cognitive IT Service Management", IEEE International Conference on Services Computing (IEEE SCC 2017), Honolulu, Hawaii, USA, 2017. [Best Student Paper Award]
- 11. Chunqiu Zeng, **Qing Wang**, Shekoofeh Mokhtari, Tao Li, "Online Context-Aware Recommendation with Time Varying Multi-Armed Bandit", ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (ACM SIGKDD 2016), San Francisco, California, USA, 2016.
- 12. Chunqiu Zeng, **Qing Wang**, Wentao Wang, Tao Li, Larisa Shwartz, "Online Inference for Time-varying Temporal Dependency Discovery from Time Series", IEEE International Conference on Big Data (IEEE Big Data 2016), Washington D.C., USA, 2016.
- Wei Xue, Wubai Zhou, Tao Li, Qing Wang, "MTNA: A Neural Multi-Task Model for Aspect Category Classification and Aspect Term Extraction on Restaurant Reviews", International Joint Conference on Natural Language Processing (IJCNLP 2017), Taipei, Taiwan, 2017.
- 14. Wubai Zhou, Wei Xue, Ramesh Baral, Qing Wang, Chunqiu Zeng, Tao Li, Jian Xu, Zhen Liu, Larisa Shwartz, Genady Ya. Graharnik, "STAR: A System for Ticket Analysis and Resolution", ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (ACM SIGKDD 2017), Halifax, Nova Scotia, Canada, 2017.
- 15. Tao Li, Wubai Zhou, Chunqiu Zeng, **Qing Wang**, Qifeng Zhou, Dingding Wang, Yue Huang, Jia Xu, Wentao Wang, Minjing Zhang, Steve Luis, Shu-Ching Chen and Naphtali Rishe, "DI-DAP: An Efficient Disaster Information Delivery and Analysis Platform in Disaster Management", ACM International Conference on

Information and Knowledge Management (ACM CIKM 2016), Indianapolis, Indiana, USA, 2016. <u>Selected Patents</u>

- 1. "Computing system event error corrective action recommendation", 2022.
- 2. "Synthetic system fault generation", 2022.
- 3. "Just in time assembly of transactions", 2022.
- 4. "Shiftleft topology construction and information augmentation using machine learning", 2022.
- 5. "Application topology discovery", 2022.
- 6. "Cross-Environment Event Correlation Using Domain-Space Exploration and Machine Learning Techniques", 2022.
- 7. "Assessing technical risk in information technology service management using visual pattern recognition", 2022.
- 8. "Automatic mapping of records without configuration information", 2021.

## SERVICE ACTIVITIES

Served as a session chair of IEEE Big Data 2018 and PC member for SIGKDD, CIKM, PKDD, ICDM, ECIR, ICMLA, AAAI, IJCAI, EMNLP.

## Honors & Awards

- 1. IBM Research Accomplishment Awards. (Nov. 2021)
- 2. IBM Outstanding Technical Achievement Awards. (May. 2021)
- 3. FIU SCIS Overall Outstanding Graduate Student Award. (Nov. 2018)
- 4. FIU Dissertation Year Fellowship. (Aug. 2018)
- 5. SIAM Student Travel Award. (May. 2018)
- 6. IEEE SCC Best Student Paper Award. (Jun. 2017)
- 7. SIGKDD Student Travel Award. (Jul. 2017)

#### Education

- 2014.8- Ph.D. in Computer Science, Florida International University, Miami, FL, U.S.A..
- $2018.12 \quad {\rm GPA:} \ 3.81/4.0, \ {\rm Dissertation:} \ {\rm Intelligent} \ {\rm Data} \ {\rm Mining} \ {\rm Techniques} \ {\rm for} \ {\rm Automatic} \ {\rm Service} \ {\rm Management}.$
- 2010.8- M.E. in Computer Science, Xidian University, Xi'an, Shaan'xi, China.
- 2013.5 GPA: 3.3/4.0
- 2005.8- **B.S. in Computer Science**, *Zhengzhou University*, Zhengzhou, Henan, China. 2009.6 GPA: 3.6/4.0