Qing Wang

Ph.D.

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INTERESTS

Large-scale Data Mining; Machine Learning; Online Learning; Multi-armed Bandits;

EDUCATION

2014.8- 2018.12	**Ph.D. in Computer Science**, *Florida International University*, Miami, FL, USA. GPA: 3.81/4.0
2010.8- 2013.5	**M.E. in Computer Science**, *Xidian University*, Xi'an, Shaan'xi, China. GPA: 3.3/4.0
2005.8- 2009.6	**B.S. in Computer Science**, *Zhengzhou University*, Zhengzhou, Henan, China. GPA: 3.6/4.0

WORK EXPERIENCE

2021.11-Present — **Sr. Data Scientist**, ***IBM Almaden Research Center***, San Jose, CA, USA.
- Construct structure data from unstructure data for various IBM products based on deep learning techniques.

2019.3-2021.11 — **Postdoctoral Researcher**, ***IBM T.J Watson Research Center***, New York, NY, USA.
- AI for operations: 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.
- Prepared datasets for AI modeling, data curation, extraction, and normalization, and building AI models for predictive algorithms to detect pattens in application behaviors.
- Designed and Implemented complex algorithms as part of the solutions design, as well as learning and incorporating component analysis, statistical modeling, neural networks, and natural language processing techniques.
- Presented advanced concepts to business partners, clients, and academic collaborators, as well as publishing technical insights in top scientific venues.
- Experimented with and adopting new programming paradigms including docker containers and advanced interface technologies like Angular and Node.js. Patenting cognitive capabilities such as event processing and log analysis, and identification of complex application problems.
- Patented the core novel technologies of AI models in the above projects for IBM Watson AIOps and published research papers on these topics in top conferences and journals.

2018.5-2018.7 — **Research Intern**, ***IBM T.J Watson Research Center***, New York, NY, USA.
- Proposed and implemented interactive recommendation models for interactive skills planning.
- Developed a new reward mechanism in deep reinforcement learning model to learn the logic forms from natural language.
- Designed and implemented a new bandit model for automation of IT Operations and published a top conference of data mining.

2017.5-2017.7 — **Research Intern**, ***IBM T.J Watson Research Center***, New York, NY, USA.
- Designed and Implemented a reinforcement learning model to facilitate problem diagnosis and determination, incident prediction auto-resolution in complex IT environment.
- Proposed a new online learning algorithm, a hierarchical multi-armed bandit algorithm for IT automation resolution recommendation.
- Implemented these online algorithms and conducted comparative experiments on a large-scale real ticket dataset collected from IBM Global Services, and published a top conference of data mining.

2016.6-	**Research Intern**, *IBM T.J Watson Research Center*, New York, NY, USA.
2016.8	○ Proposed and implemented an integrated framework for IT ticket resolution recommendation by understanding the text description of IT ticket problem.
	○ Designed an ontology modeling tequique constructing a domain knowledge base to improve feature representation.
	○ Conducted extensive experiments on a large-scale real-world ticket dataset collected from IBM Global Services, and published a conference paper of service computing.
2015.8-	**Research Assistant**, *Knowledge Discovery Research Group*, FIU, USA.
2018.12	○ Conducted research work on data mining area: how to efficiently discover useful patterns and retrieve information.
	○ Studied data mining and machine learning algorithms and developed new scalable, efficient algorithms for both the algorithmic and application issues.
	○ Published research results on top conference of data mining or machine learning area.
	○ **Interactive Recommender System.** Bandit models are very popular applying into various interactive recommender systems. I worked on modeling the interactive behaviors between users and items to better track users' preference using bandit models.
	○ **Log Mining System.** It is an online log mining system developed by our research group including log data preprocessing module, log events correlation module, and log statitics visualization module. I worked on developing event correlation mining module which is able to discover some interesting frequent patterns from event data.

SERVICE ACTIVITIES

1. Session Chair, IEEE Big Data 2018.

2. PC member, CIKM, ICDM, ECIR, ICMLA, AAAI, IJCAI, EMNLP, WSDM.

PUBLICATIONS

Paper Awards
1. Best student paper award at the 2017 IEEE International Conference on Services Computing (IEEE SCC 2017); Conf paper: Q. Wang, W. Zhou, C. Zeng, T. Li, L. Shwartz and G. Y. Graharnik, "Constructing the Knowledge Base for Cognitive IT Service Management."

Selected Articles in Refereed Journals
1. Qifeng Zhou, Xiang Liiu, **Qing Wang**, "Interpretable Sentence Pair Models Based on Attention Mechanism", Information Sciences, 2020.

2. **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.

3. Hongjun Li, Biao Cai, Shaojie Qiao, Shu-Ching Chen, **Qing Wang**, "ExTCKNN: Expanding Tree-based Continuous K Nearest Neighbor Query in Road Networks with Traffic Rules", IEEE Access, 2018.

4. 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
1. **Qing Wang**, "The Use of Bandit Algorithms in Intelligent Interactive Recommender Systems", arXiv preprint arXiv:2107.00161, 2021.

2. **Qing Wang**, Larisa Shwartz and Genady Ya. Graharnik, Vijay Arya, Karthikeyan Shanmugam, "Detecting Causal Structure on Cloud Application Microservices Using Granger Causality Models", 14th International Conference on Cloud Computing (IEEE CLOUD 2021)

3. Pooja Aggarwal, Seema Nagar, Ajay Gupta, Larisa Shwartz, Prateeti Mohapatra, Amit Paradkar, **Qing Wang**, Atri Mandal, "Causal Modeling based Fault Localization in Cloud Systems using Golden Signals", 14th International Conference on Cloud Computing (IEEE CLOUD 2021).

4. Jinhon Hwang, Larisa Shwartz, **Qing Wang**, Raghav Batta, Harshit Kumar and Michael Nidd, "FIXME:

Enhance Software Reliability with Hybrid Approaches in Cloud", 43rd International Conference on Software Engineering (ICSE SEIP 2021)

5. Pooja Aggarwal, Ajay Gupta, Prateeti Mohapatra, Seema Nagar, Atri Mandal, **Qing Wang**, Amit sParadkar, "Localization of Operational Faults in Cloud Applications by Mining Causal Dependencies in Logs using Golden Signals", AIOPs of the 18th International Conference on Service-Oriented Computing (ICSOC 2020).

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).

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.

10. 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.

11. **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**]

12. 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.

13. 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.

14. 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.

15. 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.

Selected Patents

1. **Qing Wang**, et al., "A systemt and method to automatically map operational records without configuration information to topology graph", filed in 2019.

2. **Qing Wang**, et al., "System and Method for just in time assembly of transaction for micro-services system', filed in 2019.

3. **Qing Wang**, et al., "System and Method for Interactive Diagnosis of an Issue Through Collective Intelligence', filed in 2020.

4. **Qing Wang**, et al., "System and Method of Learning Causal Relationships Between Microservices with Fault Injection', filed in 2021.

PROGRAMMING SKILLS

Languages:	Java, Python, Javascript (familiar)	Frameworks:	Tensorflow, Apache Hadoop, Map Reduce, Tomcat

DB: DB2, MySQL, Redis   Tools: Git, SVN

HONORS & AWARDS

1. A Third Plateau Invention Achievement Award in apreciation and recognition of creative contribution to IBM progress. (Nov., 2021)
2. IBM Outstanding Technical Achievement Awards. (Jun., 2021)
3. IBM Research Achievement Award. (Dec., 2020)
4. FIU SCIS Overall Outstanding Graduate Student Award. (Nov., 2018)
5. IEEE SCC Best Student Paper Award. (Jun., 2017)
6. NIPS Travel Award. (Dec., 2019)
7. FIU Dissertation Year Fellowship. (Aug., 2018 - Aug., 2019)
8. SIAM Student Travel Award. (May., 2018)
9. SIGKDD Student Travel Award. (Jul., 2017)