Qiaomu Shen | Curriculum Vitae

Rm 548B, South Tower, CoE Building, SUSTech, Shenzhen, P.R. China   shenqm@sustech.edu.cn | +86 13608175215

RESEARCH INTEREST

Data Visualization, Human-Computer Interaction, System Observerbility, Spatial-Temporal Data Analysis, Explainable AI

EXPERIENCE

Research Assistant Professor   Aug 2021 – Present
Southern University of Science and Technology (SUSTECH)   *Shenzhen, Guangdong, P.R. China*

Senior Engineer   Apr 2020 – Aug 2021
Huawei-Noah's Ark   *Shenzhen, Guangdong, P.R. China*

EDUCATION

PhD, Electronic and Computer Engineering   2016 – 2020
Hong Kong University of Science and Technology (HKUST)   *Hong Kong, P.R. China*
Advisor: Huamin Qu

MEng, Computer Science and Technology   2012 – 2015
Sichuan University (SCU)   *Chengdu, Sichuan, P.R. China*
Advisor: Min Zhu

BEng, Computer Science and Technology   2008 – 2012
Sichuan University (SCU)   *Chengdu, Sichuan, P.R. China*

RESEARCH INTERNSHIPS AND VISITS

Visting Researcher   Jan 2019 – Jun 2019
Delft University of Technology, with Prof. Anna Vilanova   *Delft, The Netherlands*

Research Assistant   Jun 2015 – Feb 2016
Hong Kong University of Science and Technology   *Hong Kong, P.R. China*

Internship   Sept 2015 – Dec 2015
Huawei-Noah's Ark   *Hong Kong, P.R. China*

AWARD AND HONORS

Shenzhen Overseas High-Caliber Personnel Peacock Plan Level C   2020 – Present
Shenzhen Government

Overseas Research Award   2019 – 2020
Hong Kong University of Science and Technology

100 Outstanding Student of Sichuan University   2012
Sichuan University

ZhiSheng Scholarship   2012
Sichuan University

Publications

I have authored about **23** scholarly papers, including **12** CCF-A (9 full papers, 4 demo papers), **2** CCF-B, and **2** CCF-C conference/journal papers. Specifically, I have contributed to **5** CCF-A (full paper), **1** CCF-B, and **1** CCF-C conference/journal papers as the first or corresponding author.
Journal Papers (J), Conference Papers (C), Books (B), $^{\#}$ for corresponding author

2024 J1 **Qiaomu Shen**, Chaozu Zhang, Xiao Yan, Chuan Yang, Dan Zeng, Wei Zeng, Bo Tang "CheetahTraj: Efficient Visualization for Large Trajectory Dataset with Quality Guarantee" IEEE Transactions on Knowledge and Data Engineering (TKDE), 2024. (**CCF-A**, To appear)

J2 Shishi Xiao, Qing Shi, Lingdan Shao, Bo Du, Yang Wang, **Qiaomu Shen**, Wei Zeng "MetroBUX: A Topology-based Visual Analytics for Bus Operational Uncertainty EXploration." IEEE Transactions on Intelligent Transportation Systems(TITS), 2024.

2023 J3 **Qiaomu Shen**, Zhengxin You, Xiao Yan, Chaozu Zhang, Ke Xu, Jianbin Qin, Dan Zeng, Bo Tang. "QEVIS: Multi-grained Visualizing of Distributed Query Execution." IEEE Transactions on Visualization and Computer Graphics (TVCG), 2023. (**CCF-A**)

J4 Xiaolin Wen, Yong Wang, Meixuan Wu, Fengjie Wang, Xuanwu Yue, **Qiaomu Shen**, Yuxin Ma, Min Zhu. "DiffSeer: Difference-Based Dynamic Weighted Graph Visualization." IEEE Computer Graphics and Applications, 2023.

C1 Dan Zeng, Shanchuan Hong, Shuiwang Li, **Qiaomu Shen**$^{\#}$, Bo Tang. "Data-Scarce Animal Face Alignment via Bi-Directional Cross-Species Knowledge Transfer." In Proceedings of the 31th ACM international conference on multimedia (MM), 2023. (**CCF-A**)

C2 Chaozu Zhang, **Qiaomu Shen**, Bo Tang. "DHive: Query Execution Performance Analysis via Dataflow in Apache Hive." In Proceedings of the 49th International Conference on Very Large Data Bases (PVLDB, Demo), 2023. (**CCF-A**)

C3 Zelin Li, Dan Zeng, Xiao Yan, **Qiaomu Shen**, Bo Tang. "Analyzing and Combating Attribute Bias for Face Restoration." In Proceedings of 32nd International Joint Conference on Artificial Intelligence (IJCAI), 2023. (**CCF-A**)

2022 C4 Haotian Liu, Bo Tang, Jiashu Zhang, Yangshen Deng, Xiao Yan, Xinying Zheng, **Qiaomu Shen**, Dan Zeng, Zunyao Mao, Chaozu Zhang, Zhengxin You, Zhihao Wang, Runzhe Jiang, Fang Wang, Man Lung Yiu, Huan Li, Mingji Han, Qian Li, Zhenghai Luo. "GHive: Accelerating Analytical Query Processing in Apache Hive via CPU-GPU Heterogeneous Computing." In Proceedings of the 13th Symposium on Cloud Computing (SOCC), 2022. **(CCF-B)**

C5 Haotian Liu, Bo Tang, Jiashu Zhang, Yangshen Deng, Xinying Zheng, **Qiaomu Shen**, Xiao Yan, Dan Zeng, Zunyao Mao, Chaozu Zhang, Zhengxin You, Zhihao Wang, Runzhe Jiang, Fang Wang, Man Lung Yiu, Huan Li, Mingji Han, Qian Li, Zhenghai Luo. "GHive: A Demonstration of GPU-Accelerated Query Processing in Apache Hive." In Proceedings of the ACM Conference on Management of Data (SIGMOD, Demo), 2022. (**CCF-A**)

C6 Bo Tang, Zeng Jian, Qiandong Tang, Chuan Yang, **Qiaomu Shen**, Leong Hou U, Xiao Yan, Dan Zeng. "CheetahKG: A Demonstration for Core-based Top-k Frequent Pattern Discovery on Knowledge Graphs." In 2022 IEEE 38th International Conference on Data Engineering(ICDE, Demo), 2022. (**CCF-A**)

2020 C7 **Qiaomu Shen**, Yanhong Wu, Yuzhe Jiang, Wei Zeng, KH Alexis, Anna Vianova, Huamin Qu. "Visual Interpretation of Recurrent Neural Network on Multi-dimensional Time-series Forecast." In 2020 IEEE Pacific Visualization Symposium (PacificVis), 2020. **(CCF-C)**

C8 Wentao Ning, Qiandong Tang, Yi Zhao, Chuan Yang, Xiaofeng Wang, Teng Wang, Haotian Liu, Chaozu Zhang, Zhiyuan Zhou, **Qiaomu Shen**, Bo Tang. "CheetahVIS: A Visual Analytical System for Large Urban Bus Data." In Proceedings of the 46th International Conference on Very Large Database(PVLDB, Demo), 2020. (**CCF-A**)

J5 Wenwei Che, H. Christopher Frey, Jimmy C.H. Fung, Zhi Ning, Huamin Qu, Hong Kam Lo , Lei Chen, Tze-Wai Wong,... Meilan Wang, **Qiaomu Shen**, Wei Huang, ... Alexis K.H. Lau. "PRAISE-HK: A personalized real-time air quality informatics system for citizen participation in exposure and health risk management." Sustainable Cities and Society, 2020.

2019 J6 Wei Zeng, **Qiaomu Shen**$^{\#}$, Yuzhe Jiang, Alexandru Telea. "Route-aware edge bundling for visualizing origin-destination trails in urban traffic." Computer Graphics Forum, 2019. (**CCF-B**)

J7 Yu Ye, Wei Zeng, **Qiaomu Shen**, Xiaohu Zhang, Yi Lu. "The visual quality of streets: A human-centred continuous measurement based on machine learning algorithms and street view images." Environment and Planning B: Urban Analytics and City Science, 2019.

C9 Qianwen Wang, Yao Ming, Zhihua Jin, **Qiaomu Shen**, Dongyu Liu, Micah J Smith, Kalyan Veeramachaneni, Huamin Qu. "Atmseer: Increasing transparency and controllability in automated machine learning." Proceedings of the 2019 CHI conference on human factors in computing systems, 2019. (**CCF-A**)

2017 J8 **Qiaomu Shen**, Wei Zeng, Yu Ye, Stefan Müller Arisona, Simon Schubiger, Remo Burkhard, Huamin Qu. "StreetVizor: Visual exploration of human-scale urban forms based on street views." IEEE Transactions on Visualization and Computer Graphics(TVCG), 2017 . (**CCF-A**)

J9 Bing Ni, **Qiaomu Shen**, Jiayi Xu, Huamin Qu. "Spatio-temporal flow maps for visualizing movement and contact patterns." Visual Informatics, 2017.

C10 Quan Li, **Qiaomu Shen**, Yao Ming, Peng Xu, Yun Wang, Xiaojuan Ma, Huamin Qu. "A visual analytics approach for understanding egocentric intimacy network evolution and impact propagation in MMORPGs." In 2017 IEEE Pacific Visualization Symposium(PacificVis), 2017. (**CCF-C**)

2016 J10 **Qiaomu Shen**, Tongshuang Wu, Haiyan Yang, Yanhong Wu, Huamin Qu, Weiwei Cui. "Nameclarifier: A visual analytics system for author name disambiguation." IEEE Transactions on Visualization and Computer Graphics(TVCG), 2016 . (**CCF-A**)

J11 Yanhong Wu, Nan Cao, Daniel Archambault, **Qiaomu Shen**, Huamin Qu, Weiwei Cui. "Evaluation of graph sampling: A visualization perspective." IEEE Transactions on Visualization and Computer Graphics(TVCG), 2016. (**CCF-A**)

C11 Qinglai He, Min Zhu, Binbin Lu, Hanqing Liu, **Qiaomu Shen**. "MENA: Visual analysis of multivariate egocentric network evolution." In 2016 International conference on virtual reality and visualization (ICVRV), 2016.

2015 J12 Yong Wang, **Qiaomu Shen**, Daniel Archambault, Zhiguang Zhou, Min Zhu, Sixiao Yang, Huamin Qu. "Ambiguityvis: Visualization of ambiguity in graph layouts." IEEE Transactions on Visualization and Computer Graphics(TVCG), 2015. (**CCF-A**)

B1 Min Zhu, Lei Duan, Bo Tang, Qiaomu Shen, et.al., "Handbook of Operating System Course Projects." China Machine Press, ISBN: 978-7-111-48416-5, 2015.

Papers under review

U1 1st Author. "EATSeer: Exploratory Trace Aware Tabular Data Analysis." Submit to IEEE VIS. (**CCF-A**) Status: under review.

U2 "ChartifyText: Automated Chart Generation from Data-Involved Texts via LLM." Submit to IEEE VIS. (**CCF-A**) Status: under review.

U3 "PonziLens+: Visualizing Bytecode Actions for Smart Ponzi Scheme Identification." Submit IEEE Transactions on Visualization and Computer Graphics(TVCG). (**CCF-A**) Status: under review.

Patents

2023 P1 **Qiaomu Shen**, Chaozu Zhang and Bo Tang. "A method, device, equipment, and medium for visualizing the analysis of the Hive query execution process." Accepted by the National Intellectual Property Administration.

2022   P2   Bo Tang, Peiqi Yuan, Qian Li and **Qiaomu Shen**. "A method, device, equipment, and storage medium for visualizing hidden risk data." Accepted by the National Intellectual Property Administration.

INVITED TALKS

2023 Aug **Visual analytics for large scale query processing system.**
           Invited Talks, HKUST Guangzhou, Guangzhou, Guangdong, P.R. China

      Aug **Towards better understanding of distributed processding system.**
           Invited Talks, Sichuan University, Chengdu, Sichuan, P.R. China

2022 Aug **Visual Analysis Techniques for Complex Urban Information.**
           Invited Talks, Sichuan University, Chengdu, Sichuan, P.R. China

       Jul **Visualization Assisted Techniques for Large-Scale Computing Systems.**
           Invited Talks, ChinaVIS, Xinin, Qinhai, P.R. China

2020 Jun **Visual Interpretation of Recurrent Neural Network on Multi-dimensional Time-series Forecast**
           Paper Presentation, Online

       Jan **Visual Analyatics for Urban Informatics**
           Invited Talks, Zhijiang Lab, Hangzhou, Zhejiang, P.R. China

       Jan **Visual Analyatics for Urban Informatics**
           Invited Talks, AntV Team, Hangzhou, Zhejiang, P.R. China

2017 Oct **StreetVizor: Visual Exploration of Human-Scale Urban Forms Based on Street Views**
           Paper Presentation, IEEE VIS Conference, Phoenix, USA

2016 Oct **NameClarifier: A Visual Analytics System for Author Name Disambiguation**
           Paper Presentation, IEEE VIS Conference, Baltimore, USA

RESEARCH AND DEVELOPMENT PROJECT

R&D PROJECT IN SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

Collaborative Project on Joint Innovation Technology for a New Database

- **Background**: Collaboration project with Huawei GaussDB team (1 million USD).
  Task: This project covers several topics related to novel techniques in new database. I am leading the section on Visualization Assisted Cloud Native Database Performance Analysis.
  Year: 2022-present.

- **Role**: Leader of sub-project.

- **Contributions**: Leading a team to build a real-time analysis platform for cloud-native database systems, developing performance analysis and diagnostic techniques for cloud-native databases.

- **Output**: Papers: J1 (1st author), C2; patent: P1.

Big Data Visual Analytics Platform for Large Integrated Systems

- **Background**: Collaboration project with Shenzhen Zhongruiheng Management Planning Co., Ltd. (600,000 RMB).
  Task: Developing big data analytical system for the integrated systems safety data management, which includes storage, visualization, and analysis.
  Year: 2021-2022.

- **Role**: Leader of project.

- **Contributions**: Lead team to develop visual analytics platform the safety data of the integrated life systems, which includes three sub-systems: data storage system, data visualization system and insight mining system. News can be found: https://mp.weixin.qq.com/s/0sOP0fPVU62OKxj8uTCxww.

- **Output**: Patent: P2.

Collaborative Project on GPU Acceleration Technology for Big Data Cluster Computing Engine

- **Background**: Collaboration project with Huawei Cloud team (600,000 RMB).
  Task: Develop techniques utilizing the GPU to accelerate the computation of query execution.
  Year: 2021-2022.
- **Role**: Participant.
- **Contributions**: (1): Propose a GPU-based implementation solution for SQL query operators. (2): Guide students in implementing relevant operators and conducting experiments on benchmarks.
- **Output**: Papers: C4 and C5.

R&D Project in Huawei Noah's Ark Lab

For approximately one and a half years, I served as a Senior Engineer on the Decision Making and Reasoning Team at Noah's Ark Lab. The primary goal of our team was to address key techniques that could be influenced by shifts in international politics. Specifically, I was tasked with developing discrete event simulation (DES) techniques applicable to warehousing, logistics and industrial manufacturing.

- **Background**: Our collaborating departments, warehousing, and logistics predominantly rely on FlexSim, software designed for discrete event simulation. This tool exhibits two significant limitations: (1) it requires manual manipulation through the user interface, resulting in poor cross-platform compatibility and an inability to integrate into the automatic workflows of our collaborators; (2) developed by a company in the USA, it is susceptible to potential political influences. We are compelled to develop our own user-friendly tool to ensure business continuity.
- **Task on Research and Development**: I have lead a development team consists of four developers to develop a suite of simulation tools, including the (1) core components of DES that provide functionalities to construct simulations; (2) a visualization platform based on DES for interactive simulation model design; (3) a suite of visualizations for analyzing and diagnosing simulation execution; (4) a platform designed to host simulations and support simulation-optimization applications.
- **Task on University Collaborations**: I served as a project manager, responsible for a collaborative project between our team and universities, with a budget of approximately 200,000 USD. The main focus of this collaboration was the development of core technologies in discrete event simulation, partnering with Dr. Li Haobing from the National University of Singapore. My responsibilities included coordinating with partners, drafting project content and relevant documentation, establishing acceptance criteria, and managing progress.
- **Achievement**: During my time in Huawei, we have finished the Task (1-3) and 80% of (4). We have not only helped our collaborators to successfully replace FlexSim with our self-developed DES tool, but also improve their working efficiency by integrating our platform into their workflow. Our team have also received the thank you letter from our collaborators.

R&D Project in Hong Kong University of Science and Technology (Ph.D.)

Personalised Real-time Air-quality Informatics System for Exposure-Hong Kong

- **Background**: Sub-project of HSBC 150th Anniversary Charity Programme (46 million HKD).
  Task: Urban Informatics and Big Data Analytics.
  Year: 2017-2019.
- **Role**: Team leader of sub-project.
- **Contributions**: (1) In this project, I led the big data analytics team with the objective of developing a comprehensive big data system. This system is designed to gather, process, and store streaming data from various sources, including meteorology, air quality, social media, demographics, and traffic. (2) Our team developed a fusion model that seamlessly integrates traditional physical air quality prediction methodologies with our data-driven models. This integration significantly enhances the prediction accuracy for any given location. (3) We explore the explainability of ML models, particularly for spatial-temporal forecasting.
- **Output**: J3 and C7 (1st author).

Big Data Platform for Smart Transportation Applications with Heterogeneous Data Sources

- **Background**: Sub-project of ITF (Innovation and Technology Fund of Hong Kong, 10 million HKD).
  Task: Visualization platform to facilitate subway data analysis.
  Year: 2016-2018.
- **Role**: Team leader of sub-project.
- **Contributions**: (1) We have developed a visually-guided integration platform designed for the fusion of spatio-temporal data from multiple sources. (2) We have implemented a visualization system to accurately represent indoor movements, as derived from video tracking data.

Visualization of the Egocentric Collaboration Network

- **Background**: Collaboration Project with HKUST library.
  Task: Visualizing the co-author network of each professor.
- **Output**: Personal webpage on the HKUST library website: http://repository.ust.hk/ir/coauthor/graph/huamin.
  Demo: http://vis.cse.ust.hk/demos/ust/.

TEACHING

Introduction to Computer Science (COMP1021)   2016 – 2020
Hong Kong University of Science and Technology, Lab TA   *4 Semester*

ACADEMIC SERVICE

Conference Review

- ACM CHI 2023, 2021
- ACM MM 2023
- IEEE VIS 2023, 2022, 2019
- ChinaVIS 2023, 2022, 2021, 2019, 2018

Journal Review

- IEEE TVCG
- JPDC

Professional Organizations

- Member, IEEE; Member,CCF; Member, CSIG

MENTORING

Ph.D. Student

- Zhengxin You (PolyU Hong Kong), 2022-present, co-supervise with Dr. Bo Tang
- Haipeng Zeng (HKUST), 2018-2020, co-supervise with Prof. Huamin Qu
- Yuzhe Jiang (HKUST), 2018-2020, co-supervise with Prof. Huamin Qu

M.Phil. Students

- Teng Wang, 2021-2022, co-supervise with Dr. Bo Tang
- Qian Li, 2021-2023, co-supervise with Dr. Bo Tang
- Chaozu Zhang, 2021-present, co-supervise with Dr. Bo Tang
- Shangxuan Wu, 2022-present
- Yansha Jia, 2023-present