Shaolun RUAN

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Research Area

To enhance the human ability to read and understand big data, I developed novel graphical representations and visual analytic systems that enable a more effective and smoother analysis using machines. Building upon the techniques from **Data Visualization** and **Human-Computer Interaction**, my work focuses on developing human-centered computing tools to address complex problems in various scientific domains, facilitating the process of explainability and data-driven decision-making. Our authoring tools and designs are appreciated and practically used by doctors, pathologists, and quantum computing developers.

Education

Research scholar in Monash University — Melbourne, Australia
Faculty of Information Technology — *2025.01 - present*
Advised by Tim Dwyer, member of Immersive Analytics Lab.

Ph.D. candidate in Singapore Management University — Singapore
School of Computing and Information System — *2022.01 - present*
Advised by Prof. Jiannan Li and Prof. Yong Wang

B.S. in University of Electronic Science and Technology of China — Chengdu, China
School of Computing Science and Engineering — *2015.09 - 2019.07*
Member of Big Data Research Center

Notable Awards

Dean's List Award — 2024
Awarded for the top 3% PhD students in recognition of the significant research achievements.

SMU Presidential Doctoral Fellowship — 2024
Awarded for PhD students who have consistently shown exceptional research achievements selected from the top 10% of PhD students.

SMU Presidential Doctoral Fellowship — 2023
Awarded for PhD students who have consistently shown exceptional research achievements selected from the top 10% of PhD students.

UESTC SCSE Outstanding Student Award — 2019
Awarded to students with an outstanding performance during the bachelor period.

Mentorship and Publications

- Mentored Work -
Qipeng Wang(mentee), **Shaolun Ruan**(mentor), Rui Sheng, Yong Wang, Min Zhu, Huamin Qu.
TrajLens: Visual Analytics for Constructing Cell Development Trajectories in Cross-Sample Analysis.
IEEE Transactions on Visualization & Computer Graphics (2025).

- Mentored Work -
Qipeng Wang(mentee), Rui Sheng, **Shaolun Ruan**(mentor), Xiaofu Jin, Chuhan Shi, Min Zhu.
SynthLens: Visual Analytics for Facilitating Multi-step Synthetic Route Design.
IEEE Transactions on Visualization & Computer Graphics (2025)

- Mentored Work -
Shaolun Ruan(mentor), Ribo Yuan(mentee), Qiang Guan, Yanna Lin, Ying Mao, Weiwen Jiang, Zhepeng Wang, Wei Xu, Yong Wang.
Venus: A Geometrical Representation for Quantum State Visualization.
Computer Graphics Forum (CGF): 42-Issue 3. https://doi.org/10.1111/cgf.14827

- Mentored Work -
Shaolun Ruan(mentor), Rohan Ramakrishnar(men'te'e), Chao Ren, Rudai Yan, Qiang Guan, Jiannan Li, Yong Wang.
Towards Explainable Quantum AI: Informing the Encoder Selection of Quantum Neural Networks via Visualization.
Under review.

Shaolun Ruan, Rui Sheng, Xiaolin Wen, Jiachen Wang, Tianyi Zhang, Yong Wang, Tim Dwyer, Jiannan Li.
Qualitative Study for LLM-assisted Design Study Process: Strategies, Challenges, and Roles.
IEEE Transactions on Visualization & Computer Graphics (2025).

Shaolun Ruan, Qiang Guan, Paul Griffin, Ying Mao, Yong Wang.
QuantumEyes: Towards Better Interpretability of Quantum Circuits.
IEEE Transactions on Visualization & Computer Graphics (2023): 1-13. https://doi.org/10.1109/TVCG.2023.3332999

Shaolun Ruan, Zhiding Liang, Qiang Guan, Paul Griffin, Xiaolin Wen, Yanna Lin, and Yong Wang.
Violet: Visual Analytics for Explainable Quantum Neural Networks.
IEEE Transactions on Visualization & Computer Graphics (2023). https://doi.org/10.1109/TVCG.2024.3388557

Shaolun Ruan, Yong Wang, Weiwen Jiang, Ying Mao, Qiang Guan.
Vacsen: A Visualization Approach for Noise Awareness in Quantum Computing.
IEEE Transactions on Visualization & Computer Graphics 29.01 (2022): 462-472. https://doi.org/10.1109/TVCG.2022.3209455

Manusha Karunathilaka*, **Shaolun Ruan***, Lin-Ping Yuan, Jiannan Li, Zhiding Liang, Kavinda Athapaththu, Qiang Guan, Yong Wang.
Intuit: Explain Quantum Computing Concepts via AR-based Analogy.
ACM Conference on Human Factors in Computing Systems (Late-Breaking Work) 2025.

Xiaolin Wen, Tai Nguyen, **Shaolun Ruan**, Qiaomu Shen, Jun Sun, Feida Zhu, Yong Wang.
PonxziLens+: Visualizing Bytecode Actions for Smart Ponzi Scheme Identification.
IEEE Transactions on Visualization & Computer Graphics (2024).

Shaolun Ruan, Yong Wang, and Qiang Guan.
Intercept Graph: An Interactive Radial Visualization for Comparison of State Changes.
2021 IEEE Visualization Conference (VIS). IEEE, 2021: 111-115. https://doi.org/10.1109/VIS49827.2021.9623307

Shaolun Ruan, Yong Wang, Hailong Jiang, Weijia Xu, Qiang Guan.
BatchLens: A Visualization Approach for Analyzing Batch Jobs in Cloud Systems.
Proceedings of DATE 2022. IEEE, 2022: 108-111. https://ieeexplore.ieee.org/document/9774668

Hailong Jiang*, **Shaolun Ruan***, Bo Fang, Yong Wang, Qiang Guan.
Visilience: An Interactive Visualization Framework for Resilience Analysis using Control-Flow Graph.
Proceedings of IEEE PRDC 2023. https://ieeexplore.ieee.org/document/10356508

Shaolun Ruan, Zhikang Wang, Furui Cheng, Rui Sheng, Kai Qian, Jiangning Song, Jiannan Li, Yong Wang.
ImaGene:A Multimodal Visualization Tool for Gene-powered Cancer Prognosis.
Under review.

Rui Sheng, Zelin Zang, Jiachen Wang, Yan Luo, Zixin Chen, Yan Zhou, **Shaolun Ruan**, Huamin Qu.
CellScout: Visual Analytics for Mining Biomarkers in Cell State Discovery.
Under review.

Invited Talks

VIS meets Quantum Computing, HKUST 2023.11
Invited Talk on Enhancing the Transparency of Quantum Computing using Visualization.

VAST Panel, HKUST 2023.12
Invited Speaker in the VisLab HAI Seminar.

Towards Making Your VIS Paper Writing Better, UESTC, China 2024.01
Invited Talk About the Sharing of Academic Writing.

VIS meets Quantum Computing, Sichuan University, China 2024.01
Invited Talk on Enhancing the Transparency of Quantum Computing using Visualization.

Stepping Into the Era of Interpretable Quantum Computing, University of Notre Dame 2024.02
Invited Lecture in QuCS Lecture Series.

VIS meets Quantum Computing, Central South University 2024.04
Invited Talk on Enhancing the Transparency of Quantum Computing using Visualization.

VIS meets Quantum Computing, GAMES Webinar 2024.05
Invited Speaker for Research Talk and Panel Discussion.

Teaching

Tutor Faculty of Information Technology, Monash University
FIT3179 - Data visualisation 2025 Semester 2

Teaching Assistant School of Computing and Information System, SMU
IS428 - Visual Analytics for Business Intelligence AY2023-24, Spring

Teaching Assistant School of Computing and Information System, SMU
CS711 - Learning and Planning in Intelligent Systems AY2024-25, Fall

Media

[QuCS Lecture] No.59 QuCS Lecture Series by me (Post).
[SMU SCIS Department- News] SCIS Dean's List Award at 2024 has been released.
[SCU VIS News] Talk at SCU VIS Lab by me (Chinese Article).
[GAMES Webinar - Updates] No. 324 GAMES Webinar - Talk and Panel by me (Chinese Article).
[UESTC News] The School of Computer Science held the first 'Outstanding Award' ceremony (Chinese Article).