Ruochen Li

Final-year PhD candidate at Durham University

+44 7541591080 | ruochen.21.li@gmail.com | https://carrotsniper.github.io/

| linkedin.com/in/ruochen21/ | Google Scholar

EDUCATION

PhD in Computer Science | Durham University, UK 2021– 2025

- **Supervisor**: Prof. Hubert P. H. Shum and Dr. Stamos Katsigiannis
- **Research interest**: Machine Learning and Deep Learning with a focus on Spatial-temporal Modeling, Graph Representation Learning, and Time-series Prediction. Experienced in developing efficient predictive models suitable for hardware acceleration, bridging theoretical algorithms and practical implementations.
- **Highlights:**
  - First-author publications in top-tier machine learning journals.
  - Interdisciplinary collaboration experience with researchers across diverse academic backgrounds.

MSc in Advanced Computer Science (Data Analytics) (Distinction) | University of Leeds, UK 2019 – 2020

- **Thesis**: 'Predicting Worm Behaviour using Deep Learning Methods'
- **Relevant Course**: Bio-Inspired Computing, Big Data System, Scientific Computation, Data Science, Artificial Intelligence, Data Mining and Text Analytics

BSc in Computing Science & Artificial Intelligence (Honours, class II division I) | University of Leeds, UK 2016 – 2019

- **Dissertation**: 'Smart Video Engagement Analysis'
- **Relevant Course**: Machine Learning, Algorithms, Linear Algebra & Probability, Software Engineering, Robotics, Distributed Systems, Parallel Computation, Mobile Application Development

Research Interest

My research focuses on designing advanced predictive frameworks and graph representation learning algorithms tailored for spatial-temporal data analysis, particularly in pedestrian and vehicle trajectory prediction and human motion analysis. I specialize in developing sparse, computationally efficient, and uncertainty-aware models, integrating theoretical insights with practical, hardware-friendly implementations. My expertise positions me effectively for interdisciplinary research in probabilistic modeling, and AI hardware co-design.

RESEARCH EXPERIENCE

Durham University 2021– 2025

Supervisor: Prof. Hubert P. H. Shum and Dr. Stamos Katsigiannis

· **Multi-agent Crowd Analysis**

– **Spatial-temporal Modeling**: Develop novel spatial-temporal predictive frameworks to accurately model and forecast complex interactions within multi-agent crowds, effectively capturing dynamic behaviors and uncertainty in real-world scenarios.

– **Graph Representation Learning**: Design and implement efficient graph-based learning algorithms optimized for low computational complexity, aligning with hardware-software co-design principles.

– **Temporal Dependency Modeling**: Explore and investigate lightweight time-series modeling techniques, prioritizing reduced complexity and potential applicability to hardware implementations.

– Hands-on experience in designing and optimizing deep learning models with an explicit emphasis on computational efficiency and hardware-friendly implementations.

· **Human-Object Interaction (HOI) Analysis**

– Develop end-to-end deep learning systems integrating geometric and visual graph neural networks to effectively recognize and predict complex human-object interactions from video data, enabling accurate context-aware analyses suitable for practical applications.

– Optimize representation learning methods for better spatial-temporal feature fusion, significantly enhancing the robustness and efficiency of interaction recognition in realistic visual environments.

PUBLICATIONS

Ruochen Li, Stamos Katsigiannis, Tae-Kyun Kim, Hubert P. H. Shum. *"BP-SGCN: Behavioral Pseudo-Label Informed Sparse Graph Convolution Network for Pedestrian and Heterogeneous Trajectory Prediction,"* IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), IEEE, 2025. Impact Factor: 10.2 | Top 10% Journal in Computer Science, Artificial Intelligence

Ruochen Li, Tanqiu Qiao, Stamos Katsigiannis, Zhanxing Zhu, Hubert P. H. Shum. *"Unified Spatial-Temporal Edge-Enhanced Graph Networks for Pedestrian Trajectory Prediction,"* IEEE Transactions on Circuits and Systems for Video Technology (**TCSVT**), IEEE, 2025.
Impact Factor: 8.3 | Top 10% Journal in Engineering, Electrical & Electronic

Ruochen Li, Stamos Katsigiannis, Hubert P. H. Shum. *"Multiclass-SGCN: Sparse Graph-based Trajectory Prediction with Agent Class Embedding,"* IEEE International Conference on Image Processing (**ICIP**), IEEE, 2022.

Tanqiu Qiao, **Ruochen Li**, Frederick WB Li, Hubert P. H. Shum. *"From Category to Scenery: An End-to-End Framework for Multi-Person Human-Object Interaction Recognition in Videos,"* International Conference on Pattern Recognition (**ICPR**), Springer, 2024.

Tanqiu Qiao, **Ruochen Li**, Frederick WB Li, Yoshiki Kubotani, Shigeo Morishima, Hubert P. H. Shum. *"Geometric Visual Fusion Graph Neural Networks for Multi-Person Human-Object Interaction Recognition in Videos,"* (Under Review).

PROFESSIONAL EXPERIENCE

Demonstrator | Durham University, UK Oct 2022 – Present

- Postgraduate Module: Text Mining and Language Analytics, Learning from Data, Programming for Data Science.
- Undergraduate Module: Data science (Probability, Image Processing and Computer Graphics), Algorithms and Data Structures.

Advisor of Bachelor Thesis – Co-supervised undergraduate students on their thesis, providing suggestions and insights on research methodologies and analytical techniques.

Student Helper – 21st ACM SIGGRAPH / Eurographics Symposium on Computer Animation, Durham Aug – Sep 2022

- Responsibly coordinated events and communicated with registered members to ensure all activities ran smoothly and on schedule.

Reviewer – IEEE Transactions on Neural Networks & Learning Systems (TNNLS) / IET Computer Vision

KEY SKILLS

Machine Learning & Deep Learning: Spatial-Temporal Prediction, Graph Representation Learning, Model Efficiency Optimization, Probabilistic & Uncertainty Modeling

Algorithm & Hardware Integration: Efficient Algorithm Design, Complexity Analysis, Lightweight Neural Network Architectures, Computational Modeling for Hardware Implementation

Programming & Tools: Python, Java, C/C++, MATLAB, PyTorch, TensorFlow

Soft Skills: Interdisciplinary Communication, Technical Presentations, Research Collaboration, Project Management

Referee

Prof. Hubert P. H. Shum (PhD supervisor)
Professor of Visual Computing, Director of Research of the Department of Computer Science,
Co-Director (Research) of the Durham University Space Research Centre.
E-mail: hubert.shum@durham.ac.uk, Homepage: http://hubertshum.com/.

Stamos Katsigiannis (PhD co-supervisor)
Associate Professor in the Department of Computer Science,
E-mail: stamos.katsigiannis@durham.ac.uk, Homepage: https://www.durham.ac.uk/staff/stamos-katsigiannis/.