



YUMENG SONG

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EDUCATION & WORK EXPERIENCE

- Aarhus University, Denmark | Postdoc** Jan. 2025 –
Institution: Department of Computer Science Aarhus, Denmark
- *Research Topic:* Trajectory-Based Spatial Analytics and Inference
- Aalborg University, Denmark | Postdoc** Nov. 2024 – Dec. 2024
Institution: Department of Computer Science Aalborg, Denmark
- *Research Topic:* Machine learning for spatio-temporal management and analytics
- Aalborg University, Denmark | Guest PhD** Nov. 2022 – Oct. 2024
Major: Computer Science Aalborg, Denmark
- *Host Supervisor:* Assistant Professor Tianyi Li
 - *Research Topic:* Learning-based trajectory compression
- Northeastern University, China | PhD** Sep. 2019 – Oct. 2024
Major: Computer Science and Technology Shenyang, China
- *Main Supervisor:* Prof. Ge Yu
 - *Co-supervisor:* Prof. Yu Gu
 - *Research Topic:* Graph neural networks
- Northeastern University, China | Master** Sep. 2017 – Jul. 2019
Major: Computer Software and Theory Shenyang, China
- *Supervisor:* Prof. Ge Yu
 - *Research Topic:* Location-based social networks
- Northeastern University, China | Bachelor** Sep. 2013 – Jun. 2017
Major: Computer Science and Technology Shenyang, China
- *Rank:* 11/258

PUBLICATIONS

Accepted papers:

- * **Yumeng Song**, Yu Gu, Tianyi Li, Yushuai Li, Christian S. Jensen, and Ge Yu. Quantifying Trajectory Point Contributions: A Lightweight Framework for Efficient and Effective Query-Driven Trajectory Simplification. VLDB, 2025.
- * Tianyi Li, Yushuai Li, **Yumeng Song**, Zhongming Yao, Wei Gao, and David Wenzhong Gao. Networked Digital Twins for Autonomous Vehicles: A New Perspective. IEEE Transactions on Intelligent Vehicles.
- * **Yumeng Song**, Yu Gu, Tianyi Li, Jianzhong Qi, Zhenghao Liu, Christian S. Jensen, and Ge Yu. CHGNN: A Contrastive Network for Semi-Supervised Hypergraph Learning. TKDE, 2024.
- * Qi Dai, **Yumeng Song**, Yu Gu, Fangfang Li, and Xiaohua Li. Diffusion Model-Enhanced Contrastive Learning for Graph Representation. DASFAA, 2024.
- * **Yumeng Song**, Xiaohua Li, Fangfang Li, and Ge Yu. Learning from Feature and Global Topologies: Adaptive Multi-View Parallel Graph Contrastive Learning. Mathematics, 2024.

- * Jingbo Wang, **Yumeng Song**, Yu Gu, Xiaohua Li and Fangfang Li. CLNIE: A Contrastive Learning Based Node Importance Evaluation Method for Knowledge Graphs with Few Labels. DASFAA, 2023.
- * **Yumeng Song**, Yu Gu, Xiaohua Li, Chuanwen Li, and Ge Yu. CSGNN: Improving Graph Neural Networks with Contrastive Semi-supervised Learning. DASFAA, 2022.
- * Di Wei, Yu Gu, **Yumeng Song**, Zhen Song, Fangfang Li, and Ge Yu. IncreGNN: Incremental Graph Neural Network Learning by Considering Node and Parameter Importance. DASFAA, 2022.
- * **Yumeng Song**, Yu Gu, Fangfang Li, and Ge Yu. Survey on AI-powered new techniques for query processing and optimization. Journal of Frontiers of Computer Science and Technology, 2020.
- * **Yumeng Song**, Mo Chen, Ge Yu. Dynamic preference-based group query in temporal geo-social networks. Journal of Frontiers of Computer Science and Technology, 2019.

Ongoing papers:

- * Xinru Ye, Yu Gu, **Yumeng Song**, Zhenghao Liu, Xiaohua Li, and Fangfang Li DS-GAT: Dynamic Spike Graph Neural Networks with Biological Attention Restoration. IJCAI, 2025. (Under review)
- * Fangfang Li, Jiajun Shen, **Yumeng Song**, Yu Gu, Xiaohua Li, and Ge Yu. CLHAE: Towards Hypergraph Pre-training based on Contrastive Learning and Hypergraph. APWeb-WAIM, 2025. (To be submitted)
- * Tianyi Li, Yifei Chen, **Yumeng Song**, Lu Chen, Yushuai Li, Yunjun Gao, Kristian Torp, Torben Bach Pedersen, and Christian S. Jensen. Movement Pattern-Enhanced Evolutionary and Incremental Clustering of Moving Objects. TKDE. (To be submitted)
- * **Yumeng Song**, Tianyi Li, Yifei Chen, Lu Chen, Yushuai Li, Yunjun Gao, Kristian Torp, Torben Bach Pedersen, and Christian S. Jensen. PMCR: An Efficient Road Network Trajectory Compression Method Supporting Decompression-Free Queries. VLDB, 2025. (To be submitted)

TEACHING EXPERIENCE & TRAINING PROGRAM

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|---|------------------|
| Data Mining <i>Guest lecture</i> | Spring 2025 |
| Aalborg University | Aalborg, Denmark |
| Algorithm and Data Structures <i>Guest lecture</i> | Fall 2024 |
| Aalborg University | Aalborg, Denmark |
| Faculty Lecture | Feb 2025 |
| Aarhus University | Aarhus, Denmark |
| Supervision of DAT7 (one group) <i>co-supervisor</i> | Fall 2024 |
| Aalborg University | Aalborg, Denmark |
| Problem-based Learning (PBL) course | Fall 2024 |
| Aalborg University | Aalborg, Denmark |

RESEARCH EXPERIENCE

- * **Research on Traffic Sign Geolocating based on Deep Learning.** The research aims to develop a deep learning framework to infer the geographic location and orientation of detected traffic signs by extracting feature information from sequential images collected during vehicle travel.
- * **Research on Trajectory Simplification based on Deep Learning.** The research provides sampling-based and generative-based efficient trajectory simplification models by deep learning. The query results on a simplified database aim to be similar to those of the source database.
- * **Research on Contrastive Graph Neural Network (GNN).** The research focuses on contrastive learning-based GNNs and hypergraph GNNs. The research aims to improve GNN and hypergraph GNN performance in semi-supervised learning by mining hidden information of unlabeled nodes.

PROJECT EXPERIENCE

- * **Mobility Analytics using Sparse Mobility Data and Open Spatial Data.** The research focuses on: (a) designing data warehouse schemas to store and manage spatial data efficiently, supporting real-time interactive mobility analytics; (b) developing software tools for query formulation and visualization on map-based interfaces for both indoor and outdoor mobility settings; (c) conducting advanced analyses such as congestion mapping, isochrones, origin-destination travel time matrices, and what-if scenario analysis for infrastructure changes; (d) integrating CO2 emission estimations using vehicular environmental impact models and GPS data for outdoor mobility; and (e) applying transfer learning techniques to extend insights from dense spatio-temporal data regions to sparser ones, enhancing analytical capabilities.
- * **Research on the Construction of Interactive Personalized Teaching Environment based on Big Data.** The research focuses on the intelligent management of multi-source heterogeneous teaching space, diversified teaching interaction design and adaptive optimization, personalized and precise guidance under multiple subjects, etc. The research aims to build an intelligent environments for teaching, where both physical space and virtual space are fused.
- * **Research on Distributed Data Storage and Management based on Heterogeneous Architecture.** The research aims at: (a) developing a distributed data storage model and designing a dynamic partitioning strategy for the model, in order to enhance the efficiency of accessing diversified types of data; (b) enabling high-throughput and flexible access of streaming data, under multiple patterns of data processing; (c) presenting a multi-level management of data cache, in order to efficiently access fault-tolerance when processing streaming data.
- * **Research on High-Performance Storage and Management Methods for Big Data.** The research includes three steps: (a) developing high-performance storage and management system with high scalability, high reliability, and high concurrency; (b) enabling the system to achieve dynamic dispatch of storage resources and to evaluate the effectiveness of itself; and (c) applying the system to manage satellite data and ocean environment monitoring data.

ACADEMIC SERVICE AND INVITED TALK

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| Program Committee Member <i>IJCAI</i> | 2025 |
| Reviewer <i>IEEE Transactions on Knowledge and Data Engineering (TKDE)</i> | 2025 |
| Reviewer <i>IEEE Transactions on Intelligent Vehicles (TIV)</i> | 2025 |
| Reviewer <i>IEEE Network</i> | 2025 |
| Reviewer <i>IEEE Transactions on Industrial Informatics (TII)</i> | 2025 |
| Reviewer <i>IEEE Transactions on Automation Science and Engineering (TASE)</i> | 2025 |
| Invited talk <i>Rambøll</i> | Feb 2025 Denmark |