Anqi Liang

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Education

- **Shanghai Jiao Tong University** Shanghai, China
  PhD in Computer Science and Technology; *Sep. 2018 – Jun. 2025*
  - Advisor: Prof. Bin Yao
  - Research Interest: **Spatial-Temporal Data Management, Data Mining, Vector Data Management**

- **Ocean University of China** Qingdao, China
  B.Eng in Computer Science and Technology; **GPA:3.68/4.0; Ranking: top-5%** *Sep. 2014 – Jun. 2018*

Major Experience

- **DBGroup in SJTU** Shanghai, China
  PhD Student and Researcher *Sep. 2018 – Jun. 2025*
  - Conducted research in spatio-temporal data mining and vector data management, including machine learning-enhanced trajectory clustering, trajectory representation, travel time estimation, and hybrid vector queries. Published academic papers in top-tier venues.
  - Worked on four research projects focused on big data analytics and spatio-temporal query processing under the supervision of Prof. Bin Yao.
  - Participated in proposal drafting and management for funded projects, including those granted by the National Natural Science Foundation of China and industry partners (Alibaba and Tencent).
  - Assisted in teaching graduate and undergraduate-level courses at SJTU: CS28007, CS392, and CS248.
  - Served as a reviewer for top-tier international journals, such as IEEE TKDE.

- **Database Products Business Unit at Alibaba Cloud Computing Co. Ltd** Beijing, China
  Research Intern advised by Jiong Xie *Jul. 2021 – Feb. 2022*
  - Performed research and developed prototypes for efficient trajectory query processing and analysis.
  - Designed solutions for trajectory representation, indexing structures, and query algorithms, optimizing trajectory k-NN queries, range queries, and similarity joins.
  - Developed trajectory-related plugins for the cloud-native location intelligence engine, GanosBase.

Project Experience

- **Smart Transportation Application** SJTU
  Role: Principal Researcher *Sep. 2024 - current*
  - Designed a framework integrating dynamic properties and user preferences for travel time estimation APPs.
  - Proposed a road segment representation method using a graph attention network to capture travel semantics.
  - Developed an updatable predictive model suitable for scenarios with continuously evolving data.
  - This work is planned to be submitted to KDD 2025.

- **High-dimensional Vector Hybrid Query Processing** SJTU and Tencent
  Role: Principal Researcher *Oct. 2023 - Oct. 2024*
  - Designed a unified proximity graph-based index for efficient hybrid querying with logarithmic time complexity.
  - Integrated auxiliary structures, such as skip list connections and edge masking bitmaps, into the index to support pre-, post-, and hybrid filtering strategies simultaneously.
  - Proposed a range-aware search strategy selection method to improve query performance.
  - This work has been submitted to VLDB 2025 and is currently under revision.

- **AI-based Trajectory Data Analytics** SJTU
  Role: Principal Researcher *Mar. 2022 - Sep. 2023*
  - Developed an intra- and inter-trajectory contrastive learning module to capture the complementarity and correlation between different modal features within a trajectory and the complex relationships between trajectories. This generates semantically rich trajectory representations for various downstream tasks.
  - Proposed a reinforcement learning-based sub-trajectory clustering framework that leverages the clustering quality to guide the trajectory segmentation in a data-driven manner.
  - Published research findings in top-tier database and GIS journals (VLDBJ 2024, Geoinformatica 2024).

- **Optimization for Trajectory Query Processing** SJTU and Alibaba
  Role: Principal Researcher *Mar. 2021 - Feb. 2022*
  - Proposed a compact bounding box representation method for sub-trajectories based on speed and direction.

- Designed a bi-directional linked tree for indexing sub-trajectories, along with efficient algorithms for k-NN search, range search, and similarity join.
- Developed trajectory indexing and query processing algorithms as plugins for Alibaba's cloud-native location intelligence engine, GanosBase.

- **Alumni Information Intelligent Management Platform** SJTU
  Role: Co-Researcher *Nov. 2019 - Jun. 2021*
  - Proposed a rule-based data cleaning framework to process multi-source heterogeneous alumni data from 1950 to 2020, transforming it into unified and structured formats.
  - Integrated the data processing module into the alumni information platform, establishing the foundation for a range of alumni services.
  - Designed alumni data tables in a relational database and interfaces for front-end and back-end integration.

Publications (♯ means corresponding author)

- **Sub-trajectory Clustering with Deep Reinforcement Learning**
  Anqi Liang, Bin Yao♯, Bo Wang, Yinpei Liu, Zhida Chen, Jiong Xie, Feifei Li
  VLDBJ 2024. [Paper Link]

- **CLMTR: A Generic Framework for Contrastive Multi-modal Trajectory Representation Learning**
  Anqi Liang, Bin Yao♯, Jiong Xie, Wenli Zheng, Yanyan Shen, Qiqi Ge
  Geoinformatica 2024. [Paper Link]

- **UNIFY: Unified Index for Range Filtered Approximate Nearest Neighbors Search**
  Anqi Liang, Pengcheng Zhang, Bin Yao♯, Zhongpu Chen, Yitong Song, Guangxu Cheng
  Under Revision (VLDB 2025.)

- **Travel Time Estimation based on Dynamicity and Personal Preferences**
  Anqi Liang, Bin Yao♯
  To be submitted to KDD 2025.

Honors and Awards

- **Sheng Xuanhuai Cup Innovation Competition Excellence Award** Shanghai, China
  Affiliation: Shanghai Jiao Tong University *2021*
- **Outstanding Graduate Student Award (Top 5% in Ocean University of China)** Qingdao, China
  Affiliation: Ocean University of China *2018*
- **Lu Xin Scholarship** Qingdao, China
  Affiliation: Ocean University of China *2017*
- **The First Prize Scholarship (Top 1% in Ocean University of China)** Qingdao, China
  Affiliation: Ocean University of China *2017*
- **The Second Prize Scholarship (Top 10% in Ocean University of China)** Qingdao, China
  Affiliation: Ocean University of China *2015 & 2016*

Technical Skills

- **Languages** Mandarin(native), English(skilled)
- **Programming** Python, C++, C
- **Tools** PostgreSQL, PostGIS, MySQL, SQL Server, LaTex, Markdown, git, Linux
- **AI&ML** PyTorch, TensorFlow, Scikit-learn