Guangyue Li

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EDUCATION

Wuhan University Wuhan, China
Master of Engineering in Computer Technology *Sep 2022 – Jun 2024* (expected)
Supervisor: Prof. Luliang Tang

China University of Geosciences Wuhan, China
Bachelor of Engineering in Spatial Information and Digital Technology *Sep 2018 – Jun 2022*
GPA: 3.90/5.0, Rank: 2/59, top 5%
Coursework: *Probability, Linear Algebra, Data Structure, Algorithms, Database, Spatial Analysis, Geographic Information System*

RESEARCH INTERESTS

Spatio-temporal data mining; Deep learning; GIS; GeoAI; Intelligent transportation system; Trajectory data

PUBLICATIONS AND MANUSCRIPTS

[Information Fusion] **IF: 18.6**, JCR: Q1, CS: 38.6, 2023
Towards Integrated and Fine-grained Traffic Forecasting: A Spatio-Temporal Heterogeneous Graph Transformer Approach. **DOI:** *https://doi.org/10.1016/j.inffus.2023.102063*
Guangyue Li, Zilong Zhao, Xiaogang Guo, Luliang Tang*, Huazu Zhang, Jinghan Wang

[Information] IF: 3.1, ESCI, EI CS: 5.8, 2021
Combine-Net: An Improved Filter Pruning Algorithm.
DOI: *https://doi.org/10.3390/info12070264*
Jinghan Wang, **Guangyue Li***, Wenzhao Zhang

[Travel Behaviour and Society] IF: 5.2, JCR: Q2, CS: 9.3, 2023
Identifying Critical Urban Intersections from a Fine-grained Spatio-Temporal Perspective **DOI:** *https://doi.org/10.1016/j.tbs.2023.100649*
Zilong Zhao, Luliang Tang*, Xue Yang, Huazu Zhang, **Guangyue Li,** Qingquan Li

[ACM SIGSPATIAL] EI, **Top Conference** of GIS, 2023
Large-Scale Human Mobility Prediction Based on Periodic Attenuation and Local Feature Match **DOI:** *https://doi.org/10.1145/3615894.3628505*
Xiaogang Guo, **Guangyue Li**, Zhixing Chen, Huazu Zhang, Yulin Ding, Jinghan Wang, et.al

[Acta Geodaetica et Cartographica Sinica] EI, CS: 2.4, 2023
Spatial Co-location Pattern Mining Based on Graph Structure *(in Chinese)* ***(Accept)***
Jinghan Wang, Tinghua Ai*, Hao Wu, Haijiang Xu, **Guangyue Li**

[IEEE Trans on ITS] **IF: 8.5**, JCR: Q1, CS: 11.6, 2023
Towards Complex Urban Traffic Forecasting: A Fully Attentional Approach Enhanced by Graph Representation ***(Under Review)***
Guangyue Li, Zilong Zhao, Yang Chen, Luliang Tang*, Jinghan Wang, Xu Chu, Chaokui Li

[Geo-spatial Information Science] IF: 6, JCR: Q2, CS:7.5, 2023
A Co-location Detection Method Based on Graph Growth Idea
(Under Review)
Jinghan Wang, Tinghua Ai*, **Guangyue Li**, Hao Wu, Haijiang Xu

RESEARCH EXPERIENCE

- **Integrated and Fine-grained Traffic Forecasting for Road Segments and Intersection Turns**
  Supervisor: Prof. Luliang Tang **Team Leader** *Nov 2022 – July 2023*
  ◦ Define a Heterogeneous Road network Graph (HRG) to comprehensively represent the topological structure of the complete traffic network, incorporating different types of nodes and edges to depict roads and turns, as well as their synergistic relationships.
  ◦ Develop a Heterogeneous Spatial Embedding (HSE) module to characterize the heterogeneous road network information from attributes, significance, and relevance. Leveraging HSE, spatial transformer can effectively explore the intricate spatial correlations.
  ◦ Propose an Adaptive Soft Threshold (AST) module to alleviate the influence of high temporal fluctuation. Integrated with the AST, the proposed temporal transformer enhanced its capacity to capture complex temporal correlations in the presence of noise.
- **Complex Urban Traffic Forecasting based on Graph Representation and Deep Learning**
  Supervisor: Prof. Luliang Tang **Team Leader** *Nov 2021 – Nov 2022*
  ◦ Propose significance encoding and relevancy encoding to compensate the attention mechanism's deficiency in complex road network representation, characterizing urban traffic networks from local and global perspectives.

◦ Develop a spatial attention to uncover the relationship between any pair of roads, dynamically modeling the geo-parcel-based traffic pattern correlations that do not depend on the road network.

◦ Design a multi-scale residual perception (MRP) based on shortcut connections to reconcile the competing influences of long-term periodicity and short-term variability, placing an emphasis on the fluctuating traffic states.

• **Spatial Co-location Pattern Detection Based on Graph Search, Prune, and Grow**

Supervisor: Prof. *Tinghua Ai* **Project Member** *Nov 2021 – July 2023*

◦ Propose an Adaptive Neighborhood Graph (ANG) to model the adjacency relationships between POIs, employing the adaptive filter to eliminate relationships hindered by large-scale geographic barriers.

◦ Realize the Apriori logical recursive process on the graph structure. Leveraging graph searching, pruning, and growing, the potential growth directions of spatial co-location patterns are identified accurately and efficiently.

◦ **Personal Contribution:** Apply the Neo4j graph database to store and manage co-location subgraphs, and use Python and Cypher to implement the main structure of the proposed algorithm.

• **Research on Crowd-sourced Mapping Algorithm Based on Low Accuracy GPS Trajectory Data**

Supervisor: Prof. Luliang Tang **Project Manager** *Nov 2022 – July 2023*

◦ **System Testing:** Develop and implement the system testing plan in close collaboration with the team, covering test case design, execution, and defect reporting.

◦ **Report Writing:** Provide a comprehensive summary of research objectives, methods, implementation process, and achievements. Prepare final project materials, including summary reports and result compilations.

◦ **Project Coordination:** Facilitate effective communication and coordination with stakeholders to align project objectives with their expectations, ensuring successful project delivery.

COMPETITION EXPERIENCE

• **The Human Mobility Prediction Challenge (ACM SIGSPATIAL 2023)** ***Top 10***

Wuhan University **Team Member** *July 2023 – Sep 2023*

Topic: Predict human mobility on a dataset of 100K individuals' trajectories across 90 days

◦ **Preliminary Research:** Study relevant literature and compare open-source methods to identify potential improvements in human mobility prediction.

◦ **Data Analysis:** Preprocess the raw trajectory data to ensure its cleanliness and integrity. Visualize trajectories for a better understanding of human mobility patterns.

◦ **Algorithm Design:** Emphasize the diversity of individual mobility patterns and develop predictive models that effectively capture this variability.

• **18th China Post-Graduate Mathematical Contest in Modeling** **Second Prize**

Wuhan University **Team Member** *Oct 2022*

Topic: Scientific management of daily necessities during the COVID-19 pandemic

◦ Construct the SIR model to simulate changes in the number of infected people under different circumstances. Compare real infection numbers with simulation results and assess the effectiveness of scientific management.

◦ Evaluate the number of daily necessities distribution points in various regions using the Isolated Forest algorithm. Analyze and adjust for a reasonable number of distribution points with the AdaBoost classifier.

◦ Quantify the main indicators of necessities distribution and develop a TOPSIS evaluation model to provide a comprehensive score for distribution strategies.

SKILLS SUMMARY

• **Language:** Mandarin (Native), English (Fluent, Preparing for IELTS, CET-6)
• **Software: Python**, QGIS, ArcGIS, PostGIS, Neo4j, MongoDB, C++
• **Technologies:** PyTorch, TensorFlow, Matplotlib, Numpy, Pandas, Geopy, Networkx, GeoPandas

AWARDS AND HONORS

• **Scholarship**

1. First Class Wuhan University Postgraduate Scholarship (Top 5%)
2. Outstanding Postgraduate Student of Wuhan University Oct 2023
3. Presidential Scholarships of China University of Geosciences (Top 5%) Oct 2023
4. Outstanding Student at China University of Geosciences Sep 2019
5. Advanced Individuals in Innovative Practices at Wuhan University Mar 2023

• **Competition**

1. Second Prize of China Post-Graduate Mathematical Contest in Modeling Oct 2022
2. Provincial Second Prize in National University Student Mathematical Modelling Competition Sep 2020
3. Top 10 in the HuMob Challenge 2023 Sep 2023