# Guangyue Li

Homepage: chicory-ggg.github.io/homepage   Email: guangyueli@whu.edu.cn

## 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; Geography information science; GeoAI; Intelligent transportation system; Trajectory data mining.

## 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 (**Major Revision**)*
**Guangyue Li**, Zilong Zhao, Xiaogang Guo, Luliang Tang[*], Huazu Zhang, Jinghan Wang

**[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

**[Information]**
IF: 3.1, ESCI, EI CS: 5.8, 2021

*Combine-Net: An Improved Filter Pruning Algorithm. Information. 2021; 12(7):264. https://doi.org/10.3390/info12070264*
Jinghan Wang, **Guangyue Li**[*], Wenzhao Zhang

**[Acta Geodaetica et Cartographica Sinica]**
EI, CS: 2.4, 2023

*Spatial Co-location Pattern Mining Based on Graph Structure (**Major Revision, in Chinese**)*
Jinghan Wang, Tinghua Ai[*], Hao Wu, Haijiang Xu, **Guangyue Li**

**[Travel Behaviour and Society]**
IF: 5.2, JCR: Q2, CS: 9.3, 2023

*Identifying Critical Urban Intersections from a Fine-grained Spatio-Temporal Perspective (**Major Revision**)*
Zilong Zhao, Luliang Tang[*], Xue Yang, Huazu Zhang, **Guangyue Li,** Qingquan Li

## 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 2022 – July 2023*
◦ 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.

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

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

  ◦ **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 (HuMob Challenge) 2023**

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

  **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**

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

  **Topic:** Scientific management of daily necessities during the COVID-19 pandemic | **Second Prize**

  ◦ 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 from qualitative and quantitative perspectives.

  ◦ 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. Presidential Scholarships of China University of Geosciences (Top 5%)　　　　　Sep 2019
  2. Outstanding Student at China University of Geosciences　　　　　Sep 2019
  3. 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