RUIXIN SONG

+1(709)769-9936 | ruixinsong21@gmail.com | St. John's, Canada
LinkedIn ◇ GitHub ◇ Portfolio ◇ Google Scholar

QUALIFICATIONS

- Master's degree in Computer Science with a specialization in mobility data analysis and modeling
- 3 years of research experience in data- and AI-driven practical projects to solve real-world problems
- 7 years of programming experience, proficient in Python, Java, C, JavaScript, and tools essential for data analysis and machine learning, and software development

EDUCATION

MSc (thesis), Computer Science, Memorial University of Newfoundland — Jan. 2021 - Apr. 2024
Position: Research student at Mobility and Data Analytics Lab — *St. John's, Canada*
Coursework: Machine Learning, Research Methods, Computational Tools, Data Visualization, Computer Graphics
Thesis: "Temporal Analysis and Gravity-Informed Marine Traffic Forecasting for Non-Indigenous Species Risk Assessment Through Ballast Water"

BEng, Spatial Information and Digital Technology, Shanghai Ocean University — Sep. 2016 - Jun. 2020
Coursework: Data Structure and Algorithms, Geo-Information System, Computer Network — *Shanghai, China*
Thesis: "Design and Implementation of an Election System Based on Homomorphic Encryption with Flask"

SELECTED RESEARCH PROJECTS

TransformerGravity [link] — Feb. 2023 - Jan. 2024
A gravity-informed deep learning framework with the self-attention mechanism for marine traffic traffic patterns forecast

- Performed graph analysis on the global shipping network to identify influential ports.
- Developed a deep learning framework using stacked transformers and features informed by gravity model, which significantly enhanced marine traffic prediction accuracy.
- Improved prediction accuracy by 13% over benchmark deep learning model and 50% over machine learning methods, which demonstrated the effectiveness of the framework in capturing marine traffic patterns.

Spatial-temporal Ballast Water Risk Assessment of Biological Invasions — Jul. 2021 - Sep. 2022
Funded by Fisheries and Oceans Canada, Transport Canada, Memorial University of Newfoundland

- Matched sea surface environmental data with over 8,300 ports, enhanced maritime environmental analysis.
- Refined Transport Canada's ballast water risk assessment model with advanced environmental data that enhanced the accuracy. Validated significant differences between new and traditional results using the statistical test.
- Boosted model efficiency by more than 80% through code optimization.

EXPERIENCE

Graduate Teaching Assistant - Data Preparation Techniques (COMP 6981) — Jan. 2022 - Apr. 2022
Memorial University of Newfoundland — *St. John's, Canada*

- Designed assignments and exercises on Python data processing and machine learning to ensure coursework was relevant, challenging, and effective in teaching key concepts.
- Marked assignments and provided constructive feedback to students.

Teaching Assistant - Advanced Mathematics (Calculus) — Feb. 2017 - Jun. 2017
Shanghai Ocean University — *Shanghai, China*

- Marked assignments and exams and provided feedback to students.

Income Tax Filing Volunteer *(Extracurricular activity)* — Feb. 2024 - Now
Community Volunteer Income Tax Program NL, Graduate Student Union of Memorial University — *St. John's, Canada*

Traditional Culture Festival Volunteer *(Extracurricular activity)* — Feb. 2024
Chinese Youth Association at Memorial University — *St. John's, Canada*

Director, Journalist, and Part-time Photographer *(Extracurricular activity)* Jan. 2017 - Aug. 2018
Information & Tech Student Union at Shanghai Ocean University *Shanghai, China*

Shanghai International Marathon Volunteer *(Extracurricular activity)* Nov. 2017
Shanghai International Marathon 2017 *Shanghai, China*

PUBLICATION

Song, R., Spadon, G., Pelot, R., Matwin, S., Soares, A., “Gravity-Informed Deep Learning Framework for Predicting Ship Traffic Flows and Non-Indigenous Species Introduction Risks from Ballast Water". Under review at *Scientific Reports* (2024). [Link]

Song, R., “Network Analysis and Vessel Flow Prediction for Risk Assessment of Biological Invasion of Non-indigenous Aquatic Species”. Spotlight talk in *The 36th Canadian Conference on Artificial Intelligence* (2023). [Link]

Song, R., Tavakoli, Y., Bailey, S.A., Soares, A., “A Temporal Assessment of Risk of Non-indigenous Species Introduction by Ballast Water to Canadian Coastal Waters Based on Environmental Similarity". *Biological Invasions* (2023). [Link]