

CURRENT

RESEARCH


INTERESTS

☐ Machine Learning☐ Matrix/Tensor Computations☐ Low-Rank Models☐ Spatiotemporal Data Modeling☐ Missing Data Imputation☐ Time Series Analysis☐ Intelligent Transportation☐ Smart Cities☐ Human Mobility

CONTACT

 chenxy346@gmail.com


INFORMATION

 <https://xinyuchen.github.io> (homepage) [xinyuchen](#) [Google Scholar](#)  950 citations (h-index: 11 & i10-index: 11)


BIOGRAPHY

In the whole year of 2024, I will be joining MIT's Department of Urban Studies and Planning as a Postdoctoral Associate with Prof. Jinhua Zhao, working on the Mens, Manus, and Machina (M3S) project and the US Department of Energy (DOE) project.

EDUCATION

 **PhD in Civil Engineering (Transportation)**

2020.08 – 2023.12

 Polytechnique Montreal (engineering school), *University of Montreal*


Montreal, Canada

 *IVADO PhD Excellence Scholarship & CIRRELT PhD Excellence Scholarship*

- Thesis: *Matrix and Tensor Models for Spatiotemporal Traffic Data Imputation and Forecasting*
- Advisor: Nicolas Saunier (full professor at Polytechnique Montreal)
- Co-advisor: Lijun Sun (associate professor at McGill University)

 **Master's degree in Traffic Information Engineering & Control**


2016.08 – 2019.06

 *Sun Yat-Sen University*


Guangzhou, China

 *Outstanding Thesis Award (top 2% in total)*

- Thesis: *Imputing Spatiotemporal Missing Traffic Data by Bayesian Tensor Factorization Models*
- Advisor: Zhaocheng He (full professor)

 **Bachelor's degree in Traffic Engineering**

2012.09 – 2016.06

 *Guangzhou University*

Guangzhou, China

- Thesis: *Modeling Vehicles' Time Headway with Log-Normal and Power-Law Distribution*
- Advisor: Xiaodong Zang (full professor)


HONOURS

AND


AWARDS

 *CIRRELT PhD Excellence Scholarship* (\$5,000)


2021.12

 *IVADO PhD Excellence Scholarship* (\$100,000, by Institute for Data Valorisation)

2020.04

 *Outstanding Thesis Award* (by Sun Yat-Sen University)

2019.06

 *National Scholarship* (by Ministry of Education of China)

2018.11

REFEREED

JOURNAL

PAPERS































Google Scholar: <https://scholar.google.com/citations?user=mCrW04wAAAAJ&hl>◆ **First-author papers** (5 papers cited above 100 times)

8. Xinyu Chen, Chengyuan Zhang, Xiaoxu Chen, Nicolas Saunier, Lijun Sun (2023). **Discovering dynamic patterns from spatiotemporal data with time-varying low-rank autoregression**. *IEEE Transactions on Knowledge and Data Engineering*. Early access.





 <https://doi.org/10.1109/TKDE.2023.3294440> JCR-Q1  IF: 8.9  top-tier







7. Xinyu Chen, Lijun Sun (2022). **Bayesian temporal factorization for multidimensional time series prediction**. *IEEE Transactions on Pattern Analysis and Machine Intelligence*. 44 (9): 4659–4673.











 <https://doi.org/10.1109/TPAMI.2021.3066551> JCR-Q1  IF: 23.6  top-tier  100+ citations ESI hot paper (top 0.1%)  ESI highly cited paper (top 1%)

6. Xinyu Chen, Mengying Lei, Nicolas Saunier, Lijun Sun (2022). **Low-rank autoregressive tensor completion for spatiotemporal traffic data imputation**. *IEEE Transactions on Intelligent Transportation Systems*. 23 (8): 12301–12310.
 <https://doi.org/10.1109/TITS.2021.3113608>
 JCR-Q1  IF: 8.5  top-tier  ESI hot paper (top 0.1%)
5. Xinyu Chen, Yixian Chen, Nicolas Saunier, Lijun Sun (2021). **Scalable low-rank tensor learning for spatiotemporal traffic data imputation**. *Transportation Research Part C: Emerging Technologies*. 129: 103226.
 <https://doi.org/10.1016/j.trc.2021.103226>
 JCR-Q1  IF: 8.3  top-tier
4. Xinyu Chen, Jinming Yang, Lijun Sun (2020). **A nonconvex low-rank tensor completion model for spatiotemporal traffic data imputation**. *Transportation Research Part C: Emerging Technologies*. 117: 102673.
 <https://doi.org/10.1016/j.trc.2020.102673>
 JCR-Q1  IF: 8.3  top-tier  100+ citations
3. Xinyu Chen, Zhaocheng He, Yixian Chen, Yuhuan Lu, Jiawei Wang (2019). **Missing traffic data imputation and pattern discovery with a Bayesian augmented tensor factorization model**. *Transportation Research Part C: Emerging Technologies*. 104: 66–77.
 <https://doi.org/10.1016/j.trc.2019.03.003>
 JCR-Q1  IF: 8.3  top-tier  100+ citations
2. Xinyu Chen, Zhaocheng He, Lijun Sun (2019). **A Bayesian tensor decomposition approach for spatiotemporal traffic data imputation**. *Transportation Research Part C: Emerging Technologies*. 98: 73–84.
 <https://doi.org/10.1016/j.trc.2018.11.003>
 JCR-Q1  IF: 8.3  top-tier  200+ citations  ESI highly cited paper (top 1%)
1. Xinyu Chen, Zhaocheng He, Jiawei Wang (2018). **Spatial-temporal traffic speed patterns discovery and incomplete data recovery via SVD-combined tensor decomposition**. *Transportation Research Part C: Emerging Technologies*. 86: 59–77.
 <https://doi.org/10.1016/j.trc.2017.10.023>
 JCR-Q1  IF: 8.3  top-tier  100+ citations

◆ Co-author papers

4. Ben-Zheng Li, Xi-Le Zhao, Xiongjun Zhang, Teng-Yu Ji, Xinyu Chen, Michael K. Ng (2023). **A learnable group-tube transform induced tensor nuclear norm and its application for tensor completion**. *SIAM Journal on Imaging Sciences*. 16 (3): 1370–1397.
 <http://dx.doi.org/10.1137/22M1531907>
3. Lijun Sun, Xinyu Chen, Zhaocheng He, Luis F. Miranda-Moreno (2021). **Routine pattern discovery and anomaly detection in individual travel behavior**. *Networks and Spatial Economics*. 35.
 <http://dx.doi.org/10.1007/s11067-021-09542-9>
2. Pu Ren, Xinyu Chen, Lijun Sun, Hao Sun (2021). **Incremental Bayesian matrix/tensor learning for structural monitoring data imputation and response forecasting**. *Mechanical System and Signal Processing*. 158: 107734.
 <https://doi.org/10.1016/j.ymssp.2021.107734>
1. Zhaocheng He, Kaiying Chen, Xinyu Chen (2018). **A collaborative method for route discovery using taxi drivers' experience and preferences**. *IEEE Transactions on Intelligent Transportation Systems*. 19 (8): 2505–2514.
 <http://doi.org/10.1109/TITS.2017.2753468>

CONFERENCE PAPERS	WCTR 2023: <u>Xinyu Chen</u> , Zhanhong Cheng, Nicolas Saunier, Lijun Sun (2023). Laplacian convolutional representation for traffic time series imputation (presentation only). <i>Proceedings of the World Conference of Transport Research</i> .		
	TRB 2023: <u>Xinyu Chen</u> , Chengyuan Zhang, Lijun Sun, Nicolas Saunier (2023). Nonstationary temporal matrix factorization for sparse traffic time series forecasting (presentation only). <i>The 102nd Annual Meeting of Transportation Research Board</i> .		
	KDD Time Series Workshop: <u>Xinyu Chen</u> , Mengying Lei, Nicolas Saunier, Lijun Sun (2021). Low-rank autoregressive tensor completion for spatiotemporal traffic data imputation (presentation only). <i>The 7th SIGKDD Workshop on Mining and Learning from Time Series (MiLeTS)</i> .		
PREPRINT AND SUBMITTED PAPERS	3. <u>Xinyu Chen</u> , Zhanhong Cheng, Nicolas Saunier, Lijun Sun (2022). Laplacian convolutional representation for traffic time series imputation . arXiv: 2212.01529.		
	2. <u>Xinyu Chen</u> , Chengyuan Zhang, Xi-Le Zhao, Nicolas Saunier, Lijun Sun (2022). Nonstationary temporal matrix factorization for multivariate time series forecasting . arXiv: 2203.10651.		
	1. <u>Xinyu Chen</u> , Lijun Sun (2020). Low-rank autoregressive tensor completion for multivariate time series forecasting . arXiv: 2006.10436.		
ACADEMIC FUNDING	1. <i>City-Scale Traffic Data Imputation and Forecasting with Tensor Learning</i>		
	<ul style="list-style-type: none"> • Authors: <u>Xinyu Chen</u>, Nicolas Saunier (advisor) • Link: https://ivado.ca/en/scholarships-and-grants/phd-excellence-scholarships/  IVADO PhD Excellence Scholarship  \$100,000  September 1, 2020		
REVIEWING ACTIVITIES	I am serving as a reviewer for 10+ scientific journals.		
	<ul style="list-style-type: none"> • Applied Intelligence • Big Data Research • Expert Systems with Applications • IEEE Intelligent Transportation Systems Magazines • IEEE Open Journal of Signal Processing • IEEE Sensors Journal • IEEE Transactions on Intelligent Transportation Systems • IEEE Transactions on Knowledge and Data Engineering • INFORMS Journal on Computing • Scientific Reports • Transportmetrica B: Transport Dynamics • Transportation Research Part B: Methodological • Transportation Research Part C: Emerging Technologies 		
PROFESSIONAL MEMBERSHIPS	<input type="checkbox"/> Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT)	Student Member	2021 - present
	<input type="checkbox"/> Institute of Electrical and Electronics Engineers (IEEE)	Student Member	2022 - present
OPEN-SOURCE PROJECTS	I am leading some innovative projects on GitHub (4k+ stars & 600+ forks & 500+ followers).		
	◆ Selected repositories		
	 transdim : Python codes for spatiotemporal data imputation and prediction using a variety of state-of-the-art machine learning (mainly including low-rank matrix and tensor methods) and deep learning models.		2018.09 - present
	 xinychen/transdim  1k+ stars		

-  **awesome-Latex-drawing**: Drawing Bayesian networks, graphical models, tensor structures, and technical frameworks in LaTeX. (Most examples are from our research papers.) 2019.06 - present
 [xinychen/awesome-latex-drawing](https://github.com/xinychen/awesome-latex-drawing) ☆ 1.1k+ stars
-  **LaTeX-cookbook**: Academic writing with LaTeX: A tutorial (in Chinese). 2021.05 - present
 Published in *Tsinghua University Press*.
 [xinychen/latex-cookbook](https://github.com/xinychen/latex-cookbook) ☆ 1.1k+ stars
-  **tensor-learning**: Python codes for low-rank tensor factorization, tensor completion, and tensor regression techniques. 2019.06 - present
 [xinychen/tensor-learning](https://github.com/xinychen/tensor-learning) ☆ 150+ stars
-  **awesome-beamer**: Creating presentation slides by using Beamer in LaTeX. 2020.11 - present
 [xinychen/awesome-beamer](https://github.com/xinychen/awesome-beamer) ☆ 80+ stars
-  **tracebase**: Multivariate time series forecasting on high-dimensional and sparse Uber movement speed data. 2020.11 - present
 [xinychen/tracebase](https://github.com/xinychen/tracebase) ☆ 40+ stars

PRESENTATION & TALK

- ☐ Matrix and Tensor Models for Spatiotemporal Traffic Data Imputation and Forecasting. 2023.12
 - PhD Research Defense
 - Montreal, Canada
 - Slides: <https://xinychen.github.io/slides/defense.pdf>
- ☐ Laplacian convolutional representation for traffic data imputation. 2023.07
 - World Conference of Transport Research (WCTR 2023)
 - Montreal, Canada
 - Slides: <https://xinychen.github.io/slides/LCR.pdf>
- ☐ Low-rank matrix and tensor methods for spatiotemporal traffic data modeling. 2023.05
 - Southern University of Science and Technology (SUSTech)
 - Shenzhen, China
 - Slides: https://xinychen.github.io/slides/traffic_data_modeling_v1.pdf
- ☐ Low-rank matrix and tensor methods for spatiotemporal data modeling. 2023.04
 - Sichuan University (SCU)
 - University of Electronic Science and Technology of China (UESTC)
 - Chengdu, China
 - Slides: https://xinychen.github.io/slides/stdata_modeling.pdf
- ☐ Low-rank matrix and tensor factorization for speed field reconstruction. 2023.03
 - Research Group of Transport, Polytechnique Montreal
 - Montreal, Canada
 - Slides: https://xinychen.github.io/slides/MF_TF_SFR.pdf
- ☐ Spatiotemporal traffic data imputation and forecasting with tensor learning. 2022.05
 - IVADO Project Workshop
 - Montreal, Canada
 - Slides: https://xinychen.github.io/slides/phd_project_22summer.pdf
- ☐ Nonstationary temporal matrix factorization for multivariate time series forecasting. 2022.05
 - Hong Kong Machine Learning Meetup (virtual)
 - Slides: <https://xinychen.github.io/slides/notmf.pdf>

- ❑ Bayesian temporal factorization for multidimensional time series prediction. 2021.03
- IFT 6760A Course (*Matrix and tensor factorization techniques for machine learning*)
- Slides: <https://doi.org/10.5281/zenodo.4693404>

SKILLS

- ❑ **Language:** Chinese (native) & English (fluent)
- ❑ **Expertise:** Python/Matlab/Julia/R/Java; NumPy/PyTorch/CuPy; Jupyter Notebook; LaTeX; CSS/HTML.

REFERENCES Please reach out to request a reference letter.

Prof. Nicolas Saunier (advisor)

- Full Professor
- Département des génies civil, géologique et des mines (CGM)
- Polytechnique Montréal
- CIRRELT, RRSR, CIRODD & IVADO
- Homepage: <http://n.saunier.free.fr/saunier/>
- Email: nicolas.saunier@polymtl.ca

Prof. Lijun Sun (co-advisor)

- Associate Professor
- Department of Civil Engineering
- McGill University
- Homepage: <https://lijunsun.github.io>
- Email: lijun.sun@mcgill.ca

Prof. Chun Cheng (collaborator)

- Full Professor
- School of Economics and Management
- Dalian University of Technology
- Homepage: <https://sites.google.com/site/chun123cheng/home>
- Email: chun.cheng@polymtl.ca