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		
	Low-Kank Models	1 Time Series Analysis	D Human Mobility		
Contact	✓ chenxy346@gmail.com				
Information	https://xinychen.github.	io (homepage)			
	chenxy346 Google Scholar 7750 citation	ons (h-index: 10 & i10-index: 10)			
Biography	In Summer 2023 (or thereafter), I will finish my PhD at University of Montreal (UdeM), with support from the IVADO PhD Excellence Scholarship and the CIRRELT PhD Excellence Scholarship My PhD research focuses on machine learning, spatiotemporal data modeling, and intelligent transportation systems.				
EDUCATION	PhD in Civil Engineering (Polytechnique Montreal, <i>Uni</i>		2020.08 - 2023.08 (expected Montreal, Canad		
	♀ IVADO PhD Excellence Scholarship & CIRRELT PhD Excellence Scholarship				
	 Thesis: Spatiotemporal Traffic Data Imputation and Forecasting with Low-Rank Models Advisor: Nicolas Saunier (full professor at Polytechnique Montreal) Co-advisor: Lijun Sun (associate professor at McGill University) 				
	► Master's degree in Traffic In ☐ Sun Yat-Sen University	nformation Engineering & Contro	2016.08 - 2019.06 Guangzhou, China		
	Q 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 Guangzhou University		2012.09 - 2016.06 Guangzhou, China		
	Thesis: Modeling Vehicles' TAdvisor: Xiaodong Zang (ime Headway with Log-Normal and I full professor)	Power-Law Distribution		
Honours	© CIRRELT PhD Excellence School		2021.12		
AND Awards	Q Outstanding Thesis Award (by	ship (\$100,000, by Institute for Dat Sun Yat-Sen University)	a Valorisation) 2020.04 2019.06		
	National Scholarship (by Minis		2018.13		
Refereed	Google Scholar: https://scholar.google.com/citations?user=mCrWO4wAAAAJ&hl				
Journal Papers	◆ First-author papers (3 papers cited above 100 times)				
	7. Xinyu Chen, Lijun Sun (2022). Bayesian temporal factorization for multidimensional time series prediction. <i>IEEE Transactions on Pattern Analysis and Machine Intelligence</i> . 44 (9): 4659-4673				
	https://doi.org/10.1109/TPAMI.2021.3066551				
	 				
	6. Xinyu Chen, Mengying Lei, Nicolas Saunier, Lijun Sun (2022). Low-rank autoregressive tensor completion for spatiotemporal traffic data imputation. <i>IEEE Transactions on Intelligent Transportation Systems</i> . 23 (8): 12301-12310.				

S 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.

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.

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.

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https://doi.org/10.1016/j.trc.2019.03.003
$ | ICR-Q1 | ■ | IF: 9.022 | Q | top-tier
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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: 9.022
    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.

- **♦** Co-author papers
- 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
$ ICR-Q1
IF: 8.934
```

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.

CONFERENCE TRB 2023: Xinyu Chen, Chengyuan Zhang, Lijun Sun, Nicolas Saunier (2023). Nonstationary
Papers temporal matrix factorization for sparse traffic time series forecasting. The 102nd Annual Meeting
of Transportation Research Board.

KDD Time Series Workshop: Xinyu Chen, Mengying Lei, Nicolas Saunier, Lijun Sun (2021). **Low-rank autoregressive tensor completion for spatiotemporal traffic data imputation**. *The 7th SIGKDD Workshop on Mining and Learning from Time Series* (*MiLeTS*).

PREPRINT AND	5. Xinyu Chen, Zhanhong Cheng, Chengyuan Zhang, Lijun Sun, Nicolas Saunier (2023). Memory- efficient Hankel tensor factorization for extreme missing traffic data imputation.				
SUBMITTED PAPERS	☐ IEEE Transactions on Signal Processing				
	4. Xinyu Chen, Zhanhong Cheng, Nicolas Saunier, Lijun Sun (2022). Laplacian convolutional representation for traffic time series imputation. arXiv: 2212.01529.				
	iii IEEE Transactions on Signal Processing under review (1st round)				
	3. Xinyu Chen, Chengyuan Zhang, Xiaoxu Chen, Nicolas Saunier, Lijun Sun (2022). Discovering dynamic patterns from spatiotemporal data with time-varying low-rank autoregression. arXiv: 2211.15482.				
	i IEEE Transactions on Knowledge and Data Engineering under review (2nd round)				
	2. Xinyu Chen, Chengyuan Zhang, Xi-Le Zhao, Nicolas Saunier, Lijun Sun (2022). Nonstationary temporal matrix factorization for multivariate time series forecasting. arXiv: 2203.10651.				
	## Transportation Research Part C: Emerging Technologies				
	1. Xinyu Chen, Lijun Sun (2020). Low-rank autoregressive tensor completion for multivariate time series forecasting. arXiv: 2006.10436.				
Academic Funding	1. City-Scale Traffic Data Imputation and Forecasting with Tensor Learning				
	Authors: Xinyu Chen, 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.				
	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				
Profes-	☐ Interuniversity Research Centre on Enterprise Student Member 2021 - present Networks, Logistics and Transportation (CIRRELT)				

Student Member

2022 - present

☐ Institute of Electrical and Electronics Engineers (**IEEE**)

Member-

SHIPS

OPEN-SOURCE PROJECTS

I am leading some innovative projects on GitHub (3.3k+ stars & 600+ forks & 450+ followers).

- ◆ Selected repositories

 - **awesome-LaTeX-drawing**: Drawing Bayesian networks, graphical models, tensor structures, and technical frameworks in LaTeX. (Most examples are from our research papers.)

 - **awesome-beamer**: Creating presentation slides by using Beamer in LaTeX. 2020.11 present (Most examples are from our research.)
 - xinychen/awesome-beamer \$\frac{1}{12}\$ 60+ stars
 - tracebase: Multivariate time series forecasting on high-dimensional and sparse Uber movement speed data.
 - **geotensor**: Geometric low-rank tensor completion for color image inpainting. 2019.10 2022.01

Presentation & Talk

- ☐ Low-rank matrix and tensor methods for spatiotemporal traffic data modeling. 2023.05
- Southern University of Science and Technology
- 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
- University of Electronic Science and Technology of 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
- Slides: https://xinychen.github.io/slides/MF_TF_SFR.pdf
- ☐ Spatiotemporal traffic data imputation and forecasting with tensor learning. 2022.05
- IVADO Project Workshop
- 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

BLOG POSTS I enjoy writing some blog posts about my research (30+ posts & 70k+ views & 300+ followers on Medium).

M https://medium.com/@xinyu.chen

♦ Selected posts

5 . Temporal matrix factorization for multivariate time series forecasting.	5k+ views	2022.03.20
4. Reduced-rank vector autoregressive model for high-dimensional time series forecasting.	4k+ views	2021.10.16
3 . Dynamic mode decomposition for multivariate time series forecasting.	16k+ views	2021.10.10
2 . Matrix autoregressive model for multidimensional time series forecasting.	8k+ views	2021.10.03
 Intuitive understanding of randomized singular value decomposition. 	9k+ views	2020.07.01

Skills D 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. Xi-Le Zhao (collaborator)

- Full Professor
- School of Mathematical Science
- University of Electronic Science and Technology of China
- Homepage: https://zhaoxile.github.io
- Email: xlzhao122003@163.com