Ziyue LI (Bonald)

Ph.D. Candidate
Department of Industrial Engineering and Decision Analytics (IEDA)
The Hong Kong University of Science and Technology
Email: zlibn@connect.ust.hk
Website: https://bonaldli.github.io
Tel: +852 69964596

Education	**Ph.D.** in Industrial Engineering and Decision Analytics *09.2017-09.2021*

Ph.D. in Industrial Engineering and Decision Analytics   *09.2017-09.2021*
The Hong Kong University of Science and Technology $^{QS:\ 27^{th}}$ Hong Kong
- **Concentration**: Machine learning models and algorithms; Data mining.
- **Others**: Cloud & serverless computing, Interpretable Machine Learning, NLP
- **Advisor**: Prof. Fugee Tsung, collabrating with Prof. Hao Yan (Arizona State University, U.S.A) Prof. Chen Zhang (Tsinghua University, China)

Exchanging in Mechanical and Manufacturing Engineering   *2015-2015*
University of New South Wales   Sydney, Australia
- China Scholarship Council (CSC) Scholarship (Distinguished)

Bachelor of Engineering in Mechanical Engineering   *2013-2017*
Bachelor of Economics in Finance   *2015–2017*
Xi'an Jiaotong University   Xi'an , China
- GPA: 3.76/4.3   Ranking: 6th/255, Top 5%
- Outstanding Graduates Award, National Scholarship

Research Interests

My research interests focus on big data analytics methodologies for real-world problems. The goal is to build up novel models that preserves the innate data structure (high-dimensionality, graph structure), and **combines the machine learning models with domain-specific or human knowledge**, for higher accuracy, efficiency, explainability, and interpretability. My current research includes transfer learning (multi-task learning), spatiotemporal big data and tensor techniques (tensor decomposition, completion), knowledge graph and topic models (NLP), and so on. Those works have been published in top-tier scientific venues (AAAI, IEEE CASE, ICDE, KDD, TKDD), and applied into smart mobility, text mining, and manufacturing.

Selected Awards

- **2nd Runners-up**, HKUST Three Minute Thesis Competition (2021).
- **Best Student Paper Award**, INFORMS Data Mining Section (2020): Finalist, selected out of 40 submissions.
- **Best Student Paper Award**, INFORMS Quality, Statistics, and Reliability (QSR) Section (2020): Finalist, selected out of 26 submissions.
- **Best Conference Paper Award**, IEEE International Conference on Automation Science and Engineering (CASE) (2020): Selected out of 500 submissions.
- **HKUST Excellent Research Award** (2017): Highly-selective.
- **1st Runners-up, Audience Award**, Hackathon@UST - Uber Smart Transportation (2018).
- **Hong Kong Ph.D. Fellowship Scholarship Award** (2017-2020): Highly-selective and prestigious, 2 recipients in IEDA.
- **National First Prize**, "Challenge Cup" National Curricular Academic Science and Technology Contest (2015): A data-driven study for land transfer in rural China (Applied Economics).

Research Experience	**Artificial Intelligence & Ethics**	*04.2021 - 07.2021*

Research Experience

Artificial Intelligence & Ethics *04.2021 - 07.2021*
Universities: **RWTH Aachen**, Germany; **ETH Zurich**, Switzerland; **TU Delft**, Netherlands; **Politecnico di Milano**, Italy.
- Doctoral school in AI and other technology (data-driven social science, brain engineering) and transdisciplinary research.

Knowledge graph embedding and tensor short-text model *2020 - present*
Keywords: *user behaviour, knowledge graph embedding, NLP, big data, clustering*
- Developing high-dimensional tensor short text models based on Dirichlet process and knowledge graph embedding (TransE, RESCAL etc.)

Graph-regularized tensor topic model *2019 - 2020*
Keywords: *mobility pattern, NLP, generative model, big data, graph-structure*
- Developed high-dimensional tensor topic models (LDA, DMM model)
- Incorporated external information as graph to improve model interpretability
- Sped up learning via online variational EM algorithm with stochastic gradient

Tensor decomposition & completion prediction on graph data *2018 - 2020*
Keywords: *smart transport, big data, time-series data, spatiotemporal data, graph*
- Developed tensor decomposition based prediction with 2D-ARIMA model, and low-rank tensor completion based prediction for spatiotemporal data
- Incorporated graphs structure to improve the prediction accuracy
- Adopted block coordinate descent algorithm for efficient learning

Transfer learning for anomaly detection *2017 - 2019*
Keywords: *transfer learning, multi-task learning, outlier, anomaly detection*
- Proposed hybrid transfer learning model with parameter transfer and feature representation transfer approach
- Proposed a decomposition model for data profile to detect anomaly accurately

Industry Experience

Project Manager *09.2020 - present*
Hong Kong Metro MTR Co.-HKUST R&D Project Hong Kong
- Research collaboration with MTR and Computer Science Dept, HKUST, developing an Intelligent Transport System (ITS) based on data-driven methods.

Cloud Computing Scientist (Intern) *09.2019 - 02.2020*
Nokia Bell Labs Stuttgart, Germany
Keywords: *cloud computing, distributed system, FaaS, machine learning system*
- Research in serverless computing, machine learning system based on Amazon Web Service (AWS) and Bell Labs KNIX MicroFunctions.
- Conducted serverless machine learning inference (regression, NLP, image recognition), data & model parallelism in AWS and Microfuntions, performance analysis, component profiling and system optimization.

Competitions

Finalist Award *in Belt & Road Justice LawTech Hackathon* *08.2018 - 10.2018*
HK Law Society Hong Kong
- Legal service recommender system based on NLP and Semantic & Cognitive analysis for domestic workers.

Top 10 *in Global Big Data Competition* *07.2018 - 08.2018*
JD.com Beijing, China
- Quantile boosting time-series prediction model with effective feature engineering and representation methods and improved forecast accuracy by 72%.

1st-Runners-up, *Audience Award* in *Hackathon@UST*   *04.2018 - 05.2018*
Uber Smart Transportation   Hong Kong
- Developed facial recognition model and integrated into vehicles to achieve facial car door unlocking, underage driving detection, and drowsy driving detection.

Teaching Experience	**Teaching Assistant**, MATH5470-Statistical Machine Learning (PG) *Spring, 2021* - Took charge of tutorials covering contents of supervised learning such as regression, classification, regularization, neural networks and support vector machine; and unsupervised learning such as random forests. **Teaching Assistant**, IEDA2200-Engineering Management (UG) *Spring, 2020* - Took charge of all tutorials covering contents of production line optimization, time-series forecasting, inventory management and manufacturing strategy. **Co-instructor**, IEDA3270-Quality Engineering (UG) *Spring, 2019* - Led all lab experiments including statistics, factorial design, control charts, and regression models. **Teaching Assistant**, EEMT5220-Six Sigma Quality Management (PG) *Fall, 2018* - Took charge of all tutorials covering contents of statistical analysis, hypothesis testing, statistical process control.

Conference Publications

[C1] **Z. Li**, H. Yan, C. Zhang, and F. Tsung, "Individualized Passenger Travel Pattern Multi-Clustering based on Tensor Latent Dirichlet Allocation". 27th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '21), *submitted*.
- **Best Student Paper Award**, Data Mining, INFORMS 2020, **Finalist Award**.

[C2] **Z. Li**, "Tensor Topic Models with Graphs and Applications on Individualized Travel Patterns", 2021 IEEE 37th International Conference on Data Engineering (ICDE), Crete, Greece, 2021, accepted and forthcoming.
- ICDE: Top-tier conference in data mining (acceptance rate 19.1%).

[C3] **Z. Li**, H. Yan, C. Zhang and F. Tsung, "Long-Short Term Spatiotemporal Tensor Prediction for Passenger Flow Profile" in IEEE 16th International Conference on Automation Science and Engineering (CASE), 2020, published.
- **Winner** of IEEE CASE 2020 **Best Conference Paper Award**.

[C4] **Z. Li**, N. D. Sergin, H. Yan, C. Zhang, and F. Tsung, "Tensor Completion for Weakly-Dependent Data on Graph for Metro Passenger Flow Prediction" Proceedings of the AAAI Conference on Artificial Intelligence, 2020, published.
- **Best Student Paper Award**, Quality, Statistics, and Reliability (QSR), INFORMS 2020, **Finalist Award**.
- AAAI: Top-tier conference in machine learning, AI (acceptance rate 20.6%).

Journal Publications

[J1] **Z. Li**, H. Yan, C. Zhang and F. Tsung, "Long-Short Term Spatiotemporal Tensor Prediction for Passenger Flow Profile" IEEE Robotics and Automation Letters, 2020.

[J2] F. Tsung, **Z. Li**, "Discussion of 'A novel approach to analysis of spatial and functional data over complex domains'" Quality Engineering, 2020, published.

[J3] **Z. Li**, K. Zhang, H. Yan and F. Tsung, "Profile Decomposition based Hybrid Transfer Learning for Cold-start Data Anomaly Detection". The ACM Transactions on Knowledge Discovery from Data (TKDD), 2021, *submitted*.

Working Papers	[W1] **Z. Li**, H. Yan, C. Zhang, and F. Tsung, "Tensor Dirichlet Process Multinomial Model with Graph Embedding for Individual Passenger Clustering," working paper.
	[W2] M. Li, **Z. Li**, and F. Tsung, "Spatiotemporal Attention-based Auto-Encoder for Dynamic Metro Station Clustering," working paper.

Invited Talks Session Chair

1. **Session Chair**, *"Knowledge-integrated Data-driven Smart Transportation"* *10.2021*
INFORMS Data Mining section 2021   Anaheim, California, U.S.A

2. **Invited Presenter**, *"Individualized Passenger Travel Pattern Multi-Clustering based on Tensor Latent Dirichlet Allocation with Graph Structure"* *11.2020*
INFORMS Annual Meeting 2020   National Harbor, Maryland, U.S.A

3. **Invited Presenter**, *"Tensor Completion for Weakly-dependent Data on Graph for Metro Passenger Flow Prediction"* *10.2019 and 01.2020*
Data Science Symposium Waseda University   Tokyo, Japan
INFORMS Annual Meeting 2019   Seattle, Washington, U.S.A

4. **Invited Presenter**, *"Transfer-learning-based Anomaly Detection for Monitoring Profiles in the 'Start-up' State"* *11.2018*
INFORMS Annual Meeting 2018   Phoenix, Arizona, U.S.A

Other Awards

- **Honored Graduate Award**, Xi'an Jiaotong University   *2017*
- **Regional First Prize**, 7th Mechanical Innovation & Design Competition *2016*
- **National Scholarship**, Xi'an Jiaotong University   *2016*
- **National Encourage Scholarships**, Xi'an Jiaotong University   *2014, 2015*

Skills

- Python   • R   • Matlab   • AWS   • C++   • Hadoop, Map-Reduce
- **English** (Fully Professional)   • **German** (B2, Fluent)   • Chinese (Native)

Reference

- **Prof. Fugee Tsung** (Ph.D. Supervisor)
Chair Professor and Acting Dean
Department of Industrial Engineering and Decision Analytics
The Hong Kong University of Science and Technology, Hong Kong
Email: season@ust.hk, *Phone*: +852 2358-7097

- **Prof. Hao Yan** (Research Collaborator)
Assistant Professor
School of Computing, Informatics & Decision Systems Engineering
Arizona State University, U.S.A
Email: haoyan@asu.edu, *Phone*: +1 (480) 727-0556

- **Prof. Chen Zhang** (Research Collaborator)
Associate Professor
Department of Industrial Engineering, Tsinghua University, China
Email: zhangchen01@tsinghua.edu.cn, *Phone*: +86-10-62796135