

# LINGYANG CHU

8850 University Cres, Burnaby, British Columbia, Canada, V5A 0C8

☎ +1 (778)-960-6345 ✉ lca117@sfu.ca 🌐 [lingyangchu.github.io](https://lingyangchu.github.io)

## RESEARCH INTEREST

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My research focuses on algorithmic data mining, machine learning and deep learning. I actively maintain two lines of research with a strong philosophy of transferring research to significant real-world applications. First, I research on mining significant patterns from various types of large graphs that manifest different characteristics of complex real-world networks. Second, I develop novel methods to understand the black box of deep neural networks.

## EDUCATION

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### Assistant Professor

*January 2021 - Present*

McMaster University, Hamilton, Canada

Research: Trustworthy AI and Large Scale Graph Analysis

### Postdoctoral Fellow in Computer Science

*September 2015 - November 2018*

Simon Fraser University, Burnaby, Canada

Supervised by Professor Jian Pei

Research: Local Pattern Mining on Large Graphs and Interpretability of Deep Neural Networks

### Ph.D. in Computer Science

*September 2009 - July 2015*

University of Chinese Academy of Sciences, Beijing, China

Supervised by Professor Qingming Huang

Thesis Topic: Large Scale Dense Subgraph Mining

### B.Sc. in Telecommunication Engineering

*September 2005 - July 2009*

Huazhong University of Science and Technology, Wuhan, China

Graduated with Honors. (GPA: 89.5/100, ranked 3rd out of 266)

## WORK

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### Principal Researcher (Leader of the AI Research Team)

*November 2018 - January 2021*

Huawei Technologies Canada, Co., Ltd., Burnaby, Canada

Research: Interpretability, Security and Compression of Deep Neural Networks, Large Scale Graph Pattern Mining and Privacy Preserving Federated Learning

## PUBLICATIONS

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### Papers in Refereed Journals

1. Mingtao Lei, Xi Zhang, **Lingyang Chu**, Zhefeng Wang, Philip S. Yu and Binxing Fang. "Finding Route Hotspots in Large Labeled Networks". Accepted by *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2020.
2. Mingtao Lei, **Lingyang Chu**, Zhefeng Wang, Jian Pei, Caifeng He, Xi Zhang and Binxing Fang. "Mining Top-k Sequential Patterns in Transaction Database Graphs". *World Wide Web (WWW)*, 1-28, 2019.
3. **Lingyang Chu**\*, Zijin Zhao\*, Dacheng Tao and Jian Pei. "Classification with Label Noise: A Markov Chain Sampling Framework". *Data Mining and Knowledge Discovery (DMKD)*, 33(5): 1468-1504, 2019. (\* Equal contribution)

4. Wu Liu, Lingheng Zhu, **Lingyang Chu** and Huadong Ma. “A Common Subgraph Correspondence Mining Framework for Map Search Services”. In *Multimedia Tools and Applications (MTA)*, 78(1): 747-766, 2019.
5. Zhefeng Wang, Yu Yang, Jian Pei, **Lingyang Chu** and Enhong Chen. “Activity Maximization by Effective Information Diffusion in Social Networks”. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 29(11): 2374-2387, 2017.
6. **Lingyang Chu**, Yanyan Zhang, Guorong Li, Shuhui Wang, Weigang Zhang and Qingming Huang. “Effective Multi-modality Fusion Framework for Cross-media Topic Detection”. *IEEE Transactions on Circuits and Systems for Video Technology (TCSVT)*, 26(3): 556-569, 2014.
7. **Lingyang Chu**, Shuqiang Jiang, Shuhui Wang, Yanyan Zhang and Qingming Huang. “Robust Spatial Consistency Graph Model for Partial Duplicate Image Retrieval”. *IEEE Transactions on Multimedia (TMM)*, 15(8): 1982-1996, 2013.

### Papers in Refereed Conferences

8. **Lingyang Chu**, Yanyan Zhang, Yu Yang, Lanjun Wang and Jian Pei. “Online Density Bursting Subgraph Detection from Temporal Graphs”. Accepted in *Proceedings of the 46th International Conference on Very Large Data Bases (VLDB)*, 2020.
9. Zicun Cong, **Lingyang Chu**, Lanjun Wang, Xia Hu and Jian Pei. “Exact and Consistent Interpretation of Piecewise Linear Models Hidden behind APIs: A Closed Form Solution”. Accepted in *Proceedings of the 36th IEEE International Conference on Data Engineering (ICDE)*, 2020.
10. **Lingyang Chu**, Zhefeng Wang, Jian Pei, Yanyan Zhang, Yu Yang and Enhong Chen. “Finding Theme Communities from Database Networks”. In *Proceedings of the 45th International Conference on Very Large Data Bases (VLDB)*, 12(10): 1071-1084, 2019.
11. **Lingyang Chu**, Xia Hu, Juhua Hu, Lanjun Wang and Jian Pei. “Exact and Consistent Interpretation for Piecewise Linear Neural Networks: A Closed Form Solution”. In *Proceedings of the 24th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 1244-1253, 2018.
12. Yu Yang, **Lingyang Chu**, Yanyan Zhang, Zhefeng Wang, Jian Pei and Enhong Chen. “Mining Density Contrast Subgraphs”. In *Proceedings of the 34th IEEE International Conference on Data Engineering (ICDE)*, 221-232, 2018.
13. **Lingyang Chu**, Zhefeng Wang, Jian Pei, Jiannan Wang, Zijin Zhao and Enhong Chen. “Finding Gangs in War from Signed Networks”. In *Proceedings of the 22nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 1505-1514, 2016.
14. Zhefeng Wang, **Lingyang Chu**, Jian Pei, Abdullah Al-Barakati and Enhong Chen. “Tradeoffs between Density and Size in Extracting Dense Subgraphs: A Unified Framework”. In *Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (DASFAA)*, 41-48, 2016.
15. **Lingyang Chu**, Shuhui Wang, Siyuan Liu, Qingming Huang and Jian Pei. “ALID: Scalable Dominant Cluster Detection”. In *Proceedings of the 41st International Conference on Very Large Data Bases (VLDB)*, 8(8): 826-837, 2015.
16. **Lingyang Chu**, Shuhui Wang, Yanyan Zhang, Shuqiang Jiang and Qingming Huang. “Graph-Density-based Visual Word Vocabulary for Image Retrieval”. In *Proceedings of the IEEE International Conference on Multimedia and Expo (ICME)*, 1-6, 2014.
17. Yanyan Zhang, Guorong Li, **Lingyang Chu**, Shuhui Wang, Weigang Zhang and Qingming Huang. “Cross Media Topic Detection: A Multi-modality Fusion Framework”. In *Proceedings of the International Conference on Multimedia & Expo (ICME)*, 1-6, 2013. **(Best Paper Candidate)**

18. Shuang Wang, Yunfeng Xue, **Lingyang Chu**, Yuhao Jiang and Shuqiang Jiang. “ObjectSense: A Scalable Multi-objects Recognition System based on Partial Duplicate Image Retrieval”. In *Proceedings of the ACM International Conference on Multimedia Retrieval (ICMR)*, 317-318, 2013. **(Best Demo Award)**
19. Tianlong Chen, Shuqiang Jiang, **Lingyang Chu** and Qingming Huang. “Detection and Location of Near-duplicate Video Sub-clips by Finding Dense Subgraphs”. In *Proceedings of the 21st ACM International Conference on Multimedia (MM)*, 1173-1176, 2011.

## SUPERVISION

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### Supervised Students

- Xin Che (M.Sc. Candidate at McMaster University)
- Qiqi Zhang (M.Sc. Candidate at McMaster University)
- Siyang Zhang (Visiting Ph.D. student from Beijing University of Posts and Telecommunications.)
- Shaoxin Li (Visiting Ph.D. student from Chongqing University)

### Mentored Students

- Zicun Cong (Ph.D. Candidate at Simon Fraser University)
- Xia Hu (Ph.D. Candidate at Simon Fraser University)
- Zhefeng Wang (Ph.D. | Now at Huawei, China)
- Mingtao Lei (Ph.D. | Now at Beijing University of Posts and Telecommunications, China)
- Zijin Zhao (M.Sc. | Now at Amazon, Canada)
- Yanyan Zhang (M.Sc. | Now at Fortinet, Canada)
- Yajie Zhou (M.Sc.)

### Interns

- Prithu Banerjee (Ph.D. Candidate at the University of British Columbia)
- Yutao Huang (Ph.D. Candidate at Simon Fraser University)
- Yongwei Wang (Ph.D. Candidate at the University of British Columbia)

## TEACHING

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### Teaching Assistant, University of Chinese Academy of Sciences

- Introduction to Pattern Recognition and Machine Learning, Fall, 2010.
- Basics of Multimedia Processing, Spring, 2011.

## ACADEMIC SERVICES

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### Program Committee Member

- The 24th SIGKDD Conference on Knowledge Discovery and Data Mining, 2018
- The 25th SIGKDD Conference on Knowledge Discovery and Data Mining, 2019
- The 28th ACM International Conference on Information and Knowledge Management, 2019
- The Web Conference, 2020 (formerly known as International World Wide Web Conference)
- The 27th ACM International Conference on Multimedia, 2019

- The 23rd International Conference on Database Systems for Advanced Applications, 2018
- The 24rd International Conference on Database Systems for Advanced Applications, 2019
- The 11th ACM International Conference on Web Search and Data Mining, 2018
- The 12th ACM International Conference on Web Search and Data Mining, 2019
- The 13th ACM International Conference on Web Search and Data Mining, 2020
- IEEE International Conference on Multimedia and Expo, 2019

#### Journal Reviewer

- IEEE Transactions on Knowledge and Data Engineering
- IEEE Transactions on Multimedia
- ACM Transactions on Knowledge Discovery from Data
- Data Mining and Knowledge Discovery
- Knowledge and Information Systems

#### External Reviewer

- The 42nd International Conference on Very Large Data Bases, 2016
- The 25th International Word Wide Web Conference, 2016
- The 32nd International Conference on Data Engineering, 2016
- The 23rd SIGKDD Conference on Knowledge Discovery and Data Mining, 2017
- The 40th International ACM SIGIR Conference on Research and Development in Information Retrieval, 2017

#### HONORS AND AWARDS

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Merit Scholarship of the Institute of Computing Technology (Top 5%)	2014
National Scholarship of China ( <b>Top 3%</b> )	2013
Pacemaker to Merit Student in the University of Chinese Academy of Sciences ( <b>Top 1%</b> )	2013
Merit Student in the University of Chinese Academy of Sciences (Top 13%, <b>3 times</b> )	2009 – 2012
Innovation Award in VLPR competition held by Microsoft Research Asia (Top 13%)	2011
Outstanding Individual of Student Association in the Institute of Computing Technology	2010
Excellent Student in Huazhong University of Science and Technology. ( <b>Top 1%</b> )	2006
Merit Student in Huazhong University of Science and Technology. (Top 10%, <b>4 times</b> )	2005 – 2009