

Lingyang Chu

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Department of Computing and Software

BUSINESS ADDRESS

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EDUCATIONAL BACKGROUND

Degrees and Diplomas

2015 Ph.D. in Computer Science, University of Chinese Academy of Sciences, Beijing, China.
2009 Bachelor of Communication Engr., Huazhong University of Science and Tech., Wuhan, China.

CURRENT STATUS AT MCMASTER

2021 – present Assistant Professor, Department of Computing and Software.

EMPLOYMENT HISTORY

Academic

2021 - present Assistant Professor, Department. of Computing and Software, McMaster University.

Consultations

2021 - present Consultant, Huawei Technologies Canada, Co., Ltd.

Other

2019 – 2021 Principal Researcher, Huawei Technologies Canada, Co., Ltd.
2018 – 2019 Senior Researcher, Huawei Technologies Canada, Co., Ltd.

SCHOLARLY AND PROFESSIONAL ACTIVITIES

Editorial Boards

2021 - 2025 Review Editor, Frontiers in Big Data

Workshop Organization

08/2021 – 08/2021 Workshop Committee, Deep Learning on Graphs: Method and Applications (DLG-KDD'21, a workshop of ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2021)

08/2019 – 08/2019 Technical Program Committee, Deep Learning on Graphs: Methods and Applications (DLG-KDD'19, a workshop of ACM SIGKDD Conference on Knowledge Discovery and Data Mining 2021)

Conference Program Committee

01/2022 – 12/2022 ACM SIGMOD/PODS International Conference on Management of Data
01/2018 – 12/2022 ACM International Conference on Web Search and Data Mining
01/2021 – 12/2021 AAAI Conference on Artificial Intelligence
01/2021 – 12/2021 SIAM International Conference on Data Mining
01/2019 – 12/2021 ACM International Conference on Information and Knowledge Management
01/2018 – 12/2021 International Conference on Database Systems for Advanced Applications
01/2018 – 01/2022 ACM SIGKDD Conference on Knowledge Discovery and Data Mining
01/2020 – 12/2020 The Web Conference
01/2020 – 12/2020 ACM SIGIR Conference on Research and Development in Information Retrieval

Journal Referee

1. IEEE Transactions on Knowledge and Data Engineering
2. IEEE Transactions on Multimedia
3. ACM Transactions on Knowledge Discovery from Data
4. Data Mining and Knowledge Discovery
5. Knowledge and Information Systems

External Grant Reviews

2021 Research Impact Fund of Research Grants Council (RGC) of Hong Kong
2022 Research Impact Fund of Research Grants Council (RGC) of Hong Kong

AREAS OF INTEREST

Data mining, Machine learning, and Trustworthy AI

HONOURS

2013 Best demo award, ACM International Conference on Multimedia Retrieval
2013 Best paper candidate, IEEE International Conference on Multimedia & Expo
2013 National Scholarship of China
2011 Innovation Award, VLPR competition, Microsoft Research Asia

COURSES TAUGHT

Undergraduate

05/2021 – 06/2021 Instructor, COMPSCI 3DM3, 46 students
09/2021 – 12/2021 Instructor, SFWRENG 2OP3, 170 students
01/2022 – 04/2022 Instructor, COMPSCI 3DM3, 88 students

Graduate

01/2022 – 04/2022 Co-instructor, CAS 781, 14 students

CONTRIBUTIONS TO TEACHING PRACTICE

Course/Curriculum Development

1. Develop an undergraduate course COMPSCI 3DM3 as a new course for introduction to data mining.
2. Develop an undergraduate course SFWRENG 2OP3 for object-oriented programming with significant hands-on components.
3. Design part of the graduate course CAS-781 to introduce principles and methods on graph machine learning.

SUPERVISORSHIPS

Master (Thesis)

09/2021 – present Xin Che, Computer Science, Interpretable deep graph machine learning models
(Note: Xin Che will transfer to a Ph.D. program in September, 2022.)
09/2021 – present Qiqi Zhang, Computer Science, Large scale community detection on big graphs
01/2022 – present Huanzhang Zhu, Computer Science, Adversarial attacks on deep neural networks
09/2022 – present Henry Li, Computer Science, **n/a**

Supervisory Committees

2021 – present Keivan Nalaie (Ph.D.), Supervisor: Rong Zheng
2021 – present Sajid Rahim (Ph.D.), Supervisor: Alan Wassying
2021 – present Qing Liu (Ph.D.), Supervisor: Hassan Ashtiani
2021 – present Alireza Fathollah Pour (M.Sc.), Supervisor: Hassan Ashtiani

Examiners

2021 – present Keivan Nalaie (Ph.D.), Supervisor: Rong Zheng

Undergraduate Research

01/2022 – present Xintong Li, Math & Stats, Adversarial attacks on deep convolutional neural networks
01/2022 – present Zicheng Guo, Computer Science, Interpretable deep graph machine learning models

Visiting Students

- 04/2021 – present Siyang Zhang, Ph.D. student, Beijing University of Posts and Telecommunications, Theme Community Discovery from Edge Database Networks
- 11/2021 – present Shaoxin Li, Ph.D. student, Chongqing University, Groupwise adversarial attacks on deep neural networks

LIFETIME RESEARCH FUNDING

1. Lingyang Chu, McMaster start-up funding, McMaster University, 2021 – present, \$175,000.

LIFETIME PUBLICATIONS

Peer Reviewed

Journal Articles

- [J1] *Hu, X; Chu, L; Pei, J; Liu, W; Bian, J.* (2021). Model Complexity of Deep Learning: A Survey. Knowledge and Information Systems (KAIS 2021) 63: 2585–2619.
- [J2] *Lei, M; Chu, L; Wang, Z; Pei, J; He, C; Zhang, X; Fang, B.* (2020). Mining Top-k Sequential Patterns in Transaction Database Graphs. World Wide Web (WWW 2020). 23(1): 103-130.
- [J3] *Zhao, Z*; Chu, L*; Tao, D; Pei, J (* means equal contribution).* (2019). Classification with Label Noise: A Markov Chain Sampling Framework. Data Mining and Knowledge Discovery (DMKD 2019). 33(5): 1468-1504.
- [J4] *Liu, W; Zhu, L; Chu, L; Ma, H.* (2019). A Common Subgraph Correspondence Mining Framework for Map Search Services. Multimedia Tools and Applications (MTA 2019). 78(1): 747-766.
- [J5] *Lei, M; Zhang, X; Chu, L; Wang, Z; Yu, P; Fang, B.* (2019). Finding Route Hotspots in Large Labeled Networks. IEEE Transactions on Knowledge and Data Engineering (TKDE 2019). 33(6): 2479-2492.
- [J6] *Wang, Z; Yang, Y; Pei, J; Chu, L; Chen, E.* (2017). Activity Maximization by Effective Information Diffusion in Social Networks. IEEE Transactions on Knowledge and Data Engineering (TKDE 2017). 29(11): 2374-2387.
- [J7] *Chu, L; Zhang, Y; Li, G; Wang, S; Zhang, W; Huang, Q.* (2014). Effective Multimodality Fusion Framework for Cross-Media Topic Detection. IEEE Transactions on Circuits and Systems for Video Technology (TCSVT). 26 (3): 556-569.
- [J8] *Chu, L; Jiang, S; Wang, S; Zhang, Y; Huang, Q.* (2013). Robust Spatial Consistency Graph Model for Partial Duplicate Image Retrieval. IEEE Transactions on Multimedia 15 (8): 1982-1996.

Conferences

- [C1] *Huang, Y*; Chu, L*; Zhou, Z; Wang, L; Liu, J; Pei, J; Zhang, Y (* means equal contribution).* (2021). Personalized Cross-Silo Federated Learning on Non-IID Data. AAAI Conference on Artificial Intelligence (AAAI 2021), (7865-7873).
- [C2] *Lam, P*; Chu, L*; Torgonskiy, M; Pei, J; Zhang, Y; Wang, L (* means equal contribution).* (2021). Finding Representative Interpretations on Convolutional Neural Networks. International Conference on Computer Vision (ICCV 2021), (1345-1354).
- [C3] *Bajaj, M*; Chu, L*; Xue, Z; Pei, J; Wang, L; Lam, P; Zhang, Y (* means equal contribution).* (2021). Robust Counterfactual Explanations on Graph Neural Networks. Thirty-Fifth Conference on Neural Information Processing Systems (NeurIPS 2021).
- [C4] *Banerjee, P; Chu, L; Zhang, Y; Lakshmanan, L; Wang, L.* (2021). Stealthy Targeted Data Poisoning Attack on Knowledge Graphs. IEEE International Conference on Data Engineering (ICDE 2021), (2069-2074).
- [C5] *Cong, Z; Chu, L; Yang, Y; Pei, J.* (2021). Comprehensible Counterfactual Interpretation on Kolmogorov-Smirnov Test. International Conference on Very Large Data Bases (VLDB 2021), (1583-1597).
- [C6] *Zhou, Z; Chu, L; Liu, C; Wang, L; Pei, J; Zhang, Y.* (2021). Towards Fair Federated Learning. ACM SIGKDD Conferences on Knowledge Discovery and Data Mining (KDD 2021), (4100-4101) (abstract).

- [C7] *Chu, L; Zhang, Y; Yang, Y; Wang, L; Pei, J.* (2020). Online Density Bursting Subgraph Detection from Temporal Graphs. International Conference on Very Large Data Bases (VLDB 2020), (2353-2365).
- [C8] *Chu, L; Wang, Z; Pei, J; Zhang, Y; Yang, Y; Chen, E.* (2019). Finding Theme Communities from Database Networks. International Conference on Very Large Data Bases (VLDB 2019), (2150-8097).
- [C9] *Cong, Z; Chu, L; Wang, L; Hu, X; Pei, J.* (2019). Exact and Consistent Interpretation of Piecewise Linear Models Hidden Behind APIs: A Closed Form Solution. IEEE International Conference on Data Engineering (ICDE 2019), (613-624).
- [C10] *Chu, L; Hu, X; Hu, J; Wang, L; Pei, J.* (2018). Exact and Consistent Interpretation for Piecewise Linear Neural Networks: A Closed Form Solution. ACM SIGKDD Conferences on Knowledge Discovery and Data Mining (KDD 2018), (1244-1253).
- [C11] *Yang, Y; Chu, L; Zhang, Y; Wang, Z; Pei, J; Chen, E.* (2018). Mining Density Contrast Subgraphs. IEEE International Conference on Data Engineering (ICDE 2018), (221-232).
- [C12] *Zhu, L; Liu, W; Chu, L; Liu, P; Gu, X.* (2017). Query from Sketch: A Common Subgraph Correspondence Mining Framework. International Conference on Multimedia Big Data (BigMM 2017), (413-418).
- [C13] *Wang, Z; Chu, L; Pei, J; Al-Barakati, A; Chen, E.* (2016). Tradeoffs Between Density and Size in Extracting Dense Subgraphs: A Unified Framework. IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2016), (41-48).
- [C14] *Chu, L; Wang, Z; Pei, J; Wang, J; Zhao, Z; Chen, E.* (2016). Finding Gangs in War from Signed Networks. ACM SIGKDD Conferences on Knowledge Discovery and Data Mining (KDD 2016), (1505-1514).
- [C15] *Chu, L; Wang, S; Liu, S; Huang, Q; Pei, J.* (2015). ALID: Scalable Dominant Cluster Detection. International Conference on Very Large Data Bases (VLDB 2015), (826-837).
- [C16] *Chu, L; Wang, S; Zhang, Y; Jiang, S; Huang, Q.* (2014). Graph-Density-based Visual Word Vocabulary for Image Retrieval. IEEE International Conference on Multimedia and Expo (ICME 2014), (1-6).
- [C17] *Zhang, Y; Li, G; Chu, L; Wang, S; Zhang, W; Huang, Q.* (2013). Cross-Media Topic Detection: A Multi-Modality Fusion Framework. IEEE International Conference on Multimedia and Expo (ICME 2013), (1-6) [**Best paper candidate**].
- [C18] *Wang, S; Xue, Y; Chu, L; Jiang, Y; Jiang, S.* (2013). ObjectSense: A Scalable Multi-Objects Recognition System based on Partial-Duplicate Image Retrieval. ACM conference on International Conference on Multimedia Retrieval (ICMR 2013), (317-318) [**Best demo award**].
- [C19] *Chen, T; Jiang, S; Chu, L; Huang, Q.* (2011). Detection and Location of Near-Duplicate Video Sub-Clips by Finding Dense Subgraphs. ACM international conference on Multimedia (MM 2011), (1173-1176).
- [C20] *Chu, L; Jiang, S; Huang, Q.* (2011). Fast Common Visual Pattern Detection via Radiate Geometric Model. IEEE International Conference on Image Processing (ICIP 2011), (2465-2468).

Not Peer Reviewed

arXiv preprint

(Note: the following papers are being submitted to top-venues.)

- [S1] *Liu, C; Zhou, Z; Shi, Y; Pei, J; Chu, L; Zhang, Y.* (2021). Achieving Model Fairness in Vertical Federated Learning. arXiv preprint arXiv:2109.08344.
- [S2] *Che, X; Wang, L; Chu, L; Dong, Y; Pei, J; Zhou, Z; Zhang, Y.* (2021). FedFair: Training Fair Models in Cross-Silo Federated Learning. arXiv preprint arXiv:2109.05662.

PRESENTATIONS AT MEETINGS

Invited

1. *Chu, L.* (2021). Application of AI Interpretation Technologies in Healthcare. Invited by the Department of Health Research Methods, Evidence & Impact of McMaster University.
2. *Chu, L.* (2021). Personalized Federated Learning on Non-IID Data. Invited by Huawei Technologies in China.
3. *Chu, L.* (2021). Large Scale Graph Data Mining and its Applications. Invited by Huawei Technologies Canada.

Contributed

Peer Reviewed

1. [Zhou, Z.; Chu, L.; Liu, C.; Wang, L.; Pei, J.; Zhang, Y.](#) (2021). Tutorial on Towards Fair Federated Learning. ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2021), Singapore.
2. [Hu, X.; Chu, L.; Pei, J.; Bian, J.; Liu, W.](#) (2021). Tutorial on Deep Learning Model Complexity: Concepts and Approaches. SIAM International Conference on Data Mining (SDM 2021), United States.

PATENTS, INVENTIONS AND COPYRIGHTS

Disclosed US Patents

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| 18/05/2021 | <i>Romaniello, V; Bajaj, M; Singh, G; Chu, L; Zhou, Z; Wang, L; Zhang, Y.</i> Model Fairness Evaluation Framework. Patent ID: 87433273, Reference #: 87433273US01. |
| 17/03/2021 | <i>Charette, L; Chu, L; Wang, L; Zhang, Y.</i> Model Watermarking Framework Against Distillation Attacks. Patent ID: 87056541, Reference #: 87027590US01. |
| 10/11/2020 | <i>Singh, G; Chu, L; Wang, L; Zhang, Y.</i> Balancing Skewed Datasets by Automatically Mining Minority-Class Examples. Patent ID: 87159434, Reference #: 87159434US01. |
| 30/10/2020 | <i>Lam, C; Chu, L; Zhang, Y; Wang, L.</i> DNN Interpretation via Rule Extraction. Patent ID: 86906358, Reference #: 86807009PCT02. |
| 08/09/2020 | <i>Chu, L; Huang, Y; Zhang, Y; Wang, L.</i> A Secure Vertical Federated Learning Method and System. Patent ID: 86771146, Reference #: 86433808US02. |
| 02/06/2020 | <i>Chu, L; Huang, Y; Zhang, Y; Wang, L.</i> A Non-IID Horizontal Federated Learning Method and System. Patent ID: 86836202, Reference #: 86782368US01. |

Issued Chinese Patents

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| 21/11/2017 | <i>Huang, Q; Chu, L; Zhang, Y; Wang, S; Jiang, S.</i> An Effective Visual Vocabulary Generation System based on Dense Subgraph Detection. Patent ID: ZL 2014 1 0312913.7. |
| 01/02/2017 | <i>Huang, Q.; Zhang, Y; Chu, L; Li, G; Wang, S; Zhang, W.</i> An Effective Cross-Modality Topic Detection System based on Multimodality Fusion and Graph Clustering. Patent ID: ZL 2014 1 0203087.2. |