

# Hongbin Pei

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## SUMMARY

Hongbin Pei is a fourth-year Ph.D. student in school of computer science, Jilin university, China, under supervision of Prof. Bo Yang (Jilin University) and Prof. Jiming Liu (Hong Kong Baptist University, IEEE Fellow). His current research interests include machine learning, data mining, and computational sustainability. He has published research papers in conferences and journals, such as TPAMI and AAAI'18. He also has a research internship in Big Data Lab, Baidu research. Now, he is a visiting scholar in Kevin Chang's group in CS department at UIUC.

## RESEARCH AND TEACHING INTERESTS

Geometry machine learning, Computational sustainability, Data mining, Complex network

## EDUCATION

- Ph.D. School of Computer Science, **Jilin University**, 2015-
- M.S. School of Computer Science, **Jilin University**, 2012-2015  
Dissertation: *Tensor based Modelling and Discovering the Spatiotemporal of Human Contact. summa cum laude (top 3%)*
- B.S. School of Computer Science, **Jilin University**, 2008-2012

## PUBLICATIONS

### Conferences

- 2020 **Hongbin Pei**, Bingzhe Wei, Kevin Chen-Chuan Chang, Yu Lei, Bo Yang. Geom-GCN: Geometric Graph Convolutional Networks. *ICLR'20: Proc. of 8-th International Conference on Learning Representations*, 2020. (Spotlight oral)
- 2019 Yu Lei, Zhitao Wang, Wenjie Li, **Hongbin Pei**. Social Attentive Deep Q-network for Recommendation. *SIGIR'19: Proc. of 42nd International ACM SIGIR Conference on Research and Development in Information Retrieval* 2019.
- 2018 **Hongbin Pei**, Bo Yang, Jiming Liu, Lei Dong. Group Sparse Bayesian Learning for Actively Surveillance on Epidemic Dynamics. *AAAI'18: Proc. of 32-th AAAI Conference on Artificial Intelligence*, 2018.

- 2014 Bo Yang (*supervisor*), **Hongbin Pei**, Hechang Chen, Jiming Liu, Shang Xia. Modeling and Mining Spatiotemporal Social Contact of Metapopulation from Heterogeneous Data. *ICDM'14: Proc. of IEEE 14-th International Conference on Data Mining*, 2014.

## Journal Articles

- 2019 Jialun Liu, Wenhui Li, **Hongbin Pei**, et al.: Identity Preserving Generative Adversarial Network for Cross-Domain Person Re-Identification. *IEEE Access*, 2019.
- 2018 Hechang Chen, Bo Yang, **Hongbin Pei**, Jiming Liu: Next Generation Technology for Epidemic Prevention and Control: Data-Driven Contact Tracking. *IEEE Access*, 2018.
- 2017 Bo Yang (*supervisor*), **Hongbin Pei**, Hechang Chen, Jiming Liu, Shang Xia. Characterizing and Discovering Spatiotemporal Social Contact Patterns for Healthcare. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2017.

## Preprint

- 2017 Jinbo Zhou, **Hongbin Pei**, Haishan Wu. Early warning of human crowds based on query data from Baidu Map: Analysis based on shanghai stampede. arXiv: 1603.06780, 2016.  
**Media hit:** [MIT Technology Review](#), [Wall Street Journal](#), [South China Morning Post](#), [Yahoo Finance](#)

## Book Translation

- 2018 *Chinese version of chapter 5 & 6: Machine learning refined: foundations, algorithms, and application.* Watt J, Borhani R, Katsaggelos A K.. Cambridge University Press, 2016.

## Papers Under Review

- 2019 **Hongbin Pei**, Bo Yang, Jiming Liu, Kevin Chen-Chuan Chang. Active Surveillance via Group Sparse Bayesian Learning. *IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)*, 2019. (Major revision)
- 2019 Yu Lei, Zhitao Wang, Wenjie Li, **Hongbin Pei**, Quanyu DAI. Social Attentive Deep Q-networks for Recommender Systems. *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2019. (Major revision)
- 2020 Yu Lei, Hanqi Yan, **Hongbin Pei**, Wenjie Li. Graph-structured Representations for Reinforcement Learning based Recommendation. *Proceedings of the 29th International Joint Conferences on Artificial Intelligence (IJCAI)*, 2020.
- 2020 Yuyao Liu, Jing Huang, Bo Yang, **Hongbin Pei**. Neural Explainable Recommender Model based on Attributes and Reviews. *Journal of Computer Science and Technology (JCST)*, 2020.

## On-going Projects

- 2019 Curvature regularization to prevent distortion in graph embedding

## HONORS AND AWARDS

- 2019 National scholarship for studying abroad, China Scholarship Council
- 2018 Academic performance scholarship for graduate student, Jilin University
- 2017 Outstanding Graduate student, Jilin University
- 2017 BOSCH Chinese Excellent Student Scholarship
- 2017 First prize scholarship for graduate student, Jilin University
- 2016 National Scholarship for Ph.D. Student, China (**top** 1%)
- 2015 Outstanding Graduate Thesis, Jilin University
- 2014 National Scholarship for Graduate Student, China (**top** 1%)

## GRANTS

- 2018 General Research Fund, Hong Kong. *Modeling and inferring latent diffusion networks for active surveillance and prediction of infectious diseases*. 12201318. HKD 692,000. 2018-2021. (Proposal writer and first student participant)
- 2016 Natural Science Foundation of China (NSFC) Fund. *Modelling and mining the dynamic contact network of large-scale population for epidemic disease control and prevention*. 61572226. CNY 650,000. 2016-2018. (Second student participant)
- 2015 Jilin Province Natural Science Foundation, China. *Modelling and computing the dynamic contact network for epidemic disease control and prevention*. 20150101052JC. CNY 170,000. 2015-2017. (Proposal writer and first student participant)

## EXPERIENCES

- 2018–19 **Visiting scholar, Department of Computer Science, UIUC**  
Project: Geometric deep learning on graph data.  
Message-passing neural networks (MPNNs) have been successfully applied to representation learning on graphs in a variety of real-world applications. However, two fundamental weaknesses of MPNNs’ aggregators limit their ability to represent graph-structured data: losing the structural information of nodes in neighborhoods and lacking the ability to capture long-range dependencies in disassortative graphs. Few studies have noticed the weaknesses from different perspectives. From the observations on classical neural network and network geometry, we propose a novel geometric aggregation scheme for graph neural networks to overcome the two weaknesses. The behind basic idea is the aggregation on a graph can benefit from a continuous space underlying the graph.
- 2016–17 **Research assistant, Department of Computer Science, Hong Kong Baptist University**  
Project: Bayesian optimal sensing on epidemic dynamics.  
The surveillance of epidemic dynamics is of great value. However, it’s intractable especially when the surveillance resources are very limited. To address this challenge, I

proposed a novel measure by group sparse Bayesian learning to identify a small portion of sentinel nodes whose information can be used to approximated predict the overall system state. I validated the method on several real-world data, including 2009 Hong Kong H1N1 flu, 2005-2014 China-Myanmar border malaria. A part of this work will appear in AAAI'18.

2015–16 *Data Science Intern, Big Data Lab (BDL), Baidu Research*

Project: Early warning of human crowds.

The mass scale unexpected human crowd is a serious threat to public safety, especially when preparation and on-site management are insufficient. I proposed a novel approach to early warning such potential crowd disasters with leveraging the large-scale user trajectory data and query data generated on Baidu Map. Based on the method, a case study was performed on 2014 Shanghai stampede, where 39 people died. This work has been reported by many media, including MIT technology review, wall street journal, etc. *Acknowledged contribution:* Dong, Lei, Carlo Ratti, and Siqi Zheng. Predicting neighborhoods' socioeconomic attributes using restaurant data. *Proceedings of the National Academy of Sciences (PNAS)*, 2019.

2013–15 *Research Assistant, School of Computer Science, Jilin University*

Project: Dynamical human contact pattern inference.

We proposed a computational framework to infer the dynamical hidden human contact network from heterogeneous data. The dynamical network can be used for epidemic outbreak understanding, prediction, and intervention strategy making. The method was empirically validated on several real infectious disease outbreak data, including 2009 Hong Kong H1N1 flu data, 2010 Taiwan seasonal flu and varicella data.

## SCIENTIFIC COMMUNITY ACTIVITIES

### Invited Talks

- 2018/12 “Active Surveillance on Epidemic Dynamics.” @Changchun, China. The 11th Ph.D student forum at Jilin University.
- 2018/05 “Active Surveillance on Epidemic Dynamics.” @Chongqin, China. Southwest University.
- 2017/10 “Contact tracking: Next Generation Technology for Epidemic Prevention and Control.” @Hangzhou, China. Hangzhou Dianzi University.
- 2017/08 “Modelling and Inferring Spatio-temporal Pattern of Human Contact.” @Yuannan. Chinese Association for Artificial Intelligence (CAAI).
- 2016/11 “Active Surveillance for Border Malaria Control.” @Shanghai, China. National Institute Parasitic Diseases, Chinese Center for Disease Control and Prevention (China CDC).

### Reviewer

Conference: ICDM'15, IJCAI'16, WI'16, AAAI'17, AAAI'18, KDD'18, KDD'19, SIGIR'19, ICDM'19, WWW'20

Journal: Infectious Diseases of Poverty, Physica A: Statistical Mechanics and its Applications

## **SKILLS**

### **Machine Learning and Data Mining**

Probability graph model, Deep neural network, Ensemble learning, Feature selection, Regression, Sparse Learning, Decision Tree, SVM, K means, PCA, Gaussian mixture model, Gaussian process.

### **Mathematics**

Mathematical analysis, Linear algebra, Probability theory, Optimization.

### **Programming languages**

Python (including numpy, scipy, matplotlib, networkx, and scikit-learn), Matlab, JAVA, Hadoop.

### **Language**

Chinese (native), English (fluent).

Updated April 2020