# Xiangnan Feng

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## RESEARCH INTERESTS

Computational Social Science, Complex Network, Machine Learning, Data Mining, Statistical Physics

## EXPERIENCE

**Postdoc** in **Max Planck Institute for Human Development**, Berlin, 01/2021 -
- **Research Topic**: Future of Work, Humans and Machines
- **Advisors**: Iyad Rahwan, Alex Rutherford

**Visiting Ph.D. Student** in Mathematics, **City, University of London**, London, 04/2019 - 08/2020
- **Research Topic**: Temporal Networks, Spatial Networks, Human Mobility
- **Advisors**: Andrea Baronchelli

**Ph.D.** in Mathematics, **Beihang University (BUAA)**, Beijing, 09/2014 - 01/2021
- **Thesis Topic**: Complex Systems, Statistics
- **Advisors**: Zhiming Zheng, Wei Wei

**B.S.** in Mathematics, **Beihang University (BUAA)**, Beijing, 09/2010 - 07/2014
- **Hua Luogeng Class**: Organized by Beihang University and Chinese Academy of Sciences jointly
- GPA: **3.6/4.0**

## ACADEMICS

**Activity and Attractiveness on Spatial Networks** 2019 - Present
- Studied the patterns of activity and attractiveness on spatial networks.
- Applied to London sharing bicycle systems to verify the conclusions.

**Hierarchical Decomposition Mechanism by König-Egérvary Layer-Subgraph** 2019 - Present
- Discover phase transition point of the König-Egérvary layer structure on graphs.
- Design an algorithm for minimum vertex cover problems with satisfactory accuracy.

**Core Influence Mechanism on Vertex-Cover Problem** 2018 - 2019
- Give out a method to break the Leaf-Removal-Core of graphs fast.
- Designed an approximated solution to minimum vertex cover problem.
- Compared to traditional solution, this method could be applied on scale-free graphs.

**Heterogeneity Index Based on von Neumann Entropy for Nodes and Motifs** 2017 - 2018
- Designed a node heterogeneity index based on information theory.
- Designed a significance index for motifs based on von Neumann entropy.

**Neuron Network with Stochastic Weight** 2017 - 2018
- Proposed a neural network based framework with stochastic weights (SWNNs).
- Experiments of using SWNNs for parameters estimation in Stochastic are presented.

**Multi-Solution Problem in Combined Fit to BESIII Data in Particle Physics** 2015
- Programmed to fit BESIII data on $e^+e^- \to h_c\pi^+\pi^-$ and $\chi_{c0}\omega$ with curve.

- Derived the formula mathematically for multi-solution situation in Breit-Wigner function fitting.

**Kernel Density Estimation: Bandwidth Selection and Their Comparison** 2014
*Graduation Project*

- Implemented and compared several bandwidth selection algorithms for kernel density estimation.
- Discussed a possible new solution: use Fast Gauss Transform and iteration to calculate bandwidth.

## PUBLICATIONS/MANUSCRIPT

Effects of dynamic-Win-Stay-Lose-Learn model with voluntary participation in social dilemma 2021
Zhenyu Shi, Wei Wei, **Xiangnan Feng**, Ruizhi Zhang, Zhiming Zheng
*Chaos, Solitons & Fractals*, Volume 151, 2021, 111269, ISSN 0960-0779

Graph classification based on skeleton and component features 2021
Xue Liu, Wei Wei, **Xiangnan Feng**, Xiaobo Cao, Dan Sun
*Knowledge-Based Systems*, Volume 228, 2021, 107301, ISSN 0950-7051

Research of Motif-Based Similarity for Link Prediction Problem 2021
Chao Li, Wei Wei, **Xiangnan Feng**, Jiaomin Liu
*IEEE Access*, vol. 9, pp. 66636-66645, 2021

Dynamic aspiration based on Win-Stay-Lose-Learn rule in spatial prisoner's dilemma game 2021
Zhenyu Shi, Wei Wei, **Xiangnan Feng**, Xing Li, Zhiming Zheng
*Plos one*, 16(1), e0244814.

Hierarchical decomposition mechanism by König-Egérvary layer-subgraph with vertex-cover Under Review
**Xiangnan Feng**, Wei Wei, Xue Liu and Zhiming Zheng

A vertex-cover algorithm of edge-adding process by solution space evolution On Draft
Wei Wei, **Xiangnan Feng**, Jiannan Wang, Yanmei Jiang, Yunge Bai and Zhiming Zheng

Neural network based stochastic generator: a primary exploration On Draft
**Xiangnan Feng**, Xueshuang Xiang, Xuejiao Liu, Yang Ming and Wei Wei

Core influence mechanism on vertex-cover problem through leaf-removal-core breaking 2019
**Xiangnan Feng**, Wei Wei, Xing Li and Zhiming Zheng
*Journal of Statistical Mechanics: Theory and Experiment*, 2019.7 (2019): 073401

Research on centralities based on von Neumann entropy for motifs 2019
**Xiangnan Feng**, Wei Wei and Zhiming Zheng
*2019 International Conference on Artificial Intelligence and Computing Science*

Exploring the heterogeneity for node importance by von Neumann entropy 2018
**Xiangnan Feng**, Wei Wei, Renquan Zhang, Jiannan Wang, Ying Shi and Zhiming Zheng
*Physica A: Statistical Mechanics and its Applications*, Volume 517, 1 March 2019, Pages 53-65

Optimal stabilization of boolean networks through collective influence 2018
Jiannan Wang, Sen Pei, Wei Wei, **Xiangnan Feng**, and Zhiming Zheng
*Physical Review E*, 97, 032305 – Published 13 March 2018

Correlation research of centralities on complex network by statistical learning 2018
Ying Shi, Wei Wei, **Xiangnan Feng** and Zhiming Zheng
*2018 2nd International Conference on Artificial Intelligence and Software Engineering*

Identifying influential vertices in boolean networks through dynamical voter rank 2017
Jiannan Wang, **Xiangnan Feng**, Zhilong Mi, Ziqiao Yin and Zhiming Zheng
*2017 IEEE 2nd Information Technology, Networking, Electronic and Automation Control Conference*

Combined fit to BESIII data on $e^+e^- \to h_c\pi^+\pi^-$ and $\chi_{c0}\omega$ 2015
**Xiangnan Feng**, Xuyang Gao and Chengping Shen
*International Journal of Modern Physics A*, 30, 1550142 (2015)

Optimization model for malfunction detection in automatic lathe 2015
Zhenfu Wang, Menglun Wang, Sen Chen and **Xiangnan Feng**
*Modular Machine Tool & Automatic Manufacturing Technique*, 2015, ISSN: 1001-2265 CN: 21-1132/TG

Photovoltaic hut design based on the greedy algorithm 2013
Zhenfu Wang, Menglun Wang, Sen Chen and **Xiangnan Feng**
*Acta Energiae Solaris Sinica*, 2013 Vol. 34 (10): 1775-1780

## ACTIVITIES

**Seminar: Elements of Statistical Learning** Beihang University, 2017-2018
- Organized the seminar of statistical learning as the group leader.

**Overwatch Replay Analyzer (ORA)** 2017-2018
*Developer*
- Developed the open-source software to extract a timeline of events from computer game Overwatch videos.
- Used by several professional Overwatch League E-Sports teams.

**Manager of Website: "Future Garden", the Official BBS of Beihang University** Since 2016

**Internship** in **China Academy of Information and Communications Technology** 07/2015-12/2015

**Teaching Assistant** in **Calculus** Beihang University, 09/2014-01/2015

**Michigan State University & Beihang University Mathematics Summer Camp** 07/2013-08/2013
*Member* *Department of Mathematics, Michigan State University*
- Spent 6 weeks in MSU, took courses given by faculties in the mathematics department.
- Gave a presentation about solving inequality.

**Meritorious Winner of Mathematical Contest in Modeling** 2012
- Used Genetic Algorithm to calculate the trip schedule on "the big long river".
- Built two models to solve the problem: genetic coding and feedback control.

## HONORS & AWARDS

- Outstanding Graduate of BUAA 2021
- Sponsorship from Academic Excellence Foundation of BUAA for PhD Students (85 among 700) 2019-2020
- Outstanding Academic Excellence Scholarship 2012, 2013, 2014, 2015
- First prize in Contemporary Undergraduate Mathematical Contest in Modeling, Beijing Zone 2012
- Second prize in the 28th National College Student Physics Competitiom 2011

## ADDITIONAL INFORMATION

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| **Programming** | Matlab, C/C++, R Language, Python |
| **Software** | Mathematica, Latex, Linux, Illustrator, Audition, Photoshop, Gephi |
| **Hobbies** | Classical Music, Photography, Astronomy, Football<br>Member of BUAA University Tennis Team (2018, 2020)<br>Member of BUAA University Football Team (2019) |