

# YIXUAN HE

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University of Oxford

## EDUCATION

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**University of Oxford, OU**

Oct. 2020 - Jun. 2024 (expected)

*D.Phil. (PhD) student in Statistics*

*Supervisors: Mihai Cucuringu and Gesine Reinert*

- **Clarendon Scholar (fully funded)**, Balliol Jason Hu Scholarship
- Thesis title: **Graph Neural Networks for Network Analysis**

**University of Edinburgh, UoE**

Sept. 2018 - Jun. 2020

*BSc (Hons) in Maths and Stats*

*Supervisor: Timothy I. Cannings*

- GPA: **92.33%** Avg., **Rank # 1** in Maths & Stats, **First Class**

**University of California, Berkeley**

Jan. 2018 - May 2018

*Semester Exchange*

- GPA: **4.0/4.0**

**South China University of Technology, SCUT**

Sept. 2016 - Jun. 2020

*BSc Mathematics and Applied Mathematics*

*Supervisor: Delu Zeng*

- Rank: **1/60** (Outstanding graduate)
- Overall GPA for 2016 - 18: **3.99/4.0**, Major GPA: **4.0/4.0**; transferred to UoE on 2+2 program
- Winning 2 years of **National Scholarship** granted by Ministry of Education of China
- **650/710** in CET6, **top 0.02 %** of students in SCUT

## RESEARCH EXPERIENCE

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***OU: Graph Neural Networks for Network Analysis***

Oct. 2020 - Jun. 2024

*Doctoral Research*

*Supervisors: Gesine Reinert, Mihai Cucuringu*

- Worked on signed, directed, and temporal GNNs, as well as GNNs for signal recovery.
- Developed open-source libraries: creator of PyG Signed Directed & contributor of PyG Temporal.
- Collaborated with Amazon as an applied scientist intern (Mentor: David Wipf).

***NetEase Games: Behaviour-based Anti-cheating in FPS Games***

Jun. 2020 - Aug. 2020

*Summer Internship*

*Supervisor: Xin Wen*

- Extracted features from logs using multiprocessing & built multi-input single-output models with TensorFlow 2.2.

***UoE: AUROC vs AUPRC: A Comparison of Performance Measures in Classification Problems***

Sept. 2019 - Apr. 2020

*UoE Honors Project*

*Supervisor: Timothy I. Cannings*

- Collected data, compared measure scores, **analyzed measure properties** & data properties.

***UCLA CSST summer research/REU: Deforestation Brazil***

Jun. 2019 - Sept. 2019

*Funded by NGA & NSF*

*Supervisors: Christian Parkinson, Andrea L. Bertozzi, Stanley J. Osher*

- Conducted data mining, data analysis, matlab programming & model construction.
- Implemented **level set method**, numerical PDEs, optimal path searching, satellite image processing, Maximum Penalized Likelihood Estimation (MPLE), time series simulation etc.

- **Delivered a talk** at IPAM’s “The Level Set Collective” seminar invited by Professor Stanley Osher.
- **Presented a poster** at Intelligence Community Academic Research Symposium (ICARS) 2019.

***SCUT: Robust Image Salient Object Perception Prior for Image Segmentation based on PDEs Related Methods***

May 2018 - May 2020

*Funded by National Natural Science Foundation of China (NSFC)*

*Supervisor: Delu Zeng*

- Studied level set methods and **neural networks** on **semantic image segmentation**.
- Worked on lung nodule segmentation using MEnet.
- Utilized Linux, Colab, Caffe, TensorFlow, PyTorch & programming in Python.

***SCUT: Efficiency of Collaborative Innovation Knowledge Output in Professional Towns in Internet + Times***

May 2017 - May 2018

*Funded by MOE of PRC*

*Supervisors: Shifu Wang, Miaoqi Zhao, Shenquan Liu*

- **Cross-disciplinary:** Maths & Urban Planning.
- Responsible: data mining & analysis, paper writing.
- **Led** the project as part of the National Training Program of Innovation for Undergraduates.

## MAJOR AWARDS

<b>Grant</b>	2024 ICML Financial Aid
<b>Grant</b>	2024 ICLR Financial Assistance
<b>Grant</b>	2024 Balliol College Support Grant
<b>Grant</b>	2023-24 Balliol College Floreat Grant for Sports
<b>Grant</b>	2022-23 Balliol College Floreat Grant for Sports
<b>Grant</b>	2022 ICML Participant Award
<b>Grant</b>	2022 Simons Institute Summer School Fund
<b>Grant</b>	2022 Balliol’s fund on IMA Conf. on The Mathematical Challenges of Big Data reg.
<b>Award</b>	2022 SIAM Student Travel Award for SDM’22
<b>Award</b>	2022 SIGIR Student Registration Award for WSDM’22
<b>Grant</b>	2021 Balliol’s fund on Complex Networks 2021 reg.
<b>Grant</b>	2021 Balliol’s fund on NeurIPS 2021 reg.
<b>Grant</b>	2021 Balliol’s fund on ACM membership & CIKM’21 registration
<b>Prize</b>	2020 Napier Medal and Gangadhar Balwant Gadgil Prize ( <b>top</b> Maths student @UoE)
<b>Prize</b>	2020 Lawley Memorial Prize ( <b>top</b> student in Maths & Stats @UoE)
<b>Scholarship</b>	2020 <b>Clarendon Scholarship</b> & Balliol Jason Hu scholarship at Oxford
<b>Honor</b>	2020 Outstanding Graduate at SCUT Maths Dept.
<b>Prize</b>	2019 Arthur Erdelyi Prize (For top 3 performing Math students @UoE)
<b>Prize</b>	2019 James Ward Memorial Prize ( <b>top</b> student in Maths & Stats @UoE)
<b>Second Prize</b>	2018 ICM/MCM International <b>Mathematical Modeling</b> Competition
<b>Grand Prize</b>	2018 Maths Competition of SCUT (Maths Group) ( <b>Rank # 1</b> )
<b>Honor</b>	2017-2018 one of the ten <b>Role Models to Merit Students</b> at SCUT
<b>Prize</b>	2017 & 2018 <b>National Scholarship</b>
<b>Second Prize</b>	2017 “9 <sup>th</sup> National College Student <b>Maths Competition</b> (Maths)” in Guangdong
<b>Second Prize</b>	2017 National College Student Mathematical Modeling Competition (Guangdong)

## PUBLICATIONS

\* indicates equal contribution.

- Aminian, G.\*, **He, Y.\***, Reinert, G., Szpruch, L., Cohen, SN. Generalization Error of Graph Neural Networks in the Mean-field Regime. (**ICML 2024**)

- **He, Y.**, Reinert, G., Wipf, D., & Cucuringu, M. Robust Angular Synchronization via Directed Graph Neural Networks. (**ICLR 2024**)
- Steach, H., Viswanath, S., **He, Y.**, Zhang, X., Ivanova, N., Hirn, M., Perlmutter, M., Krishnaswamy, S. Inferring Metabolic States from Single Cell Transcriptomic Data via Geometric Deep Learning. (**RECOMB 2024**)
- **He, Y.**, Zhang, X., Huang, J., Rozemberczki, B., Cucuringu, M., & Reinert, G. PyTorch Geometric Signed Directed: A Software Package on Graph Neural Networks for Signed and Directed Graphs. (**LoG 2023, Open-Source Software with 100+ stars**)
- Geng, H., Chen, C., **He, Y.**, Zeng, G., Han, Z., Chai, H., Yan, J. Pyramid Graph Neural Network: a Graph Sampling and Filtering Approach for Multi-scale Disentangled Representations. (**KDD 2023, Talk**)
- Wu, Q., Yang, C., Zhao, W., **He, Y.**, Wipf, D., & Yan, J. DIFFormer: Scalable (Graph) Transformers Induced by Energy Constrained Diffusion. (**ICLR 2023, Spotlight Talk**)
- **He, Y.**, Reinert, G., & Cucuringu, M. DIGRAC: Digraph Clustering Based on Flow Imbalance. (**LoG 2022**)
- **He, Y.**, Perlmutter, M., Reinert, G., & Cucuringu, M. MSGNN: A Spectral Graph Neural Network Based on a Novel Magnetic Signed Laplacian. (**LoG 2022**)
- Wang, X., Chen, S., **He, Y.**, Wang, M., Gan, Q., & Yan, J. CEP3: Community Event Prediction with Neural Point Process on Graph. (**LoG 2022**)
- **He, Y.**, Gan, Q., Wipf, D., Reinert, G. D., Yan, J., & Cucuringu, M. GNNRank: Learning Global Rankings from Pairwise Comparisons via Directed Graph Neural Networks. (**ICML 2022, Talk**)
- **He, Y.**, Reinert, G., Wang, S., & Cucuringu, M. SSSNET: Semi-Supervised Signed Network Clustering. (**SDM 2022, Talk**)
- **He, Y.** GNNs for Node Clustering in Signed and Directed Networks. (**WSDM-DC 2022, Talk**)
- Zhang, X., **He, Y.**, Brugnone, N., Perlmutter, M., & Hirn, M. MagNet: A Neural Network for Directed Graphs. (**NeurIPS 2021**)
- Rozemberczki, B., Scherer, P., **He, Y.**, Panagopoulos, G., Riedel, A., Astefanoaei, M., ... & Sarkar, R. PyTorch Geometric Temporal: Spatiotemporal Signal Processing with Neural Machine Learning Models. (**CIKM 2021 best paper award, Open-Source Software with 2.3k stars, 300+ forks**)
- **He, Y.**, Hu, T., & Zeng, D. Scan-flood Fill (SCAFF): an Efficient Automatic Precise Region Filling Algorithm for Complicated Regions. (**CVPR 2019 workshop**)
- Zeng, D., **He, Y.**, Liu, L., Chen, Z., Huang, J., Chen, J., & Paisley, J. Ro-SOS: Metric Expression Network (MEnet) for Robust Salient Object Segmentation. (ArXiv 2018)

## TEACHING EXPERIENCE

### University of Oxford Teaching Assistant

Dec. 2020 - Dec. 2022

- Courses to grade and discuss a problem in the problem classes: Applied Statistics (Fall 2022), Advanced Topics in Statistical Machine Learning (Spring 2022), Computational Statistics (Spring 2021)
- Course to demonstrate and answer questions: Statistics and Data management (for DTC in Dept. of Zoology, Fall 2020)

### UoE's Digital Skills Trainer - Python

Dec. 2019 - May 2020

- **Delivered Python training courses**, reviewed & improved existing Python training.
- Recorded lectures: Introduction to Python and Python for Data Science.

### Teaching Support in a Primary School in Longsheng Rural Village

July 2017

- Devised & delivered lectures in singing, dancing, craftsmanship & story-telling.
- **Leader** in hosting the closing ceremony.
- **Visited families** to collect information & offer suggestions.

## ACADEMIC SERVICES

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### Reviewer

- Conferences: NeurIPS2024, ICML2024, ICLR2024, AAAI 2024, NeurIPS 2023, ICML 2023, WWW 2023, AAAI 2023, NeurIPS 2022, SIGKDD 2022, ICML 2022, WSDM 2022
- Journals: IEEE Transactions on Knowledge and Data Engineering (TKDE), Journal of Complex Networks, Statistics and Computing

### Organizer

- One of the **organizers** for: LoG<sup>2</sup> @ Oxford: the Learning on Graphs and Geometry seminar series

## WORK EXPERIENCE

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**Applied Scientist Intern at Amazon Web Services AI Shanghai Lablet** Nov. 2021 - Aug. 2024

- Mentor: David Wipf.
- Conducted research on graph neural networks.

### NetEase Games Programmer

Jun. 2020 - Aug. 2020

- Project: Behaviour-based Anti-cheating in FPS Games (Supervisor: Xin Wen)
- Selected as **Outstanding Intern** to present my work.

### Student Assistant for School of Mathematics

Sept. 2016 - Aug. 2017

- Assisted in organizing materials & releasing notifications.
- Outstanding individual in work-study of South China University of Technology.

## CONFERENCES/SUMMER SCHOOLS

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41st International Conference on Machine Learning ( <b>ICML</b> )	Author	Jul. 2024
CNRS GdR IASIS Graph Learning Day	Speaker	Jun. 2024
12th International Conference on Learning Representations ( <b>ICLR</b> )	Author	May 2024
2nd Learning on Graphs (LoG) Conference	Author	Nov. 2023
Workshop: statistical learning on LARge scale GRaphs (LARGR)	Presenter	Mar. 2023
1st Learning on Graphs (LoG) Conference	Author	Dec. 2022
4th IMA Conference on The Mathematical Challenges of Big Data	Speaker	Sept. 2022
39th International Conference on Machine Learning ( <b>ICML</b> )	Author	Jul. 2022
SIAM International Conference on Data Mining ( <b>SDM</b> )	Author	Apr. 2022
15th ACM Int. Conf. on Web Search and Data Mining ( <b>WSDM</b> )	Doctoral Cons.	Feb.2022
35th Conf. on Neural Information Processing Systems ( <b>NeurIPS</b> )	Author	Dec.2021
The 10th Int. Conf. on Complex Networks and their Applications	Author	Nov.2021
Int. Conf. on Information and Knowledge Management ( <b>CIKM</b> )	Author	Nov.2021
Intelligence Community Academic Research Symposium ( <b>ICARS</b> )	Poster presenter	Sept. 2019
Computer Vision and Pattern Recognition ( <b>CVPR</b> )	Author	Jun. 2019

## COMPUTER SKILLS

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Programming:	<b>Python (Advanced)</b> , C++ (Intermediate), VB (Basic) & Pascal (Basic)
Statistical Analysis:	<b>R (Advanced)</b> , SQL (Intermediate) & SPSS (Intermediate)
Modelling:	<b>Matlab (Advanced)</b> , Maple (Intermediate) & Xpress (Intermediate)
Paper writing:	<b>Latex (Advanced)</b>

## POSITIONS OF RESPONSIBILITY

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**President of Oxford University Table Tennis Club (OUTTC)** May 2023 - May 2024

- **Organized** club activities, promoted the club, organized training, booked & coordinated facilities.
- Participated in table tennis **competitions** as a squad member.
- **Initialized** the use of an Oxford mailing list to send notifications (600+ subscribers) & **managed** a club Facebook group (1.2k members).

**Director of Dept. of Visiting Scholars in Oxford Chinese Students & Scholars Association (OXCSSA)** July 2021 - July 2022

- **Co-organized** 2021 welcoming event for new students to University of Oxford.
- **Organized** events for visiting scholars: visiting scholars' tea party, hiking, formal, punting etc.
- Collaborated with other departments to hold virtual and in-person talks.

**Head of Class** Sept. 2013 - Jun. 2018

- Conveyed notifications, organized activities & led by example.
- 2017 & 2018 South China University of Technology **Outstanding Student Leader**.
- 2016-2017 **outstanding class** of SCUT & 2017-2018 top-16 classes of SCUT.

**University Student Representative** May 2017 - May 2018

- Actively listened to students' opinions & participated in raising proposals.
- Outstanding Student Representative of South China University of Technology in 2017.

**Member of Public Relationship Dept., Math Student Union** Sept. 2016 - Oct. 2017

- **Led** the hosting of a social party in School of Mathematics.
- 2017 **Star** in Mathematics Student Union.