Shu Hu

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EDUCATION

Ph.D., Computer Science, University at Buffalo, SUNY — Aug 2020 - Jun 2022
Advisor: Prof. Siwei Lyu

M.A., Mathematics, University at Albany, SUNY — Aug 2018 - Jun 2020
Advisor: Prof. Yiming Ying

M.Eng., Software Engineering, University of Science and Technology of China — Sep 2013 - Apr 2016
Advisor: Prof. En-Hong Chen and Prof. Jiuyong Li

B.S., Electronic Information Engineering, North China Institute of Science and Technology — Sep 2009 - Jul 2013

APPOINTMENTS

Assistant Professor — July 2024 - present
Department of Computer and Information Technology
Purdue University

Assistant Professor — Aug 2023 - June 2024
Department of Computer and Information Technology
Indiana University–Purdue University Indianapolis

EXPERIENCE

Post-Doctoral Fellow (Machine Learning), Carnegie Mellon University, PA — Aug 2022 - Aug 2023
Advisor: Prof. George H. Chen

Research Intern (Deep Learning), Robert Bosch LLC, Sunnyvale, CA — June 2021 - Aug 2021
Object detection for autonomous driving (Computer Vision).

Research Assistant (Machine Learning) CS, University at Albany, SUNY — Aug 2018 - Jul 2020
Ph.D. student. Advisors: Prof. Siwei Lyu and Prof. Feng Chen

Research Assistant (Data Mining) CTG, University at Albany, SUNY — May 2019 - Aug 2019
Voter registration visualization and analysis for the New York State BOE.

Research Assistant (Machine Learning) IIE, Chinese Academy of Sciences — Apr 2016 - May 2018
Published research on security and machine learning topics, e.g., Anomaly detection.

Senior Data Analyst (Data Mining) Discover Financial Services — Jan 2016 - Mar 2016
Credit card risk control and model design.

Research Assistant (Data Mining) University of South Australia — Jul 2014 - Aug 2015
Visiting student. Advisors: Prof. Jiuyong Li and Prof. Thuc Duy Le

TEACHING

Instructor: CIT 57800, Advanced Topics in Data Management — Spring 2024
Department of Computer and Information Technology, IUPUI.

Instructor: CIT 42100/52600, Big/Applied Data Analytics — Fall 2023
Department of Computer and Information Technology, IUPUI.

Instructor: CSE 555 Introduction to Pattern Recognition — Fall 2021
164 graduate students, Department of Computer Science and Engineering, University at Buffalo.

HONORS AND AWARDS

National AI Research Resource (NAIRR) Pilot Award *NSF & DOE* 2024

Outstanding Reviewer Award *Machine Intelligence Research* 2023

CSE Best PhD Dissertation (with a prize of $500) *University at Buffalo* 2022

Honorable Mention *CSE Agrusa CSE Student Innovation Competition, University at Buffalo* 2021

First Prize *CSE Graduate Poster Competition, University at Buffalo* 2020

Travel Award *Thirty-fourth NeurIPS Conference* 2020

Dean Special Scholarships *North China Institute of Science and Technology* 2012

First Prize *China College Students' Mathematical Modeling Contest* 2011

GRANTS

- **PI**. *CRII: RI: A Study of Rank-based Decomposable Losses for Machine Learning*. **National Science Foundation, Project IIS-2348419**, $175,000, 2024-2026.
- **PI**. *Enhancing Generalization in Detecting Novel DeepFakes*. **IUPUI Navy Engineering Innovation & Leadership (NEIL) Program**, $1,500, 2024.

PROFESSIONAL SERVICE

Journal Reviewer:

· ACM Computing Surveys 2024

· International Journal of Computer Vision 2023, 2024

· IEEE Transactions on Image Processing 2023

· Forensic Science International: Digital Investigation 2023

· Journal of Imaging 2023

· IEEE Internet of Things Journal 2022, 2023

· Computers & Security 2022

· Transportation Research Part C 2022

· IEEE Transactions on Multimedia 2022

· Transactions on Machine Learning Research 2022, 2023

· Machine Intelligence Research 2022

· Neurocomputing 2021

· Journal of Big Data Research 2020

Conference:

– *Organizing Committee:*

∗ *Program Chair*:

· The 7th IEEE International Conference on Multimedia Information Processing and Retrieval (MIPR) 2024

· The 1st Workshop on New Trends in AI-Generated Media and Security (AIMS) 2024

∗ *Member*:

· The 20th edition of the IEEE International Conference on Advanced Video and Signal-Based Surveillance (AVSS) 2024

– *Area Chair:*

· International Conference on Advanced Video and Signal-Based Surveillance (AVSS) 2023

– *Reviewer and PC Member:*

· The European Conference on Computer Vision (ECCV) 2024

· IEEE/CVF Winter Conference on Applications of Computer Vision (WACV) 2024

· International Conference on Neural Information Processing (ICONIP) 2023

· European Conference on Artificial Intelligence (ECAI) 2023

· International Conference on Multimedia Information Processing and Retrieval (MIPR) 2022, 2023

· International Conference on Computer Vision (ICCV) 2023

· The Conference on Uncertainty in Artificial Intelligence (UAI) 2023, 2024

· IEEE International Conference on Multimedia and Expo (ICME) 2023

· International Joint Conference on Artificial Intelligence (IJCAI) 2023, 2024

· The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2023, 2024

· International Conference on Machine Learning (ICML) 2022-2024

· International Conference on Artificial Intelligence and Statistics (AISTATS) 2022

· International Conference on Learning Representations (ICLR) 2022-2024

· AAAI Conference on Artificial Intelligence (AAAI) 2022-2024

· Conference on Neural Information Processing Systems (NeurIPS) 2021-2024

Workshop PC Member:

· AI City Challenge (CVPR Workshop) 2023

PUBLICATIONS

🎓**Google Scholar**: https://scholar.google.com/citations?user=q4qu28QAAAAJ&hl=en

DBLP: https://dblp.org/pid/169/9795.html

ORCID: https://orcid.org/0000-0003-1446-4140

(**My students are highlighted in red**, **Shu serving as the corresponding author is highlighted in blue**)

Refereed Journal Articles

1. [**Electronics**] Peng Zheng, Hao Chen, **Shu Hu**, Bin Zhu, Jinrong Hu, Ching-Sheng Lin, Xi Wu, Siwei Lyu, Guo Huang, Xin Wang. Few-shot Learning for Misinformation Detection based on Contrastive Models. Electronics. 2024, 2. (Impact Factor: 2.9).
2. [**IEEE TPAMI**] **Shu Hu**, Xin Wang, Siwei Lyu. Rank-based Decomposable Losses in Machine Learning: A Survey. IEEE Transactions on Pattern Analysis and Machine Intelligence. 2023, 7. (Impact Factor: 23.6).

3. [**IEEE ACCESS'23**] Jing Hu, Zhikun Shuai, Xin Wang, **Shu Hu**, Shanhui Sun, Siwei Lyu, Xi Wu. Attention Guided Policy Optimization for 3D Medical Image Registration. IEEE Access. 2023, 4. (Impact Factor: 3.9).

4. [**FRONTIERS'23**] Yi Lu, Bin Kong, Feng Gao, Kunlin Cao, Siwei Lyu, Shaoting Zhang, **Shu Hu**, Youbing Yin, Xin Wang. Attention-driven tree-structured convolutional LSTM for high dimensional data understanding. Frontiers in Physics. 2023, 3. (Impact Factor: 3.1).

5. [**PR'22**] Wenbo Pu, Jing Hu, Xin Wang, Yuezun Li, **Shu Hu**, Bin Zhu, Qi Song, Xi Wu, Siwei Lyu. Learning a Deep Dual-level Network for Robust DeepFake Detection. Pattern Recognition. 2022, 6. (Impact Factor: 8).

6. [**JMLR'22**] **Shu Hu**, Yiming Ying, Xin Wang, and Siwei Lyu. Sum of Ranked Range Loss for Supervised Learning. Journal of Machine Learning Research. 2022, 4. (Impact Factor: 3.654).

7. [**IEEE ACCESS'22**] Hui Guo, **Shu Hu**, Xin Wang, Ming-Ching Chang, and Siwei Lyu. Robust Attentive Deep Neural Network for Exposing GAN-Generated Faces. IEEE Access. 2022, 2. (Impact Factor: 3.9).

8. [**Computer Networks'22**] Chonghua Wang, Hao Zhou, Zhiqiang Hao, **Shu Hu**, Jun Li, Xueying Zhang, Bo Jiang, and Xuehong Chen. Network Traffic Analysis Over Clustering-based Collective Anomaly Detection. Computer Networks, 2022. (Impact Factor: 5.6).

9. [**TCBB'16**] Thuc Duy Le, Tao Hoang, Jiuyong Li, Lin Liu, Huawen Liu, **Shu Hu**. A fast PC algorithm for high dimensional causal discovery with multi-core PCs. IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2016. (Impact Factor: 4.5).

10. [**AMM'14**] Yang Shu, **Shu Hu**. An Sample Analysis of Heavy Metal Pollution to Urban Surface Soil Based on Transfer Function Theory. Applied Mechanics and Materials, Volumes 446-447, 1516-1522, 2014. (Impact Factor: 0.3).

Refereed Conference Papers

1. [**IJCNN'24**] Tiewen Chen, Shanmin Yang, **Shu Hu**, Zhenghan Fang, Ying Fu, Xi Wu, and Xin Wang. Masked Conditional Diffusion Model for Enhancing Deepfake Detection. The International Joint Conference on Neural Networks, YOKOHAMA, JAPAN, 2024, 6.

2. [**IJCNN'24**] Yicui Peng, Hao Chen, Chingsheng Lin, Guo Huang, Jinrong Hu, Hui Guo, Bin Kong, **Shu Hu**, Xi Wu, and Xin Wang. Uncertainty-Aware Explainable Recommendation with Large Language Models. The International Joint Conference on Neural Networks, YOKOHAMA, JAPAN, 2024, 6.

3. [**IJCNN'24**] Chengxu Wu, Qinrui Fan, **Shu Hu**, Xi Wu, Xin Wang, and Jing Hu. Efficient Image Super-Resolution via Symmetric Visual Attention Network. The International Joint Conference on Neural Networks, YOKOHAMA, JAPAN, 2024, 6.

4. [**IJCNN'24**] Lei Zhang, Hao Chen, **Shu Hu**, Bin Zhu, Xi Wu, Jinrong Hu, and Xin Wang. X-Transfer: A Transfer Learning-Based Framework for Robust GAN-Generated Fake Image Detection. The International Joint Conference on Neural Networks, YOKOHAMA, JAPAN, 2024, 6.

5. [**CVPR'24**] Li Lin, Xinan He, Yan Ju, Xin Wang, Feng Ding, and **Shu Hu**. Preserving Fairness Generalization in Deepfake Detection. The IEEE/CVF Conference on Computer Vision and Pattern Recognition, Seattle, USA, 2024, 6. (Acceptance rate 23.6% of 11,532 submissions)

6. [**ISBI'24**] Jing Hu, Qinrui Fan, **Shu Hu**, Siwei Lyu, and Xin Wang. UMedNeRF: Uncertainty-aware Single View Volumetric Rendering for Medical Neural Radiance Fields. 21st IEEE International Symposium on Biomedical Imaging, Athens, Greece, 2024, 5.

7. [**ICASSP'24**] Bing Fan, **Shu Hu**, and Feng Ding. Synthesizing Black-box Anti-forensics DeepFakes with High Visual Quality. 49th IEEE International Conference on Acoustics, Speech, and Signal Processing, Toronto, Ontario, Canada, 2024, 4. (Acceptance rate 45% of 5796 submissions)

8. [**WACV'24**] **Shu Hu**, Yan Ju, Shan Jia, George H. Chen, Siwei Lyu. Improving Fairness in Deepfake Detection. IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Waikoloa, Hawaii, USA, 2024, 1. (Acceptance rate 41.7% of 2041 submissions)

9. [**ACML'23**] **Shu Hu**, Zhenhuan Yang, Xin Wang, Yiming Ying, Siwei Lyu. Outlier Robust Adversarial Training. The 15th Asian Conference on Machine Learning (ACML), İstanbul, Turkey, 2023, 11. (Acceptance rate 35% of 333 submissions)

10. [**ECAI'23**] Xin Wang, Hui Guo, **Shu Hu**, Ming-Ching Chang, Siwei Lyu. GAN-generated Faces Detection: A Survey and New Perspectives. 26th European Conference on Artificial Intelligence (ECAI), Kraków, Poland, 2023, 10. (Acceptance rate 24% of 1631 submissions)

11. [**IROS'23**] Yanfei Xiang, Xin Wang, **Shu Hu**, Bin Zhu, Xiaomeng Huang, Xi Wu, Siwei Lyu. RM-Bench: Benchmarking Deep Reinforcement Learning for Robotic Manipulator Control. The 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Detroit, Michigan, USA, 2023, 10. (Acceptance rate 43.3% of 2760 submissions).

12. [**MIPR'23**] Bing Fan, Zihan Jiang, **Shu Hu**, Feng Ding. Attacking Identity Semantics in DeepFakes via Deep Feature Fusion. IEEE 6th International Conference on Multimedia Information Processing and Retrieval (MIPR), Singapore, 2023, 9. (Invited Papers Track).

13. [**IJCAI'23**] Chengming Feng, Jing Hu, Xin Wang, **Shu Hu**, Bin Zhu, Xi Wu, Hongtu Zhu, Siwei Lyu. Style-SAEC: A Light-weight Reinforcement Learning Model for Step-wise Neural Style Transfer. The 32nd International Joint Conference on Artificial Intelligence, Macao, S.A.R, 2023, 4. (Acceptance rate 15% of 4566 submissions).

14. [**ML4H'22**] **Shu Hu** and George H. Chen. Distributionally Robust Survival Analysis: A Novel Fairness Loss Without Demographics. Proceedings of 2nd Machine Learning for Health symposium 2022 (ML4H 2022), PMLR volume, Issn: 2640-3498. New Orleans, 2022, 11. (Acceptance rate 32.2% of 87 submissions)

15. [**UAI'22**] Zhenhuan Yang, **Shu Hu**, Yunwen Lei, Kush Varshney, Siwei Lyu, Yiming Ying. Differentially Private SGDA for Minimax Problems. The 38th Conference on Uncertainty in Artificial Intelligence, Eindhoven, the Netherlands, 2022, 8. (Acceptance rate 32.3% of 712 submissions).

16. [**ICME'22**] Dizhong Lin, Ying Fu, Xin Wang, **Shu Hu**, Bin Zhu, Qi Song, Xi Wu, Jilin Zhou and Siwei Lyu. Contrastive Class-specific Encoding For Few-shot Object Detection. IEEE International Conference on Multimedia and Expo, Taipei, Taiwan, 2022, 7. (Acceptance rate 29% of 1,300 submissions).

17. [**ICASSP'22**] Hui Guo, **Shu Hu**, Xin Wang, Ming-Ching Chang, and Siwei Lyu. Eyes Tell All: Irregular Pupil Shapes Reveal GAN-generated Faces. 47th IEEE International Conference on Acoustics, Speech, and Signal Processing, Toronto, Ontario, Canada, 2022, 1. (Acceptance rate 1785/3967≈45%).

18. [**AAAI'22**] Ziwei Luo, Jing Hu, Xin Wang, **Shu Hu**, Bin Kong, Youbing Yin, Qi Song, Xi Wu and Siwei Lyu. Stochastic Planner-Actor-Critic for Unsupervised Deformable Image Registration. AAAI Conference on Artificial Intelligence, Vancouver, BC, Canada, 2022, 2. (Acceptance rate 1349/9020≈15%).

19. [**ICCV'21**] **Shu Hu**, Lipeng Ke, Xin Wang, and Siwei Lyu. T_kML-AP: Adversarial Attacks to Top-k Multi-Label Learning. International Conference on Computer Vision, Montreal, Canada, 2021, 10. (Acceptance rate 1617/6236≈25.9%).

20. [**IJCB'21**] (as a participating team). NIR Iris Challenge Evaluation in Non-cooperative Environments: Segmentation and Localization. International Joint Conference on Biometrics, Shenzhen, China, 2021, 8. (Acceptance rate 66/164≈40.2%).

21. [**ICASSP'21**] **Shu Hu**, Yuezun Li, Siwei Lyu. Exposing GAN-generated Faces Using Inconsistent Corneal Specular Highlights. 46th IEEE International Conference on Acoustics, Speech, and Signal Processing, Toronto, Ontario, Canada, 2021, 1. (Acceptance rate 1734/3610≈48%).

22. [**NeurIPS'20**] **Shu Hu**, Yiming Ying, Xin Wang, and Siwei Lyu. Learning by minimizing the sum of ranked range. Thirty-fourth Conference on Neural Information Processing Systems, Montreal, QC, Canada, 2020, 9. (Acceptance rate 1900/9454≈20.07%).

23. [**NeurIPS'20**] Xujiang Zhao, Feng Chen, **Shu Hu**, Jin-Hee Cho. Uncertainty Aware Semi-Supervised Learning on Graph Data. Thirty-fourth Conference on Neural Information Processing Systems, Montreal, QC, Canada, 2020, 9. ((***Spotlight***), Acceptance rate 280/9454≈3%).

24. [**FUSION'19**] Xujiang Zhao, **Shu Hu**, Feng Chen Jin-Hee Cho. Uncertainty-based Decision Making Using Deep Reinforcement Learning. International Conference on Information Fusion, 2019, 7.

25. [**PAKDD'18**] Thuc Duy Le, Taosheng Xu, Lin Liu, **Hu Shu**, Tao Hoang, Jiuyong Li. ParallelPC: An R Package for Efficient Causal Exploration in Genomic Data. Pacific-Asia Conference on Knowledge Discovery and Data Mining, 2018, 6.

26. [**CSBio'17**] Thuc Duy Le, Junpeng Zhang, Lin Liu, Buu Minh Thanh Truong, **Shu Hu**, Taosheng Xu, Jiuyong Li. Identifying microRNA targets in epithelial-mesenchymal transition using joint-intervention causal inference. Computational Systems-Biology and Bioinformatics, 2017, 8.

Workshop and Demo Papers

1. [**CVPRW'23**] (as a participating team). NTIRE 2023 challenge on efficient super-resolution: Methods and results. The CVPR 2023 Workshop, 2023, 4.

2. [**CVPRW'23**] Hao Chen, Peng Zheng, Xin Wang, **Shu Hu**, Bin Zhu, Jinrong Hu, Xi Wu, Siwei Lyu. Harnessing the Power of Text-image Contrastive Models for Automatic Detection of Online Misinformation. The CVPR 2023 Workshop on Media Forensics (WMF), 2023, 4.

3. [**CVPRW'22**] **Shu Hu**, Chun-Hao Liu, Jayanta Dutta, Ming-Ching Chang, Siwei Lyu, and Naveen Ramakrishnan. PseudoProp: Robust Pseudo-Label Generation for Semi-Supervised Video Object Detection. The CVPR 2022 Workshop on Autonomous Driving (WAD), 2022, 4.

4. [**MIPR'22**] Hui Guo, **Shu Hu**, Xin Wang, Ming-Ching Chang, and Siwei Lyu. Open-Eye: An Open Platform to Study Human Performance on Identifying AI-Synthesized Faces. IEEE 5th International Conference on Multimedia Information Processing and Retrieval (MIPR), 2022, 8.

TALKS

- School of Software, Nanchang University, 2023, 11.
- Purdue School of Engineering & Technology, Indiana University–Purdue University Indianapolis (IUPUI), 2023, 4.
- College of Engineering and Applied Sciences, University at Albany (UAlbany), SUNY, 2023, 3.
- Gianforte School of Computing, Montana State University (MSU), 2023, 3.
- Department of Computer Science and Engineering, University of North Texas (UNT), 2023, 2.
- Computer Science Department, University of Mississippi (Ole Miss), 2023, 2.
- Computer Science Department, The University of Memphis (UM), 2023, 2.

- School of Information, Rochester Institute of Technology (RIT), 2022, 4.
- Computer Science Department, Texas State University (TSU), 2022, 4.

PATENTS

1. SYSTEM AND METHOD FOR ROBUST PSEUDO-LABEL GENERATION FOR SEMI-SUPERVISED OBJECT DETECTION. US Patent 20230244924 (A1), 2023

MEDIA

1. (5/8/2024) New U.S. AI network aims to make supercomputers available to more researchers, *Science Magazine*.
2. (9/8/2021) How to Spot Synthetic Faces Online — the Clue Is in the Eyes, *DISCOVER Magazine*.
3. (9/10/2021) A way to spot computer-generated faces, *Tech Xplore*.
4. (3/15/2021) Mother 'used deepfake to frame cheerleading rivals', *BBC*.
5. (3/16/2021) What are deepfake images and how can you spot them? *WKBW-TV*.
6. (3/17/2021) ALGORITHM DETECTS DEEPFAKES BY ANALYZING REFLECTIONS IN EYES CAN YOU SPOT THE DIFFERENCE? *Futurism*.
7. (3/12/2021) Deepfakes can be detected by analyzing light reflections in eyes, scientists say. *CNET*.

ADVISEMENT

Current Students

1. Li Lin, Ph.D. student at Purdue University.
2. Mei Qiu, Ph.D. student at Purdue University
3. Santosh Fnu, Master student at Purdue University
4. Yamini Sri Krubha, Undergraduate student at Purdue University

Graduated Students Advised

1. Neeraj Gupta, Master student at Purdue University in Indianapolis, 2023
2. Sarah Papabathini, Undergraduate student at Purdue University, 2024