Chirag Agarwal

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Education

University of Illinois at Chicago — Chicago, IL
Ph.D. in Electrical and Computer Engineering — 2020

- Committee: Dr. Dan Schonfeld, Dr. Bharati Prasad, Dr. Mojtaba Soltanalian, Dr. Piotr Gmytrasiewicz, Dr. Anh Nguyen
- Thesis: "Robustness and Explainability of Deep Neural Networks"

University of Illinois at Chicago — Chicago, IL
M.S. in Electrical and Computer Engineering — 2018

- Project: Fall detection in elderly patients

Future Institute of Engineering and Management — Kolkata, India
B.Tech in Electronics and Communication Engineering — 2012

- Project: Finger-print Recognition using Fourier Transform

Experience

Adobe — Noida, IN
Research Scientist — 2022 –Current

Harvard University — Boston, MA
Postdoctoral Fellow — 2020 –2022
Advisor: Dr. Marinka Zitnik and Dr. Hima Lakkaraju

Auburn University — Auburn, AL
Research Assistant — Summer 2019
Advisor: Dr. Anh Nguyen

Robert Bosch LLC — Sunnyvale, CA
Computer Vision/Augmented Reality Intern — Summer 2018

Tempus labs Inc. — Chicago, IL
Imaging Science Intern — Spring 2018

Kitware Inc. — Clifton Park, NY
Research and Development Intern — Summer 2017

Geisinger Health Systems — Danville, PA
Research Intern — Summer 2016

Publications

Articles in peer-reviewed Journals

1. **C. Agarwal**, S. Gupta, M. Y. Najjar, T. E. Weaver, X. J. Zhou, D. Schonfeld, B. Prasad: Deep Learning Analyses of Brain MRI to Identify Sleepiness in Treated Obstructive Sleep Apnea: A Pilot Study, *Journal of Sleep and Vigilance (JSV), 2022*

2. B. Prasad*, **C. Agarwal***, E. Schonfeld, D. Schonfeld, B. Mokhlesi: Deep learning applied to polysomnography to predict blood pressure in obstructive sleep apnea and obesity hypoventilation: A proof-of-concept study, *Journal of Clinical Sleep Medicine (JCSM), 2020*

3. **C. Agarwal**, J. Klobusicky, D. Schonfeld: Convergence of backpropagation with momentum for network architectures with skip connections, *Journal of Computational Mathematics (JCM), 2019*

4. E. Cha, Y. Veturi, **C. Agarwal**, M. Arbabshirani, S. Pendergrass: Using Adipose Measures from Electronic Health Record Imaging Based Data for Discovery, *Journal of Obesity, 2018*

Articles in peer-reviewed conference proceedings

1. **C. Agarwal**, M. Zitnik, H. Lakkaraju: Probing GNN Explainers: A Rigorous Theoretical and Empirical Analysis of GNN Explanation Methods, *International Conference on Artificial Intelligence and Statistics (AISTATS), 2022* – Acceptance rate ($\sim 29\%$)

2. M. Pawelczyk, **C. Agarwal**, S. Joshi, S. Upadhyay, H. Lakkaraju: Exploring Counterfactual Explanations Through the Lens of Adversarial Examples: A Theoretical and Empirical Analysis, *International Conference on Artificial Intelligence and Statistics (AISTATS), 2022* – Acceptance rate ($\sim 29\%$)

3. **C. Agarwal**, H. Lakkaraju, M. Zitnik: Towards a Unified Framework for Fair and Stable Graph Representation Learning, *Conference on Uncertainty in Artificial Intelligence (UAI), 2021* – Acceptance rate ($\sim 26\%$)

4. S. Agarwal, S. Jabbari, **C. Agarwal**, S. Upadhyay, Z. S. Wu, H. Lakkaraju: Towards the Unification and Robustness of Perturbation and Gradient Based Explanations, *International Conference on Machine Learning (ICML), 2021* – Acceptance rate ($\sim 21\%$)

5. **C. Agarwal***, S. Khobahi*, D. Schonfeld, M. Soltanalian: CoroNet: A Deep Network Architecture for Semi-Supervised Task-Based Identification of COVID-19 from Chest X-ray Images, *SPIE Medical Imaging, 2021*

6. **C. Agarwal**, A. Nguyen: Explaining image classifiers by removing input features using generative models , *Asian Conference on Computer Vision (ACCV), 2020* – Acceptance rate ($\sim 33\%$)

7. N. Bansal*, **C. Agarwal***, A. Nguyen*: SAM: The Sensitivity of Interpretability Methods to Hyperparameters, *Conference on Computer Vision and Pattern Recognition (CVPR), 2020* – Oral presentation ($\sim 5\%$)

8. **C. Agarwal**, S. Khobahi, A. Bose, M. Soltanalian, D. Schonfeld: Deep-URL: A Model-Aware Approach To Blind Deconvolution Based On Deep Unfolded Richardson-Lucy Network, *IEEE Conference on Image Processing (ICIP), 2020* – Acceptance rate ($\sim 42\%$)

9. **C. Agarwal**, A. Nguyen, D. Schonfeld: Improving Robustness to Adversarial Examples by Encouraging Discriminative Features, *IEEE Conference on Image Processing (ICIP), 2019* – Spotlight (top $\sim 10\%$)

10. M. Aloraini, M. Sharifzadeh, **C. Agarwal**, D. Schonfeld: Statistical Sequential Analysis for Object-based Video Forgery Detection, *Electronic Imaging, 2019*

11. N. Khobragade*, **C. Agarwal***: Multi-class segmentation of neuronal electron microscopy images using deep learning, *SPIE Medical Imaging, 2018*

12. **C. Agarwal**, M. Sharifzadeh, D. Schonfeld: CrossEncoders: A complex neural network compression framework, *IST International Symposium on Electronic Imaging, 2018*

13. M. Sharifzadeh, **C. Agarwal**, M. Aloraini, D. Schonfeld: Convolutional neural network steganalysis's application to steganography, *IEEE Visual Communications and Image Processing (VCIP), 2017*

14. **C. Agarwal**, A.H. Dallal, M.R. Arbabshirani, A. Patel, G. Moore: Unsupervised quantification of abdominal fat from CT images using Greedy Snakes, *SPIE Medical Imaging, 2017*

15. A.H. Dallal, **C. Agarwal**, M.R. Arbabshirani, A. Patel, G. Moore: Automatic estimation of heart boundaries and cardiothoracic ratio from chest X-ray images, *SPIE Medical Imaging, 2017*

16. M.R. Arbabshirani, A.H. Dallal, **C. Agarwal**, A. Patel, G. Moore: Accurate segmentation of lung fields on chest radiographs using deep convolutional networks, *SPIE Medical Imaging, 2017*

17. **C. Agarwal**, A. Bose, S. Maiti, N. Islam, S.K. Sarkar: Enhanced data hiding method using DWT based on Saliency model, *IEEE International Conference on Signal Processing, Computing and Control (ISPCC), 2013*

18. S. Maiti, **C. Agarwal**, A. Bose, S.K. Sarkar: Robust data hiding technique in wavelet domain using saliency map, *International Journal of Advances in Engineering and Technology, 2013*

19. N. Islam S. Maiti, A. Bose, **C. Agarwal**, S. K. Sarkar: An Improved Method of Pre-Filter Based Image Watermarking in DWT Domain, *International Journal of Computer Science and Technology, 2013*

Articles in peer-reviewed workshop proceedings

1. **C. Agarwal**, M. Zitink, H. Lakkaraju: Towards a Unified Framework for Fair and Stable Graph Representation Learning, *Workshop on Socially Responsible Machine Learning, ICML, 2021*

2. **C. Agarwal**, H. Lakkaraju, M. Zitink: Towards a Rigorous Theoretical Analysis and Evaluation of GNN Explanations, *Workshop on Theoretic Foundation, Criticism, and Application Trend of Explainable AI, ICML, 2021*

3. M. Pawelczyk, S. Joshi, **C. Agarwal**, S. Upadhyay, H. Lakkaraju: On the Connections between Counterfactual Explanations and Adversarial Examples, *Workshop on Theoretic Foundation, Criticism, and Application Trend of Explainable AI, ICML, 2021*

4. D. D'Souza, Z. Nussbaum, **C. Agarwal**, S. Hooker: A Tale Of Two Long Tails, *Workshop on Uncertainty Robustness in Deep Learning, ICML, 2021*

5. A novel representation of electrocardiogram waveforms for enhancing deep learning predictions H. Honarvar, **C. Agarwal**, S. Somani, A. Vaid, J. Lampert, T. Wanyan, V. Y. Reddy, G. N. Nadkarni, R. Miotto1, M. Zitnik, F. Wang, B. S. Glicksberg: A novel representation of electrocardiogram waveforms for enhancing deep learning predictions, *Workshop on Interpretable Machine Learning in Healthcare, ICML, 2021*

6. **C. Agarwal***, S. Hooker*: Estimating Example Difficulty using Variance of Gradients, *Workshop on Human Interpretability in Machine Learning (WHI), ICML, 2020* – Poster Presentation

7. **C. Agarwal***, P. Chen*, A. Nguyen: Intriguing generalization and simplicity of adversarially trained neural networks, *Workshop on Human Interpretability in Machine Learning (WHI), ICML, 2020* – Spotlight Presentation

Preprints

1. **C. Agarwal**, B. Dong, D. Schonfeld, A. Hoogs: An explainable adversarial robustness metric for deep learning neural networks, *arXiv, 2018*

2. M. Sharifzadeh, **C. Agarwal**, M. Salarian, D. Schonfeld: A new parallel message-distribution technique for cost-based steganography, *arXiv, 2017*

Teaching

- **Joint Instructor** at Harvard University — Spring 2021
  Course on Interpretability and Explainability in Machine Learning
- **Teaching Assistant** at University of Illinois at Chicago — Fall 2014 – Spring 2020
  Pattern Recognition (ECE 407), Image Analysis and Computer Vision I (ECE 415), Digital Signal Processing (ECE 417), Multimedia Systems (ECE 434), Image Analysis and Computer Vision II (ECE 515), Neural Networks (ECE 559)

Skills

- **Machine Learning Libraries:** scikit-learn; numpy; pandas
- **Languages:** Python
- **Deep Learning Libraries:** PyTorch; PyTorch-Geometric

Awards

- AI for Social Good Google Workshop with Dr. Marinka Zitnik and Dr. Hima Lakkaraju (US $10,000) Jan, 2021
- Research Proposal accepted by Google Cloud Platform (US $1,000) May, 2020
- Research Proposal accepted by Google Cloud Platform (US $1,000) September, 2020
- Finalist for the Deans Scholarship Award at UIC 2018, 2019

Invited Talks

- Guest Lecture in Interpretability & Explainability course at Harvard 2021
- 2d3d.ai 2021
- Weights & Biases Salon 2020

Community Service

Organizer:

- Presented a tutorial at FAccT on "Limitations of Explainability Methods in ML" 2021
- Journal Club at University of Illinois at Chicago 2017–2018
- MATLAB workshop at University of Illinois at Chicago 2016

Program Committee:

- Workshop on Socially Responsible Machine Learning, ICML 2021
- Workshop on Security and Safety in Machine Learning Systems, ICLR 2021
- Workshop on Adversarial Robustness in the Real World (AROW), ECCV 2020,2021
- Workshop on Human Interpretability (WHI) in Machine Learning, ICML 2020

Reviewer:

- ICLR 2022
- NeurIPS 2021
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2021
- International Conference on Machine Learning – ICML 2021
- SN Computer Science – Springer Nature 2020
- Entropy 2020