Sanghack Lee, Ph.D.

Contact Information

Department of Computer Science
Columbia University
New York, NY 10027, USA

+1-515-509-6047
sanghacklee@cs.columbia.edu
sanghack.lee@gmail.com

Research Interests

Causal inference and causal discovery in a propositional or relational setting. Sequential decision making problems from the aspect of causality. Practical causal modeling for common sense. Incorporating game theory and irrationality into a causal framework.

Employment

Columbia University, New York

Associate Research Scientist, Computer Science **2019 – present**

Investigating ranges of causality problems from classical causal inference to its application to sequential decision making.

Education

Purdue University

Postdoctoral Research Associate, Computer Science
Advisor: Prof. Elias Bareinboim **2018 – 2019**

Pennsylvania State University, University Park

Ph.D., College of Information Sciences and Technology
Advisor: Prof. Vasant G. Honavar **2018**

Sogang University, Seoul, Republic of Korea

MS., Computer Science and Engineering **2006**
BE., Computer Science and Engineering, *Cum Laude* **2004**

Publications

$*$ for equally contributed authors.

Sanghack Lee and Elias Bareinboim (2020). Characterizing Optimal Mixed Policies: Where to Intervene and What to Observe. In *Advances in Neural Information Processing Systems 33 (NeurIPS 2020)*

Sanghack Lee and Elias Bareinboim (2020). Causal Effect Identifiability under Partial Observability. In *Proceedings of the 37th International Conference on Machine Learning (ICML 2020)*

Sanghack Lee, Juan D. Correa, and Elias Bareinboim (2020). General Transportability — Synthesizing Observations and Experiments from Heterogeneous Domains. In *Proceedings of Thirty-fourth Conference on AAAI Conference on Artificial Intelligence (AAAI 2020)*

Sanghack Lee, Juan D. Correa, and Elias Bareinboim (2020). Identifiability from a Combination of Observations and Experiments. In *Proceedings of Thirty-fourth Conference on AAAI Conference on Artificial Intelligence (AAAI 2020)*

Sanghack Lee, Juan D. Correa, and Elias Bareinboim (2019). General Identifiability with Arbitrary Surrogate Experiments. In *Proceedings of Thirty-fifth Conference on Uncertainty in Artificial Intelligence (UAI 2019)* Best Paper Award

Sanghack Lee and Vasant Honavar (2019). Towards Robust Relational Causal Discovery . In *Proceedings of Thirty-fifth Conference on Uncertainty in Artificial Intelligence (UAI 2019)*

Aria Khademi, **Sanghack Lee**, David Foley, Vasant Honavar (2019). Fairness in Algorithmic Decision Making: An Excursion Through the Lens of Causality. In *Proceedings of 2019 International Conference on World-Wide Web (WWW 2019)*

Sanghack Lee and Elias Bareinboim (2019). Structural Causal Bandits with Non-manipulable Variables. In *Proceedings of Thirty-third AAAI Conference on Artificial Intelligence (AAAI 2019)*

Sanghack Lee and Elias Bareinboim (2018). Structural Causal Bandits: Where to Intervene?. *In Advances in Neural Information Processing Systems 31 (NeurIPS 2018)*

Sanghack Lee and Vasant Honavar (2017). Self-Discrepancy Conditional Independence Test. In *Proceedings of Thirty-third Conference on Uncertainty in Artificial Intelligence (UAI 2017)*

Sanghack Lee and Vasant Honavar (2017). A Kernel Conditional Independence Test for Relational Data. In *Proceedings of Thirty-third Conference on Uncertainty in Artificial Intelligence (UAI 2017)*

Sanghack Lee and Vasant Honavar (2016). A Characterization of Markov Equivalence Classes of Relational Causal Models under Path Semantics. In *Proceedings of Thirty-second Conference on Uncertainty in Artificial Intelligence (UAI 2016)*. 387–396

Kyungsik Han, **Sanghack Lee**, Jin Yea Jang, Yong Jung, and Dongwon Lee (2016). "Teens are from Mars, Adults are from Venus": Analyzing and Predicting Age Groups with Behavioral Characteristics in Instagram. In *Proceedings of Eighth International ACM Web Science Conference 2016 (WebSci 2016).* 35–44

Sanghack Lee and Vasant Honavar (2016). On Learning Causal Models for Relational Data. In *Proceedings of Thirtieth Conference on Artificial Intelligence (AAAI 2016)*. 3263–3270

Sanghack Lee and Vasant Honavar (2015). Lifted Representation of Relational Causal Models Revisited: Implications for Reasoning and Structure Learning. In *Proceedings of the UAI 2015 Workshop on Advances in Causal Inference co-located with the 31st Conference on Uncertainty in Artificial Intelligence (UAI 2015).* 56–65

Elias Bareinboim*, **Sanghack Lee***, Vasant Honavar, and Judea Pearl (2013). Transportability from Multiple Environments with Limited Experiments. In Advances in Neural Information Processing 26 (NeurIPS 2013), 136–144

Sanghack Lee and Vasant Honavar (2013). *m*-Transportability: Transportability of a Causal Effect from Multiple Environments. In *Proceedings of the Twenty-seventh Conference on Artificial Intelligence (AAAI 2013)*. 583–590

Sanghack Lee and Vasant Honavar (2013). Causal Transportability of Experiments on Controllable Subsets of Variables: *z*-Transportability. In *Proceedings of the Twenty-ninth Conference on Uncertainty in Artificial Intelligence (UAI 2013)*. 361–370

Harris Lin*, **Sanghack Lee***, Ngot Bui* and Vasant Honavar (2013). Learning Classifiers from Distributional Data. In IEEE Second International Congress on Big Data. 302–309

Sanghack Lee, Jihoon Yang and Sungyong Park (2006). A New Polynomial Time Algorithm for Bayesian Network Structure Learning. Advanced Data Mining and Applications, Second International Conference (ADMA 2006): Springer, Lecture Notes in Computer Science, Vol. 4093. 501-508.

Sanghack Lee, Jihoon Yang and Sung-Yong Park (2004). Discovery of Hidden Similarity on Collaborative Filtering to Overcome Sparsity Problem. Discovery Science 2004 (DS 2004): Springer, Lecture Notes in Computer Science, Vol. 3245 396-402.

Talks, Tutorials, Posters

- Summer AI Seminar Series at POSTECH (Aug, 2020) (Pohang, South Korea), invited talk
- ICML'2020 (Virtual), poster
- AAAI'2020 (New York, NY), talk
- AAAI'2020 (New York, NY), invited talk
- UAI'2019 (Tel Aviv, Israel), talk (*)
- IJCAI'2019 (Macau), "Causal Reinforcement Learning", tutorial (*)

- ISysE Seminar at KAIST (Apr, 2019) (Daejeon, South Korea), invited talk
- AAAI'2019 (Hawaii), talk
- NeurIPS'2018 (Montreal, Canada), poster
- Causality workshop at UAI'2017 (Sydney, Australia), talk
- UAI'2017 (Sydney, Australia), two posters
- UAI'2016 (Jersey City, NJ), talk
- AAAI'2016 (Phoenix, AZ), talk
- Causality workshop at UAI'2015 (Amsterdam, Netherlands), poster
- AAAI'2013 (Bellevue, WA), talk
- UAI'2013 (Bellevue, WA), poster

* someone else substituted for me.

Professional Service

Program Committee / Reviewers

- 2021 ICLR, AAAI, AISTATS, UAI
- 2020 NeurIPS, UAI, ICML (Top Reviewer Award), AAAI, AISTATS, TPAMI, Journal of Artificial Intelligence (AIJ), Journal of Causal Inference (JCI), NeurIPS Workshop on Causal Discovery and Causality-Inspired Machine Learning (CDML, Area Chair)
- 2019 NeurIPS (Best Reviewer Award), JMLR, WHY conference
- 2017 Causality Workshop at UAI
- 2016 ACM CHI
- 2014 ACM TIST Special Issue on Causal Discovery and Inference

External Reviews

- FODS 2020, Statistical Science, IJCAI 2019, ICML 2019, NeurIPS 2018

Industrial Experience

Senior Engineer at **Diquest, inc.**, Seoul, South Korea **February 2006 to June 2009**

Development and maintenance of an enterprise search engine

Research Experience

Associate Research Scientist, Columbia University **July 2019 – Present**

Post-doctoral Research Associate, Purdue University **2018 – June 2019**

Research Assistant, Pennsylvania State University **2013 – 2014**, **2015 – 2018**

Research Assistant, Iowa State University **2011 – 2013**

Research Assistant, Sogang University **2005**

Teaching Experience

Guest Lecture, Purdue University

Structural Causal Bandits (Advanced Machine Learning, Spring 2019), Counterfactual Bandits (Advanced Machine Learning, Spring 2019)

Graduate Teaching Assistant (Pennsylvania State University): Discrete Mathematics, Principles of Artificial Intelligence. (Iowa State University): Design and Analysis of Algorithms, Principles of Artificial Intelligence, Machine Learning, Object-Oriented Analysis and Design, Design and Analysis of Algorithms. (Sogang University): Java Language Programming, Personal Computer Laboratory I, Discrete Structures.

References

Dr. Vasant Honavar
Professor
Information Sciences and Technology,
Pennsylvania State University, USA
vhonavar@psu.edu

Dr. Elias Bareinboim
Associate Professor
Department of Computer Science
Columbia University, USA
eb@cs.columbia.edu

Dr. Jihoon Yang
Professor
Department of Computer Science
Sogang University, South Korea
yangjh@sogang.ac.kr

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