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## Academic Experience

2021 - Present **Computing Innovation Fellow Postdoctoral Researcher**, Department of Computer Science,  
The University of Chicago  
Advisor: Prof. Raul Castro Fernandez

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## Research Interests

Data Science, Causal Inference, Data Management, Probabilistic Methods, Algorithms

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## Education

2017 - 2021 **PhD in Computer Science**, University of Massachusetts Amherst, USA  
Advisor: Prof. Barna Saha  
Thesis title: Robust Algorithms for Clustering with Applications to Data Integration

2015 - 2017 **Masters in Computer Science**, University of Massachusetts Amherst, USA

2010 - 2014 **BTech in Computer Science and Engineering**, Indian Institute of Technology (IIT) Delhi, India  
Advisor: Prof. Amitabha Bagchi

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## Selected Awards and Honors

2021 Rising Star in Data Science at the Data Science Institute, UChicago

2021 Computing Innovation Fellowship Award Recipient (by CRA, CCC and NSF)

2021 DAAD AInet Fellow

2020 ACM SIGMOD Entity Resolution Programming Contest – Top 5 finalist

2018 PhD Candidate with Distinction

2018 Finalist for Adobe Fellowship

**2018 - 2019 Most reproducible paper award in SIGMOD 2018 and 2019**

**2017 Best paper award in SIGSOFT FSE 2017**

2016 First recipient of Krithi Ramamritham Computer Science Scholarship

2016 - 2018 SIGMOD Travel Award for three consecutive years

2014 - 2021 Travel Grants Awarded: VLDB 2021, CIKM 2020, VLDB 2020, SIGMOD 2019, EDBT 2019, AAAI 2018, and UAI 2014

2010 All India Rank 53 in IIT-JEE (of ~ 450K candidates)

2010 State Rank 1 and All India Rank 20 in AIEEE (of ~ 1M candidates)

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## Work Experience

Aug - Nov 2019 **Applied Scientist Intern**, Amazon, Seattle, USA  
Mentor: Dr. Xin Luna Dong  
Developed a novel deep-learning based entity linking approach that leveraged Amazon Knowledge Graph to identify product attributes from search queries.

May - Aug 2019 **Research Intern**, IBM T.J. Watson Research Center, Yorktown Heights, USA  
Mentor: Dr. Udayan Khurana  
Demonstrated use of external knowledge for feature enrichment with AutoML. Demo paper of this work was presented at CIKM 2020 and ICDM 2019.

May - Aug 2018 **Research Intern**, Megagon Labs, Mountain View, USA

Mentors: Dr. Wang-Chiew Tan & Dr. Behzad Golshan

Designed a scalable system to generate labelled training data with minimum human intervention. Demonstrated superior performance over a variety of NLP tasks. This work was published at SIGMOD 2021.

May - Aug 2016 **Research Intern**, Google Research, Mountain View, USA

Mentor: Dr. Steven Whang

Developed algorithms to recommend feature engineering services for billions of internal datasets

May 2014 - 2015 **Predoctoral Budding Scientist**, Xerox Research Center India (XRCI), Bangalore India

Member of Text and Graph Analytics team

Worked on data mining algorithms to reduce customer churn and validated it on various telecommunications providers.

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## Patents

- [1] Udayan Khurana, **Sainyam Galhotra**, Oktie Hassanzadeh, Kavitha Srinivas, Horst Samulowitz. Knowledge Aided Feature Engineering. USPTO Application Number: 16/741,084 2020.
- [2] **Sainyam Galhotra** and Narayanan Unny. Method and system to predict a communication channel for communication with a customer service. USPTO Application Number: 15/077,085, Filed: 2016.
- [3] Akhil Arora, Manoj Gupta, Neeta Pande, **Sainyam Galhotra**, Shourya Roy: System for Identifying Root Causes of Churn for Churn Prediction Refinement. USPTO Application Number: 15/132,767, Filed: 2016
- [4] Akhil Arora, **Sainyam Galhotra**, Srinivas Virinchi, Shourya Roy. Methods and Systems for Identifying Target Users of Content. USPTO Application Number: 14/628,070, Filed: 2015.

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## Refereed Conference and Journal Publications

### Articles Under Review

- [1] **Sainyam Galhotra**, Yue Gong and Raul Castro Fernandez. METAM: Goal-Oriented Automated Data Discovery. 2022.

### Articles published at conferences

- [2] Yue Gong, Zhiru Zhu, **Sainyam Galhotra**, and Raul Castro Fernandez. Ver: View Discovery in the Wild. IEEE International Conference on Data Engineering (ICDE) 2023.
- [3] **Sainyam Galhotra\***, Amir Gilad\*, Sudeepa Roy, and Babak Salimi. Hyper: Hypothetical Reasoning With What-If and How-To Queries Using a Probabilistic Causal Approach. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2022.
- [4] **Sainyam Galhotra**, Donatella Firmani, Barna Saha and Divesh Srivastava. Hierarchical Entity Resolution using an Oracle. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2022.
- [5] **Sainyam Galhotra**, Yue Gong, and Raul Castro Fernandez. Goal-oriented data discovery for effective analytics. IASSIST, 2022.
- [6] **Sainyam Galhotra**, Anna Fariha, Raoni Lourenco, Juliana Freire, Alexandra Meliou and Divesh Srivastava. DataPrism: Exposing Disconnect between Data and Systems. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2022.
- [7] **Sainyam Galhotra**, Karthikeyan Shanmugam, Prasanna Sattigeri and Kush R. Varshney. Causal Feature Selection for Algorithmic Fairness. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2022.
- [8] Suman Bera, Syamantak Das, **Sainyam Galhotra** and Sagar Kale. Fair k-Center in MPC and Streaming Settings. The WebConf WWW, 2022.

- [9] **Sainyam Galhotra**, Sandhya Saisubramanian and Shlomo Zilberstein. Learning to Generate Fair Clusters from Demonstrations. In Proc. of 4th ACM Conference on AI, Ethics, and Society (**AIES**), 2021.
- [10] **Sainyam Galhotra**, Romila Pradhan and Babak Salimi. Explaining Black-Box Algorithms Using Probabilistic Contrastive Counterfactuals. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2021.
- [11] **Sainyam Galhotra**, Donatella Firmani, Barna Saha and Divesh Srivastava. BEER: Blocking for Effective Entity Resolution. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), Demonstrations Track, 2021.
- [12] Paul Y Wang, **Sainyam Galhotra**, Romila Pradhan and Babak Salimi. Demonstration of Generating Explanations for Black-Box Algorithms Using Lewis. In **PVLDB**, Demonstrations Track, 2021.
- [13] Udayan Khurana and **Sainyam Galhotra**. Semantic Concept Annotation for Tabular Data. In Proc. of ACM International Conference on Information and Knowledge Management (**CIKM**), 2021.
- [14] **Sainyam Galhotra**, Behzad Golshan and Wang-Chiew Tan. Adaptive Rule Discovery for Labeling Text Data. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), Data Science and Engineering Track, 2021.
- [15] Raghavendra Addanki, **Sainyam Galhotra**, and Barna Saha. How to Design Robust Algorithms using Noisy Comparison Oracle. In **PVLDB**, 2021.
- [16] **Sainyam Galhotra** and Udayan Khurana. Semantic Search over structured data. In Proc. of Conference on Information and Knowledge Management (**CIKM**), Demonstrations Track, 2020.  
**Nomination: Best Demo Paper**
- [17] Sandhya Saisubramanian\*, **Sainyam Galhotra\*** and Shlomo Zilberstein. Balancing the Tradeoff Between Clustering Value and Interpretability. In Proc. of 3rd ACM Conference on AI, Ethics, and Society (**AIES**), 2020.
- [18] **Sainyam Galhotra**, Udayan Khurana, Oktie Hassanzadeh, Kavitha Srinivas, Horst Samulowitz, Miao Qi. Automated Feature Enhancement for Predictive Modeling using External Knowledge. In Proc. of International Conference on Data Mining (**ICDM**), Demonstrations Track, 2019.
- [19] **Sainyam Galhotra**, Soumyabrata Pal, Arya Mazumdar and Barna Saha. Connectivity in Random Annulus Graphs and the Geometric Block Model. In Proc. of International Conference on Randomization and Computation (**APPROX-RANDOM**), 2019.
- [20] **Sainyam Galhotra**, Donatella Firmani, Barna Saha and Divesh Srivastava. Robust Entity Resolution using Random Graphs. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), pages 3-18, 2018.  
**Most Reproducible Paper Award**
- [21] **Sainyam Galhotra**, Arya Mazumdar, Soumyabrata Pal and Barna Saha. The Geometric Block Model. In Proc. of the 32nd AAAI Conference on Artificial Intelligence (**AAAI**), 2018.
- [22] **Sainyam Galhotra**, Arya Mazumdar, Soumyabrata Pal and Barna Saha. The Geometric Block Model and Applications. In Proc. of Allerton Conference on Communication, Control, and Computing (Invited papers track), pages 1147-1150, 2018.
- [23] **Sainyam Galhotra**, Yuriy Brun and Alexandra Meliou. Fairness Testing: Testing Software for Discrimination. In Proc. of ACM SIGSOFT Foundations of Software Engineering (**ESEC/SIGSOFT FSE**), pages 498-510, 2017.  
**Best Paper Award**
- [24] Akhil Arora\*, **Sainyam Galhotra\*** and Sayan Ranu. Debunking the Myths of Influence Maximization. In Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2017.  
**Most Reproducible Paper Award**
- [25] **Sainyam Galhotra\***, Akhil Arora\* and Shourya Roy. Holistic IM: Combining Scalability and Efficiency with Opinion-Aware Models. In: Proc. of ACM International Conference on Management of Data (**SIGMOD**), 2016

- [26] Shourya Roy, Sandipan Dandapat, R. Mariappan, S Srivastava, **Sainyam Galhotra** and B. Peddamuthu.  $QA^{RT}$  : A System for Real-time Holistic Quality Assurance for Contact Center Dialogues. In Proc. of 30th AAAI Conference on Artificial Intelligence (**AAAI**), 2016.
- [27] **Sainyam Galhotra**, Amitabha Bagchi, Srikanta Bedathur, Maya Ramanath and Vidit Jain. Tracking the Conductance of Rapidly Evolving Topic-Subgraphs. In Proc. of International Conference on Very Large Databases (**VLDB**), 2015.
- [28] **Sainyam Galhotra**, Akhil Arora, Srinivas Virinchi and Shourya Roy. ASIM: A Scalable Algorithm for Influence Maximization under the Independent Cascade Model. In Proc. of ACM International Conference on World Wide Web (**WWW**), 2015 (Poster: Companion Volume)
- [29] STAR: Real-time Spatio-Temporal Analysis and Prediction of Traffic Insights using Social Media. In Proc. of ACM Joint International Conference on Data Science and Management of Data (**CoDS-COMAD**), 2015.
- [30] Vidit Jain and **Sainyam Galhotra**. Min-d-Occur: Ensuring Future Occurrences in Streaming Sets. In Proc. of the Conference on Uncertainty in Artificial Intelligence (**UAI**), 2014.
- [31] Amitabha Bagchi, Cristina M. Pinotti, **Sainyam Galhotra** and Tarun Mangla. Optimal Radius for Connectivity in Duty-Cycled Wireless Sensor Networks. In Proc. of ACM International Conference on Modeling, Analysis and Simulation of Wireless and Mobile Systems (**MSWiM**), 2013.

#### Articles in journals

- [32] **Sainyam Galhotra**, Karthikeyan Shanmugan, Prasanna Sattigeri, and Kush R. Varshney. Interventional Fairness with Indirect Knowledge of Unobserved Protected Attributes. *Entropy*, 2021
- [33] **Sainyam Galhotra**, Donatella Firmani, Barna Saha and Divesh Srivastava. Efficient and Effective ER with Progressive Blocking. *VLDB Journal*, 2021.
- [34] Donatella Firmani, **Sainyam Galhotra**, Barna Saha, Divesh Srivastava. Robust Entity Resolution Using a CrowdOracle. *IEEE Data Engineering Bulletin*, 2018.
- [35] Amitabha Bagchi, Cristina M. Pinotti, **Sainyam Galhotra** and Tarun Mangla. Optimal Radius for Connectivity in Duty-Cycled Wireless Sensor Networks, In *Transactions of Sensor Networks (TOSN)*, 2015.
- [36] Fuhuo Li, **Sainyam Galhotra** and Shigeru Kanemitsu. Emerging Importance of EVs in the Green Grid Era. In *Pure and Applied Mathematics Journal Special issue: Mathematical aspects of engineering disciplines*, 2015.
- [37] **Sainyam Galhotra**, Shigeru Kanemitsu, Hiroyuki Kondo. An adaptation method for removing arsenate species from water solution. In *Pure and Applied Mathematics Journal*, 2015.
- [39] **Sainyam Galhotra**, J. K. Bhattacharjee and Bijay K. Agarwalla. Turing - Hopf instabilities through a combination of diffusion, advection and finite size effects. In *Journal of Chemical Physics*, 2014.
- [39] Bijay K. Agarwalla, **Sainyam Galhotra** and J. K. Bhattacharjee. Diffusion driven instability to a drift driven one: Turing patterns in the presence of an electric field. In *Journal of Mathematical Chemistry*, 2014.

#### Tutorials

- [1] Romila Pradhan, Aditya Lahiri, **Sainyam Galhotra** and Babak Salimi. Explainable AI: Foundations, Applications, Opportunities for Data Management Research. *SIGMOD 2022*.
- [2] Romila Pradhan, Aditya Lahiri, **Sainyam Galhotra** and Babak Salimi. Explainable AI: Foundations, Applications, Opportunities for Data Management Research. *ICDE 2022*.
- [3] Akhil Arora\*, **Sainyam Galhotra\*** and Sayan Ranu. Navigating the Maze of Influence Maximization Algorithms. *IEEE DSAA*, 2019.
- [4] Akhil Arora\*, **Sainyam Galhotra\*** and Sayan Ranu. Influence Maximization Revisited: The State of the Art and the Gaps that Remain. In Proc. of *EDBT*, 2019.
- [5] Akhil Arora\*, **Sainyam Galhotra\*** and Sayan Ranu. Influence Maximization Revisited: The State of the Art and the Gaps that Remain. In Proc. of *ACM Joint International Conference on Data Science and Management of Data CoDS-COMAD*, 2018.

## Workshops and Symposiums

- [1] **Sainyam Galhotra**, Romila Pradhan and Babak Salimi. Feature Attribution and Recourse via Probabilistic Contrastive Counterfactuals. In ICML Workshop on Algorithmic Recourse, 2021.
- [2] **Sainyam Galhotra**. Reliable Clustering with Applications to Data Integration. In PhD Workshop at VLDB, 2020.
- [3] **Sainyam Galhotra**, Udayan Khurana, Oktie Hassanzadeh, Kavitha Srinivas and Horst Samulowitz. KAFE: Automated Feature Enhancement for Predictive Modeling using External Knowledge. In NeurIPS 2019 Workshop: Knowledge Representation & Reasoning Meets Machine Learning, 2019.
- [4] **Sainyam Galhotra**, Donatella Firmani, Barna Saha, Divesh Srivastava. Crowd-Sourced Entity Resolution with Control Queries. In SEBD, 2019.
- [5] **Sainyam Galhotra**, Arya Mazumdar, Soumyabrata Pal and Barna Saha. The Geometric Block Model. In NeurIPS 2017 Workshop on Learning on Distributions, Functions, Graphs and Groups, 2017.
- [6] **Sainyam Galhotra\***, Akhil Arora\* and Sayan Ranu. Debunking the Myths of Influence Maximization, In North East Database Day (NEDB), 2017 (Oral).
- [7] **Sainyam Galhotra\***, Akhil Arora\* and Shourya Roy. Holistic IM: Combining Scalability and Efficiency with Opinion-Aware Models. In NEDB (Poster) 2016.
- [8] **Sainyam Galhotra** and Shigeru Kanemitsu. and Shigeru Kanemitsu. An adaptation method for removing arsenate species from water solution. SUDA, 2013.

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## Teaching Experience

- May 2022 **Guest Lecture:** Delhi Public School, UAE
- December 2021 **Guest Lecture:** Harvard Extension - Data Mining for Business
- 2016-2018 **Teaching Assistant:** Algorithms for Data Science (CS590D), CICS, UMass Amherst
  - Fall 2016
  - Spring 2017
  - Fall 2017
  - Spring 2019
- 2015 **Grader:** Introduction to Computer Architecture (CS335), CICS, UMass Amherst (Fall 2015)

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## Mentorship

As a postdoctoral researcher, I mentored two PhD students for their research projects and three Masters students for semester projects at UChicago. Further, I mentored four Masters and PhD students at UCSD and Duke University as a part of my external collaborations.

- Yue Gong (PhD student, UChicago 2022):  
Worked on data discovery for causal inference, published a research paper at ICDE 2023 [1]
- Zhiru Zhu (PhD student, UChicago 2022):  
Developed a data discovery system, published a research paper at ICDE 2023 [1]
- John Kim (Masters student, UChicago 2022 → Amazon):  
Empirically evaluated the impact of dataset noise (null values) on the quality of AutoML techniques.
- Cole Bryant (Masters student, UChicago 2022 → Athena Health):  
Explored self-supervised learning techniques for data discover.
- Hannah Yao (Masters student, UChicago 2022 → Meta):  
Extended self-supervised data integration techniques to identify joinable datasets.
- Jiongli Zhu (PhD student, UCSD 2022):  
Studied fairness of ML models in the presence of selection bias. Paper submitted at SIGMOD 2023.
- Paul Wang (Masters student, UCSD 2020 → Machine Learning Engineer, Capital Group):  
Worked on explaining output of ML models, published a demo paper PVLDB 2021



- Kayvon Heravi (Masters student, UCSD 2022):  
Developing a declarative framework to answer hypothetical reasoning queries.
- Fangzhu Shen (Masters student, Duke University 2022):  
Developing a declarative framework to answer hypothetical reasoning queries.

I mentored the following first year students at UMass to smoothen the transition into graduate school.

- Hui Wei (PhD student, UMass Amherst, 2020)
- Sidong Zhang (PhD student, UMass Amherst, 2020)
- Nicolas Van Kempen (PhD student, UMass Amherst, 2020)
- Ankita Mehta (Masters student, UMass Amherst, 2016)
- Divyesh Harit (Masters student, UMass Amherst, 2016)
- Tanvi Sahay (Masters student, UMass Amherst, 2016)

#### AfriCode Initiative.

- Akot Benjamin Awanda (Masters student, University of Namibia, 2022): Helping clarify any questions about machine learning, and apply for PhD in the United States.

## Professional Service

Guest Editor: Frontiers of AI journal

Panelist: ICO/Alan Turing Institute workshop on Fairness in AI

**NSF Review Panels :** SBIR/STTR 2022, CSGrad4US 2022

**Senior PC Member:** IJCAI (2021)

**PC Member:** ICDE (2023), VLDB (2022), UAI (2021), AAAI (2022, 2021, 2020), FAccT (2021), GRADES-NDA Workshop SIGMOD (2020, 2019, 2018), SIGMOD Reproducibility 2018, ISWC Demo (2020, 2019, 2018), CoDS-COMAD (2021, 2020)

**Reviewer:** FOCS (2021), AISTATS (2021), ICDE (2021) NeurIPS (2021, 2020, 2019, 2018, 2016), ICML (2020,2019), NORDICHI 2020, CIKM (2020, 2019, 2018, 2017), KDD (2018, 2017), SIGMOD 2018, TKDE, SEA 2017, WWW 2017, CoDS 2015

2019-Present **Feature Editor** for the ACM XRDS Magazine.

2018-2019 **Graduate Student Representative** for all Computer Science graduate students, UMass Amherst.

2015 Organizing Committee member, XRCI Open 2015, Bangalore, India

2017-18 **Vice President**, Indian Student Association, UMass Amherst

2014-15 **Overall Coordinator, XRCI-CSR (Corporate Social Responsibility)**, Initiated the CSR group at Xerox Research Centre India and led the team for social activities like cleanliness campaign, distributing food to the needy

## Selected Media Coverage

1. UMass Amherst Computer Scientists Develop New Technique to Measure Social Bias in Software, in ACM News and MIT Technology Download
2. Unlearning Racism and Sexism in Learning Machines, in EnterpriseTech
3. Look Who's Fighting Our Algorithmic Overlords, in Bloomberg
4. Uncovering discrimination in machine-learning software, in GCN
5. This Breakthrough Tool Detects Racism And Sexism In Software, in Co.Design