

# Satyaki Sikdar

Luddy Center for Artificial Intelligence – Bloomington IN 47408 – USA

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## Research Interests

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Network science · science of science · social and information networks · machine learning

## Education

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### University of Notre Dame

*Ph.D. in Computer Science & Engineering*

**Notre Dame, IN**

2017 – 2022

**Adviser:** Tim Weninger

**Thesis:** Scalable and Interpretable Graph Modeling with Graph Grammars

**Committee:** David Chiang, Peter Kogge, and Danai Koutra

### Heritage Institute of Technology

*B.Tech. in Computer Science & Engineering*

**Kolkata, India**

2013 – 2017

**Advisers:** Partha Basuchowdhuri and Subhashis Majumder

**Thesis:** Learning Models for Influence Maximization

## Honors and Awards

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**Teaching Award:** Outstanding Graduate Student Instructor Award 2022

**Student Award:** Best Student Award for Academic Excellence – Class of 2017

**Travel Award:** ACM WSDM 2022

**Travel Award:** ACM IKDD Conference on Data Science 2016

## Research Experience

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### Indiana University

*Postdoctoral Fellow, Luddy School of Informatics, Computing, & Engineering*

**Bloomington, IN**

Jan 2022 –

**Adviser:** Santo Fortunato

Investigated collaboration and citation networks to model the scientific enterprise.

### Snap Inc.

*Research Intern, Computational Social Science Team*

**Remote**

May – Aug 2020

**Mentors:** Neil Shah and Leonardo Neves

Modeled large attributed social network graphs.

### University of Notre Dame

*Graduate Research Assistant*

**Notre Dame, IN**

May 2018 – Dec 2021

**Adviser:** Tim Weninger

Proposed scalable and interpretable graph generative models using graph grammars.

### Heritage Institute of Technology

*Undergraduate Research Assistant*

**Kolkata, India**

Apr 2015 – Jul 2017

**Advisers:** Partha Basuchowdhuri and Subhashis Majumder

Implemented novel graph community detection algorithms.

## Publications

(\* equal contribution      AR acceptance rate      IF impact factor)

### Journal Articles.....

- [J4] **S. Sikdar\***, S. Venturini\*, F. Rinaldi, F. Tudisco, and S. Fortunato, "*Collaboration and Topic Switches in Science*," *Scientific Reports*, 2023 (to appear), [IF:4.6].
- [J3] Ş. Erkol, **S. Sikdar**, F. Radicchi, and S. Fortunato, "*Consistency Pays off in Science*," *Quantitative Science Studies (QSS)*, 2023.
- [J2] **S. Sikdar**, D. G. Cedre, T. W. Ford, and T. Weninger, "*The Infinity Mirror Test for Graph Models*," *IEEE Transactions on Knowledge and Data Engineering (TKDE)*, 2022, [IF:8.9].
- [J1] P. Basuchowdhuri, **S. Sikdar**, V. Nagarajan, K. Mishra, S. Gupta, and S. Majumder, "*Fast Detection of Community Structures using Graph Traversal in Social Networks*," *Knowledge and Information Systems (KAIS)*, 2018, [IF:2.7].

### Conference Papers.....

- [C6] **S. Sikdar**, N. Shah, and T. Weninger, "*Attributed Graph Modeling with Vertex Replacement Grammars*," *ACM International Conference on Web Search and Data Mining (WSDM)*, 2022, [AR:18%].
- [C5] J. I. Hibshman, D. G. Cedre, **S. Sikdar**, and T. Weninger, "*Joint Subgraph-to-Subgraph Transitions: Generalizing Triadic Closure for Powerful and Interpretable Graph Modeling*," *ACM International Conference on Web Search and Data Mining (WSDM)*, 2021, [AR:18%].
- [C4] J. Hibshman, **S. Sikdar**, and T. Weninger, "*Towards Interpretable Graph Modeling with Vertex Replacement Grammars*," *IEEE International Conference on Big Data (BigData)*, 2019, [AR:19%].
- [C3] **S. Sikdar**, J. Hibshman, and T. Weninger, "*Modeling Graphs with Vertex Replacement Grammars*," *IEEE International Conference on Data Mining (ICDM)*, 2019, [AR:9%].
- [C2] C. Pennycuff, **S. Sikdar**, C. Vajiac, D. Chiang, and T. Weninger, "*Synchronous Hyperedge Replacement Graph Grammars*," *International Conference on Graph Transformation (ICGT)*, 2018.
- [C1] P. Basuchowdhuri, **S. Sikdar**, S. Shreshtha, and S. Majumder, "*Detecting Community Structures in Social Networks by Graph Sparsification*," *ACM IKDD Conference on Data Science (CODS)*, 2016, [AR:5%].

### Peer-reviewed Abstracts.....

- [A5] **S. Sikdar\***, S. Venturini\*, M. L. Charpignon, S. Kumar, F. Rinaldi, F. Tudisco, S. Fortunato, and M. S. Majumder, "*The COVID-19 Research Outbreak: How the Pandemic Culminated in a Surge of New Researchers*," *International Conference on Computational Social Science (IC<sup>2</sup>S<sup>2</sup>)*, Contributed Talk, 2023, [AR:31%].
- [A4] **S. Sikdar\***, S. Venturini\*, M. L. Charpignon, S. Kumar, F. Rinaldi, F. Tudisco, S. Fortunato, and M. S. Majumder, "*The COVID-19 Research Outbreak: How the Pandemic Culminated in a Surge of New Researchers*," *International Conference on Science of Science and Innovation (ICSSI)*, Contributed Talk, 2023.
- [A3] **S. Sikdar\***, S. Venturini\*, F. Rinaldi, F. Tudisco, and S. Fortunato, "*Collaboration and Topic Switches in Science*," *International Conference on Computational Social Science (IC<sup>2</sup>S<sup>2</sup>)*, Plenary Talk, 2023, [AR:1.75%].
- [A2] **S. Sikdar\***, S. Venturini\*, F. Rinaldi, F. Tudisco, and S. Fortunato, "*Collaboration and Topic Switches in Science*," *International Conference on Science of Science and Innovation (ICSSI)*, Contributed Talk, 2023.
- [A1] **S. Sikdar\***, S. Venturini\*, F. Rinaldi, F. Tudisco, and S. Fortunato, "*Collaboration and Topic Switches in Science*," *International Conference on Network Science (NetSci)*, Contributed Talk, 2023.

### Contributed Chapters.....

- [R2] **S. Sikdar**, "*NetworkX Graph Library*," *A Survey of Graph Processing Paradigms*, P. M. Kogge, Ed., University of Notre Dame, 2019. DOI: 10.7274/10-z6dc-9c71.

- [R1] **S. Sikdar**, "*Spectral Community Detection*," *A Survey of Graph Kernels*, P. M. Kogge, Ed., University of Notre Dame, 2019. DOI: 10.7274/10-e7wb-da60.

## Under Preparation.....

- [P2] **S. Sikdar\***, A. Ghavasieh\*, M. De Domenico, and S. Fortunato, "*Persistent Energy Localization Determines the Mesoscale Functional Organization of Complex Networks*," Forthcoming, 2023.
- [P1] **S. Sikdar\***, S. Venturini\*, M. L. Charpignon, S. Kumar, F. Rinaldi, F. Tudisco, S. Fortunato, and M. S. Majumder, "*The COVID-19 Research Outbreak: How the Pandemic Culminated in a Surge of New Researchers*," Under review at Science, 2023.




## Presentations

(\* virtual talk)





### Invited Talks

Heritage Institute of Technology, Kolkata, India	Sep 2022
Indian Association for the Cultivation of Science, Kolkata, India	Sep 2022
University of Louisville, Louisville, KY	Mar 2022
Lawrence Livermore National Laboratory, Livermore, CA*	Apr 2021
University of Illinois, Urbana, IL*	Apr 2021
Missouri State University, Springfield, MO*	Feb 2021
South Dakota State University, Brookings, SD*	Dec 2020
Indian Association for the Cultivation of Science, Kolkata, India	Oct 2019
Vidyasagar College, Kolkata, India	Jan 2016

### Posters

<i>Consistency Pays off in Science</i> . ICSSI 2023	June 2023
<i>The Infinity Mirror Test for Graph Generators</i> . SIAM NS 2020 	July 2020
<i>Modeling Graphs with Vertex Replacement Grammars</i> . SIAM NS 2019, NetSci 2019 	May 2019
<i>Synchronous Hyperedge Replacement Graph Grammars</i> . MSLD 2018 	May 2018

### Other Talks

<i>Introduction to Support Vector Machines</i> 	Apr 2017
<i>Density Based Spatial Clustering of Applications with Noise</i> 	Feb 2017
<i>Introduction to Decision Trees</i> 	Nov 2016
<i>A Friendly Introduction to Random Networks</i> 	Feb 2016

## Service

<i>International Committee Leader</i> . Postdoc Association Indiana University Bloomington	Jun 2022 –
<i>Program Committee Member</i>	
- PAKDD 2024	- WSDM 2024
- The Web Conference 2024	- ICWSM 2023, 2022, 2020
- SDM 2024, 2023, 2022	- CIKM 2023, 2022, 2021

- ISSI 2023
- BigData 2019
- WISE 2019

#### Journal Reviewer

- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- Journal of Combinatorial Optimization
- Physical Review E
- PLOS ONE
- ACM Transactions on Data Science (TDS)
- Data Mining and Knowledge Discovery (DMKD)
- International Journal Cooperative Information Systems (IJCIS)
- Journal of Logic & Computation

*External Reviewer* (multiple times). ICDM, CIKM, The Web Conference, WSDM, KDD, AAAI

*Volunteer*. The Scoop from Grad Students Dec 2019

*Panelist*. Preparing a Grad School Application Dec 2019

*Member*. Notre Dame CSE Graduate Student Board 2019 – 2020

*Volunteer Judge*. Northern Indiana Regional Science & Engineering Fair 2019, 2020

*Chair, Vice Chair, Secretary*. Heritage Institute of Technology ACM Student Chapter 2014 – 2017

*Student Member*. ACM 2013 –

## Students Mentored

(@ indicates co-authorship in papers)

*Arsham Ghavasieh*@. Visiting Ph.D. student, University of Trento, Italy Aug 2022 –

*Şirag Erkol*@. Ph.D. student, IU Feb – Aug 2022

*Daniel Kaiser*. Ph.D. student, IU Feb – Aug 2022

*Sara Venturini*@. Visiting Ph.D. student, University of Padova, Italy Jan 2022 –

*Manita Pote*. Ph.D. student, IU Jan – May 2022

*Daniel Gonzalez Cedre*@. Ph.D. student, ND Dec 2019 – Aug 2020

*Catalina Vajiac*@. B.S. student, ND (now a Ph.D. student at CMU) Jan – Jul 2019

*Justus Hibshman*@. Ph.D. student, ND Sep – Dec 2018

## Computer Skills

**Advanced:** Python, NetworkX, Matplotlib, Seaborn, Jupyter,  $\text{\LaTeX}$

**Intermediate:** C++, Boost Graph Library, Pandas, SQL, shell scripting

## Relevant Coursework

Scalable Graph Algorithms · Web Science & Information Retrieval · Exotic Computing · Social Networks Complexity & Algorithms · Pedagogy and Practice in the College Classroom

## References

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- Tim Weninger 574-631-6770  
 Frank M. Freimann Collegiate Associate Professor of Engineering  
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 University of Notre Dame
- Santo Fortunato 812-856-5754  
 Professor santo@indiana.edu  
 APS Fellow, Network Science Society Fellow  
 Luddy School of Informatics, Computing, and Engineering  
 Indiana University Bloomington
- Maimuna S. Majumder 617-355-6000  
 Assistant Professor maimuma.majumder@childrens.harvard.edu  
 Peter Szolovits Distinguished Scholar  
 Computational Health Informatics Program  
 Harvard Medical School & Boston Children's Hospital
- Peter Kogge 574-631-6763  
 Ted H. McCourtney Professor of Computer Science & Engineering kogge@nd.edu  
 IBM Fellow, IEEE Fellow, AAAS Fellow  
 University of Notre Dame
- Filippo Radicchi 812-855-9322  
 Professor filiradi@indiana.edu  
 Luddy School of Informatics, Computing, and Engineering  
 Indiana University Bloomington