

Satyaki Sikdar

150K Fitzpatrick Hall – Notre Dame – IN 46556, USA

📧 satyakisikdar

🌐 sites.nd.edu/ssikdar

📱 satyakisikdar

✉️ ssikdar@nd.edu

☎️ 574-339-2898

Research Interests

Network science · social and information networks · graph mining · data mining · machine learning · information retrieval · information diffusion · formal language theory

Education

University of Notre Dame

Ph.D. in Computer Science & Engineering

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

Committee: Tim Weninger (chair), David Chiang, Peter Kogge, and Danai Koutra

Notre Dame, IN

2017 –

University of Notre Dame

M.S. in Computer Science & Engineering

Notre Dame, IN

2017 – 2020

Heritage Institute of Technology

B.Tech. in Computer Science & Engineering

Thesis: *Learning Models for Influence Maximization*

Advisers: Partha Basuchowdhuri and Subhashis Majumder

Kolkata, India

2013 – 2017

Honors and Awards

Student Award: Best student award for academic excellence – Class of 2017

Travel Award: ACM IKDD Conference on Data Science 2016

Research Experience

Snap Inc.

Research Intern – Computational Social Science Team

Mentors: Neil Shah and Leonardo Neves

Mining and modeling large attributed social graphs

Santa Monica, CA

May 2020 – Aug 2020

University of Notre Dame

Graduate Research Assistant – Artificial Intelligence Lab

Supervisor: Tim Weninger

Studying scalable and interpretable graph generative models using graph grammars

Notre Dame, IN

May 2018 –

Heritage Institute of Technology

Undergraduate Research Assistant – Social Network Analysis Research Group

Supervisors: Partha Basuchowdhuri and Subhashis Majumder

Developed novel graph clustering algorithms

Kolkata, India

Apr 2015 – Jul 2017

Teaching Experience

University of Notre Dame

Instructor of Record for Discrete Mathematics

Notre Dame, IN

Spring 2021

University of Notre Dame

Graduate Teaching Assistant for Theory of Computing

Instructors: David Chiang and Peter Kogge

Graded assignments, exams, held office hours, and designed a tutorial on the TikZ library

Notre Dame, IN

Spring 2018, Fall 2017

Heritage Institute of Technology

Workshop Instructor

Designed and taught a 15 hour introductory workshop on programming in Python

Kolkata, India

Fall 2016, Fall 2015

Journal Papers

- J1 Basuchowdhuri, P., **Sikdar, S.**, Nagarajan, V., Mishra, K., Gupta, S., and Majumder, S. *Fast Detection of Community Structures using Graph Traversal in Social Networks*, 2017. Knowledge and Information Systems (KAIS). arXiv:1707.04459 (Impact factor = 2.397)

Conference Papers

- C4 Hibshman, J., **Sikdar, S.**, and Weninger, T. *Towards Interpretable Graph Modeling with Vertex Replacement Grammars*. IEEE International Conference on Big Data (BigData), 2019. arXiv:1910.08579 (Acceptance rate \approx 19%)
- C3 **Sikdar, S.**, Hibshman, J., and Weninger, T. *Modeling Graphs with Vertex Replacement Grammars*. IEEE International Conference on Data Mining (ICDM), 2019. arXiv:1908.03837 (Acceptance rate \approx 9%)
- C2 Pennycuff, C., **Sikdar, S.**, Vajiac, C., Chiang, D., and Weninger, T. *Synchronous Hyperedge Replacement Graph Grammars*. International Conference on Graph Transformation (ICGT), 2018
- C1 Basuchowdhuri, P., **Sikdar, S.**, Shreshtha, S., and Majumder, S. *Detecting Community Structures in Social Networks by Graph Sparsification*. ACM IKDD Conference on Data Science (CoDS), 2016 (Acceptance rate \approx 5%)

Non Peer Reviewed Articles

- NP2 **Sikdar, S.** *Spectral Community Detection*. In "A Survey of Graph Kernels", edited by Peter Kogge. doi:10.7274/r0-e7wb-da60
- NP1 **Sikdar, S.** *NetworkX Graph Library*. In "A Survey of Graph Processing Paradigms", edited by Peter Kogge. doi:10.7274/r0-z6dc-9c71

Articles under Preparation

- P3 **Sikdar, S.**, Gonzalez, D., Ford, T., and Weninger, T. *The Infinity Mirror Test for Graph Models*, 2020. Submitted to IEEE Transactions on Knowledge and Data Engineering (TKDE). arXiv:2009.08925
- P2 Hibshman, J., Gonzalez, D.*, **Sikdar, S.***, and Weninger, T. *Joint Subgraph-to-Subgraph Transitions: Generalizing Triadic Closure for Powerful and Interpretable Graph Modeling*, 2020. Submitted to ACM International Conference on Web Search and Data Mining (WSDM) 2021. arXiv:2009.06770
- P1 **Sikdar, S.**, Shah, N., and Weninger, T. *Attributed Vertex Replacement Grammars*, 2020

Selected Projects

Attributed Vertex Replacement Grammars

Adapting vertex replacement grammars to handle attributed graphs while incorporating assortativity




The Infinity Mirror Test for Graph Models

A novel stress test for graph generative models to identify and amplify latent inductive biases.  

Towards Interpretable Graph Modeling with Vertex Replacement Grammars

Using vertex replacement graph grammars to learn interpretable rules for directed graphs.   




Modeling Graphs with Vertex Replacement Grammars

A scalable graph generative model which uses hierarchical clustering to extract compact vertex replacement grammar rules which are then used to generate topologically faithful graphs.   

Synchronous Hyperedge Replacement Graph Grammars

Generalizes machine translation techniques for modeling temporal graphs.  

Community Detection in Social Networks

Novel graph clustering algorithms using graph traversal and sparsification techniques.   

Presentations


Invited Talks

Recent Advances in Graph Modeling and Generation: Looking Beyond Simple Random Graphs.
Indian Association for the Cultivation of Science, Kolkata Oct 2019

An Introduction to Community Detection in Social Networks. Vidyasagar College, Kolkata  Jan 2016

Posters

The Infinity Mirror Test for Graph Generators. SIAM NS 2020  July 2020

Modeling Graphs with Vertex Replacement Grammars. SIAM NS 2019, NetSci 2019  May 2019

Synchronous Hyperedge Replacement Graph Grammars. Midwest Speech & Language Days  May 2018

Other Talks

Introduction to Support Vector Machines  Apr 2017

Density Based Spatial Clustering of Applications with Noise  Feb 2017

Introduction to Decision Trees  Nov 2016

A Friendly Introduction to Random Networks  Feb 2016

Service

Reviewer. Physical Review E, PLOS ONE, ACM Transactions on Data Science (TDS), Data Mining and Knowledge Discovery (DMKD), International Journal Cooperative Information Systems (IJCIS)

Program Committee Member. ICWSM 2020, IEEE BigData 2019, WISE 2019

External Reviewer (several times). IEEE 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)

Daniel Gonzalez[@]. Ph.D. student, ND (advisor Tim Weninger) Dec 2019 – Aug 2020

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

Justus Hibshman[@]. Ph.D. student, ND (advisor Tim Weninger) Sep 2018 – Dec 2018

Computer Skills

Advanced: Python, NetworkX, Matplotlib, Seaborn, Jupyter, \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

Tim Weninger

574-631-6770

Frank M. Freimann Collegiate Associate Professor of Engineering
Department of Computer Science & Engineering,
University of Notre Dame

tweninger@nd.edu

Peter Kogge

574-631-6763

Ted H. McCourtney Professor of Computer Science & Engineering
IBM Fellow, IEEE Fellow
Department of Computer Science & Engineering,
University of Notre Dame

kogge@nd.edu

David Chiang

574-631-9441

Associate Professor of Computer Science & Engineering
Department of Computer Science & Engineering,
University of Notre Dame

dchiang@nd.edu