Curriculum Vitae
Sinan G. Aksoy

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Research Interests

Spectral and extremal graph theory, stochastic processes on graphs, the analysis of complex networks.

Education

2014 – 2017   **Ph.D., Mathematics**, University of California, San Diego.
               Advisor: Fan Chung Graham
2012 – 2014   **M.A., Applied Mathematics**, University of California, San Diego.
2008 – 2012   **B.A., Mathematics, B.A., Economics** University of Chicago.
               General Honors

Professional Experience

2017 –   **Scientist**, Pacific Northwest National Laboratory
2016 Sum.   **Intern**, Pacific Northwest National Laboratory.
2015 Fall   **Visiting Scholar**, National Taiwan University, Mathematics Division NCTS.
2015 Sum.   **Intern**, Sandia National Laboratories, Livermore.

Journal Articles

2019   12.   S. Aksoy, E. Purvine, S. Young, *Importance measures for network flow using linear algebra*, in preparation.

      11.   S. Aksoy, P. Bruillard, S. Young, *Benefits of Ramanujan supercomputing topologies*, in preprint.

      10.   S. Aksoy, C. Joslyn, C. Ortiz-Marrero, B. Praggastis, E. Purvine, *Hypernetwork science via high-order walks*, submitted, arXiv:1906.11295

      9.   S. Aksoy, K. Nowak, E. Purvine, S. Young, *Relative Hausdorff distance for network analysis*, to appear, Applied Network Science: Issue on Machine Learning with Graphs, arXiv:1906.04936

      8.   S. Aksoy, K. Nowak, S. Young, *A linear-time algorithm and analysis of graph Relative Hausdorff distance*, to appear SIAM Journal on the Mathematics of Data Science, arXiv:1903.01682

2018   7.   S. Aksoy, F. Chung, M. Tait, J. Tobin, *The maximum relaxation time of a random walk*, Advances in Applied Mathematics, **101**:1–14, 2018, DOI: 10.1016/j.aam.2018.07.002

      6.   S. Aksoy, E. Purvine, E. Cotilla-Sanchez, M. Halappanavar, *A generative graph model for electrical infrastructure networks*, Journal of Complex Networks, DOI: 10.1093/comnet/cny016

2017   5.   S. Aksoy, T. G. Kolda, A. Pinar, *Measuring and modeling bipartite graphs with community structure,* Journal of Complex Networks, **5**(4):581–603, 2017, DOI: 10.1093/comnet/cnx001

2016   4.   S. Aksoy, F. Chung, X. Peng, *Extreme values of the stationary distribution of random walks on directed graphs,* Advances in Applied Mathematics, **81**:128–155, 2016, DOI: 10.1016/j.aam.2016.06.012

      3.   S. Aksoy, P. Horn, *Graphs with many strong orientations,* SIAM J. Discrete Math., **30**(2):1269–1282, 2016, DOI: 10.1137/15M1018885

2015   2.   S. Aksoy, A. Azzam, C. Coppersmith, J. Glass, G. Karaali, X. Zhao, X. Zhu, *Coalitions and cliques in the school choice problem*, Involve, **8**(5):801–823, 2015, DOI: 10.2140/involve.2015.8.801

2012   1.   S. Aksoy, S. Nelson, *Bikei, involutary biracks, and unoriented link invariants*, Journal of Knot Theory and Its Ramifications, **21**(6):13 pp., 2012, DOI: 10.1142/S0218216511009972

Refereed Conference and Workshop Proceedings

2019   4.   C. Joslyn, S. Aksoy, D. Arendt, L. Jenkins, B. Praggastis, E. Purvine, M. Zalewski, *High Performance Hypergraph Analytics of Domain Name System Relationships*, HICSS Symposium on Cybersecurity Big Data Analytics, 2019.

2018   3.   L. Jenkins, T. Bhuiyan, S. Harun, C. Lightsey, D. Mentgen, S. Aksoy, T. Stavenger, M. Zalewski, H. Medal, C. Joslyn, *Chapel HyperGraph Library (CHGL)*, 2018 IEEE High Performance Extreme Computing Conference (HPEC 18). DOI: 10.1109/HPEC.2018.8547520

       2.   E. Purvine, S. Aksoy, C. Joslyn, K. Nowak, B. Praggastis, M. Robinson, *A topological approach to representational data models*, In International Conference on Human Interface and the Management of Information, pp. 90–109. Springer, Cham. DOI: 10.1007/978-3-319-92043-6_8

2012   1.   S. Aksoy, A. Azzam, C. Coppersmith, J. Glass, G. Karaali, X. Zhao, X. Zhu, *School Choice as a One-Sided Matching Problem: Cardinal Utilities and Optimization*, 2012 International Symposium on Artificial Intelligence, arXiv:1304.7413

Software

- **Chapel Hypergraph Library** (Chapel) – Large-scale hypergraph generation and analysis.
- **HyperNetX** (Python) – Hypergraph visualization and exploratory data analytics.

Talks

2018   Jan.   **AMS Joint Math Meetings** (Special Session: Applied and Computational Combinatorics)
              Invited Talk: *A generative graph model for electrical infrastructure networks.*

2017   June   **UC San Diego** (Final Defense)
              Random walks on directed graphs and orientations of graphs.

       Apr.   **AMS Sectional**, Washington State University (Clustering of Graphs: Theory & Practice)
              Invited Talk: *Measuring and modeling bipartite graphs with community structure.*

2016   Nov.   **Purdue University** (Geometry Seminar)
              Invited Talk: *Problems in the spectral theory of directed and oriented graphs.*

       Oct.   **AMS Sectional**, University of Denver (Analysis on Graphs & Spectral Graph Theory)
              Invited Talk: *Extreme values of the stationary distribution of random walks on directed graphs.*

       Aug.   **Pacific Northwest National Laboratory** (NSIP Symposium)
              A generative graph model for the power-grid.

       June   **UC San Diego** (Stochastic Networks Conference: Short Talk & Poster Session)
              Extreme values of the stationary distribution of random walks on directed graphs.

       Feb.   **Claremont Colleges** (Algebra, Number Theory, & Combinatorics Seminar)
              Invited Talk: *Strong orientations of graphs and Cheeger's inequality.*

              UC San Diego (Advancement to Candidacy Seminar)
              Two problems on the spectral theory of directed graphs

       Jan.   **AMS Joint Math Meetings** (Special Session on Research from the GRWC)
              Invited Talk: *Graphs with many strong orientations.*

2015   Sep.   **Sandia National Laboratories, Livermore** (Seminar)
              A generative bipartite graph model with affiliation structure.

2014 Aug. **University of Denver** (Graduate Research Workshop Open Problem Seminar)
                  The connectivity of randomly oriented graphs.
2010 July **Pomona College** (NSF-funded REU Seminar)
                  Game theory in school choice.

Teaching Experience

evaluations at math.ucsd.edu/~saksoy/teaching.htm

2016–2017 **Head Teaching Assistant**, UC San Diego Math Department
        Responsibilities: training and evaluating new TAs, serving as a first point of contact for conflicts and grievances, representing graduate students in departmental affairs.

2012–2016 **Teaching Assistant**, UC San Diego Math Department
        Courses: Discrete Math & Graph Theory, Combinatorics, Complex Analysis, Mathematical Reasoning, Linear Algebra, Calculus and Analytic Geometry, Calculus I-III.

Fellowships and Awards

2016 Jun.   **Outstanding Poster Award**, Stochastic Networks Conference
2013–2014 **Graduate Student Research Fellowship**, UC San Diego
2012–2013 **Graduate Assistance in Areas of National Need Fellowship**, UC San Diego
2012–2013 **M. Salah Baouendi Graduate Fellowship**, UC San Diego
2012 Jun.   **General Honors**, University of Chicago

Programming Skills

- **MATLAB**: Proficient with graph analytics tools, implemented several scalable generative graph models I designed, taught MATLAB basics to undergraduates.
- **Java, Mathematica, R**: Used for testing combinatorial conjectures.

Service

2013–   **Referee**: Journal of Combinatorics, Theoretical Computer Science, Graphs & Combinatorics, Journal of Algebraic Combinatorics, Ars Combinatoria
2015–2016 **Graduate Student Association Representative**, UC San Diego Math Department.
2014–2015 **Webmaster**, "Erdős' Problems on Graphs" website.
        Role: Helped update and maintain a database that lists and tracks the status of Paul Erdős' conjectures, http://www.math.ucsd.edu/~erdosproblems.

References

Fan Chung Graham
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