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RESEARCH AUSTRALIA (NIASRA)

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School of Mathematics and Applied Statistics
University of Wollongong, NSW 2522,
Australia

Education

'03-'09 **PhD in Statistics**

University of Washington, Seattle, WA, USA
Thesis: Statistical Models for Social Network Data and Processes
Advisor: Mark S. Handcock

'03-'06 **MS in Statistics**

University of Washington, Seattle, WA, USA
Advisors: Adrian E. Raftery and Mark S. Handcock

'99-'03 **BS in Biometry and Statistics, Cum Laude with Distinction in Research**

Cornell University, Ithaca, NY, USA
Thesis: The Effect of Integration Cell Size and *In Situ* Target Strength Calculation Method on Acoustic Fish Density Estimates for Alewife Lakes of New York State
Advisors: Steven J. Schwager and Lars G. Rudstam

Positions

7/'13- **Lecturer (Assistant/Associate Professor) in Statistics** at University of Wollongong School of Mathematics and Applied Statistics and National Institute for Applied Statistics Research Australia (NIASRA), Wollongong, NSW, Australia
Confirmed (Tenured): 5/'16

9/'11-6/'13 **Research Associate** at Pennsylvania State University Department of Statistics, University Park, PA, USA
Topic: Modeling of social networks; statistical computing
Principal Investigator: David R. Hunter

9/'09-8/'11 **Visiting Research Scientist** at Carnegie Mellon University iLab at Heinz College and Department of Statistics; and Instituto Superior Técnico Institute for Systems and Robotics, Pittsburgh, PA, USA; and Lisbon, Portugal
Topic: Modeling of social networks, particularly dynamic networks and telecommunications networks; analysis of mobile phone network data
Principal Investigator: Pedro M. A. Ferreira

Publications

Under Review **Foundations of Finite-, Super-, and Infinite-Population Random Graph Inference** (Michael Schweinberger, Pavel N. Krivitsky, and Carter T. Butts). July 2017. <https://arxiv.org/abs/1707.04800>

Investigating Foreign Portfolio Investment Holdings: Gravity Model with Social Network Analysis (Luke Mazur, Thomas Suesse, and Pavel N. Krivitsky). September 2015. <http://niasra.uow.edu.au/workingpapers/UOW205811.html>

Peer-Reviewed

Journal **Exponential-Family Random Graph Models for Rank-Order Relational Data** (Pavel N. Krivitsky and Carter T. Butts). *Sociological Methodology*, 47(1):68–112, 2017. doi:10.1177/0081175017692623

Inference for Social Network Models from Egocentrically-Sampled Data, with Application to Understanding Persistent Racial Disparities in HIV Prevalence in the US (Pavel N. Krivitsky and Martina Morris). *Annals of Applied Statistics*, 11(1):427–455, 2017. doi:<http://dx.doi.org/10.1214/16-AOAS1010>

Using Contrastive Divergence to Seed Monte Carlo MLE for Exponential-Family Random Graph Models (Pavel N. Krivitsky). *Computational Statistics and Data Analysis*, 107:149–161, March 2017. doi:10.1016/j.csda.2016.10.015

Sharing Social Network Data: Differentially Private Estimation of Exponential-Family Random Graph Models (Vishesh Karwa, Pavel N. Krivitsky, and Aleksandra B. Slavković). *Journal of the Royal Statistical Society, Series C*, 66(3):481–500, 2017. doi:10.1111/rssc.12185

Capturing Multivariate Spatial Dependence: Model, Estimate, and then Predict (Discussion Paper) (Noel Cressie, Sandy Burden, Walter Davis, Pavel N. Krivitsky, Payam Mokhtarian, Thomas Suesse, and Andrew Zammit-Mangion). *Statistical Science*, 30(2):170–175, May 2015. doi:10.1214/15-STS517

On the Question of Effective Sample Size in Network Modeling: An Asymptotic Inquiry (Pavel N. Krivitsky and Eric D. Kolaczyk). *Statistical Science*, 30(2):184–198, May 2015. doi:10.1214/14-STS502

An Approximation Method for Improving Dynamic Network Model Fitting (Nicole Bohme Carnegie, Pavel N. Krivitsky, David R. Hunter, and Steven M. Goodreau). *Journal of Computational and Graphical Statistics*, 24(2):502–519, 2015. doi:10.1080/10618600.2014.903087

A Separable Model for Dynamic Networks (Pavel N. Krivitsky and Mark S. Handcock). *Journal of the Royal Statistical Society, Series B*, 76(1):29–46, January 2014. doi:10.1111/rssb.12014

Computational Statistical Methods for Social Network Models (Invited Paper) (David R. Hunter, Pavel N. Krivitsky, and Michael

Schweinberger). *Journal of Computational and Graphical Statistics*, 21(4):856–882, 2012. doi:10.1080/10618600.2012.732921

Exponential-Family Random Graph Models for Valued Networks (Pavel N. Krivitsky). *Electronic Journal of Statistics*, 6:1100–1128, June 2012. doi:10.1214/12-EJS696

Adjusting for Network Size and Composition Effects in Exponential-Family Random Graph Models (Pavel N. Krivitsky, Mark S. Handcock, and Martina Morris). *Statistical Methodology*, 8(4):319–339, July 2011. doi:10.1016/j.stamet.2011.01.005

Representing Degree Distributions, Clustering, and Homophily in Social Networks with Latent Cluster Random Effects Models (Pavel N. Krivitsky, Mark S. Handcock, Adrian E. Raftery, and Peter D. Hoff). *Social Networks*, 31(3):204–213, July 2009. doi:10.1016/j.socnet.2009.04.001

Fitting Position Latent Cluster Models for Social Networks with `latentnet` (Pavel N. Krivitsky and Mark S. Handcock). *Journal of Statistical Software*, 24(5):1–23, May 2008. <http://www.jstatsoft.org/v24/i05>

Proceedings **Quantifying Protection Level of a Noise Candidate for Noise Multiplication Masking Scheme** (Yue Ma, Yan-Xia Lin, Pavel N. Krivitsky, and Bradley Wakefield). *Privacy in Statistical Databases: Lecture Notes in Computer Science*, to appear, May 2018.

Reviewing the Methods of Estimating the Density Function Based on Masked Data (Yan-Xia Lin and Pavel N. Krivitsky). *Privacy in Statistical Databases: Lecture Notes in Computer Science*, to appear, March 2018.

Differentially Private Exponential Random Graphs (Vishesh Karwa, Aleksandra Slavković, and Pavel N. Krivitsky). *Privacy in Statistical Databases: Lecture Notes in Computer Science* (J. Domingo-Ferrer (ed.)), 8744:143–155, 2014. doi:10.1007/978-3-319-11257-2_12

Network Neighbor Effects on Customer Churn in Cell Phone Networks (Pavel N. Krivitsky, Pedro M. A. Ferreira, and Rahul Telang). *Proceedings of the 7th Symposium on Statistical Challenges in E-Commerce Research (SCECR 2011)*, 2011. <http://ro.uow.edu.au/eispapers/4505/>

Estimating the Integrated Likelihood via Posterior Simulation Using the Harmonic Mean Identity (Adrian E. Raftery, Michael A. Newton, Jaya M. Satagopan, and Pavel N. Krivitsky). *Bayesian Statistics 8: Proceedings of the Eighth Valencia International Meeting* (J. M. Bernardo, M.J. Bayarri, J. O. Berger, A. P. Dawid, D. Heckerman, A. F. M. Smith, and M. West (eds.)), 8:371–416, 2007. <http://www.bepress.com/mskccbiostat/paper6>

Other **A note on the role of projectivity in likelihood-based inference for random graph models** (Michael Schweinberger, Pavel N. Krivitsky, and Carter T. Butts). July 2017. <https://arxiv.org/abs/1707.00211>

Modeling of Dynamic Networks based on Egocentric Data with Durational Information (Pavel N. Krivitsky). *Pennsylvania State University Department of Statistics Technical Report*, TR12-01, April 2012. http://stat.psu.edu/research/technical-reports/copy2_of_2012-technical-reports

Modeling Tie Duration in ERGM-Based Dynamic Network Models (Pavel N. Krivitsky). *Pennsylvania State University Department of Statistics Technical Report*, TR12-02, April 2012. http://stat.psu.edu/research/technical-reports/copy2_of_2012-technical-reports

Teaching

Recent Course Instruction

University of Wollongong

'13-'17 STAT 251: Fundamentals of Biostatistics

'14,'17 STAT 903: Model-Based Survey Design and Analysis

'16 INFO 411/911: Data Mining

'14-'16, '18 STAT 902: Advanced Data Analysis

'14-'15 STAT 131: Understanding Variation and Uncertainty

'14 MATH 131: Mathematics for Primary School Teachers

Workshops and Tutorials

International Network for Social Network Analysis Annual Conference: Sunbelt

'09-'16, '18 Exponential-family Random Graph (ERG or p^*) Modeling with `statnet`

Extending ERGM Functionality within `statnet`: Building Custom User Terms

STERGM—Separable Temporal ERGMs for modeling discrete relational dynamics with `statnet`

Latent variable network modeling with `latentnet`

Introduction to Egocentric Network Analysis with ERGMs in `statnet`

Valued Network Modeling with `statnet`

with Martina Morris, Mark S. Handcock, Steven M. Goodreau, Skye Bender-deMoll, Carter T. Butts, David R. Hunter, and others

StatsWeek@UOW

4-5/2/'16 Social Network Analysis with `statnet` with Martina Morris

Supervision

PhD

- '16– **Yue Ma** (co-supervisor, with Yan-Xia Lin primary)
- '16– **Victoria Leaver** (part-time) (primary, with Robert Clark and Carole Birrell)

MS

- '15– **Georgina Davies** (part-time) (co-supervisor, with Noel Cressie primary)

Honours

- '18– **Aidan Mison** (primary, with Dionigi Gerace)
- '15 **Luke Mazur** (equal co-supervisor, with Thomas Suesse)

Grants

ARC: Australian Research Council

NIH: US National Institutes of Health

EIS: University of Wollongong Faculty of Engineering and Information Sciences

Successful

- '18–'22 **Consultant** on NIH Grant R01AI138783
Title: “EpiModel 2.0: Integrated Network Models for HIV/STI Prevention Science”
Principal Investigator: Samuel M. Jenness
Co-Investigators: Kimberly Workowski, Patrick Sullivan, Gregory Phillips II, Brian Mustanski, Michelle Birkett, Patrick Janulis, Martina Morris, Steven Goodreau, Deven Hamilton, Karen Kuntz, and Eva Enns
Amount: 2,974,839 USD
- '18 **Awardee** on EIS Strategic Investment Grant
Amount: 10,000 AUD
- '11–'16 **Co-Investigator** on NIH Grant R01HD68395
Title: “Statistical Methods for Network Epidemiology”
Principal Investigator: Martina Morris
Co-Investigators: Steven M. Goodreau, David R. Hunter, Carter T. Butts, and Skye Bender-deMoll
Amount: 3,040,740 USD

Pending

- '18 **Principal Investigator** on ARC Discovery Project
Title: “Statistical Modelling of Evolution of Complex Sexual Partnership Networks based on Egocentrically Sampled Data”
Principal Investigator: Pavel N. Krivitsky
Co-Investigators: Raymond L. Chambers, Margaret Hellard, Rachel Sacks-Davis, and Martina Morris

Presentations

* — *travel funded by organisers*

Invited

- 5/1/'18 * **Exponential-Family Random Graph Models for Multi-Layer Networks** with Christopher S. Marcum and Laura Koehly. Invited presentation at *Next Generation Network Analytics Meeting at University College London*, London, UK
- 17/12/'16 * **Inference for Exponential-Family Random Graph Models and Their Dynamic Extensions from Egocentrically-Sampled Data** with Martina Morris and others. Invited paper at *Isaac Newton Institute Workshop on Dynamic Networks*, Cambridge, UK
- 1/8/'11 **A Separable Model for Dynamic Networks** with Mark S. Handcock. Invited paper at *American Statistical Association Joint Statistical Meeting*, Miami Beach, FL, USA
- 16/6/'11 **Latent Space Cluster Models for Social Networks**. Invited paper at *Classification Society Annual Meeting*, Pittsburgh, PA, USA
- 11/1/'11 **A Separable Model for Dynamic Networks** with Mark S. Handcock. Invited presentation at *SAMSI Complex Networks Modeling Workshop*, Research Triangle Park, NC, USA

Refereed

- 3/12/'15 **Inference and Simulation for Dynamic Network Models from Egocentrically Sampled Data**. Contributed paper to *MODSIM 2015: 21st International Congress on Modelling and Simulation*, Gold Coast, QLD, Australia
- 7/12/'12 **Fitting Dynamic Network Models to Static Network Data**. Poster presentation at *Neural Information Processing Systems Conference, Workshop on Algorithmic and Statistical Approaches for Large Social Networks*, Lake Tahoe, NV, USA
- 10/6/'11 **Network Neighbor Effects on Customer Churn in Cell Phone Networks** with Pedro M. A. Ferreira (presenter), Rahul Telang. Contributed paper to *Seventh Symposium on Statistical Challenges in Electronic Commerce Research (SCECR 2011)*, Rio de Janeiro, RJ, Brazil
- 12/12/'08 **Adjusting for Network Size and Composition Effects in Exponential Family Random Graph Models** with Mark S. Handcock and Martina Morris. Poster presentation at *Neural Information Processing Systems Conference, Workshop on Analyzing Graphs*, Whistler, BC, Canada

External Seminar

- 17/8/'18 The University of Sydney, Sydney, NSW, Australia
- 5/7/'18 ETH Zurich, Zurich, Switzerland
- 15/5/'18 Kirby Institute, University of New South Wales, Sydney, NSW, Australia
- 10/1/'18 University of Groningen, Groningen, Netherlands

- 8/1/'18 Hasselt University, Hasselt, Belgium
- 1/11/'17 NIASRA Fellows Meeting, Goulburn, NSW, Australia
- 29/3/'17 University of Washington, Seattle, Seattle, WA, USA
- 2/2/'17 University of California, Irvine, Irvine, CA, USA
- 9/6/'16 Australian National University, Canberra, ACT, Australia
- 2/4/'15 University of New South Wales, Sydney, NSW, Australia
- 26/11/'15 NIASRA Fellows Meeting, Goulburn, NSW, Australia
- 14/10/'14 Macquarie University, Sydney, NSW, Australia
- 26/3/'14 NIASRA Fellows Meeting, Goulburn, NSW, Australia

Other Recent

- 30/16/'18 **Exponential-Family Random Graph Models for Many-Layer Networks** with Christopher S. Marcum and Laura Koehly. Presentation at *International Network for Social Network Analysis Annual Conference: Sunbelt XXXVIII*, Utrecht, Netherlands
- 29/11/'17 **Exponential-Family Random Graph Models for Multilayer Networks** with Christopher S. Marcum and Laura Koehly. Presentation at *2nd Australian Social Network Analysis Conference*, Sydney, NSW, Australia
- 17/11/'16 **Estimation of Exponential-Family Random Graph Mixed Models with Dyadic Dependence: Combining MCMC with Analytic Approximation.** Presentation at *1st Annual Australian Social Network Analysis Conference*, Hawthorn, VA, Australia
- 8/4/'16 **Estimation of Exponential-Family Random Graph Mixed Models With Dyadic Dependence.** Presentation at *International Network for Social Network Analysis Annual Conference: Sunbelt XXXVI*, Newport Beach, CA, USA
- 28/6/'15 **Quantifying Uncertainty in Dynamic Network Models Fit to Egocentrically Sampled Data.** Presentation at *International Network for Social Network Analysis Annual Conference: Sunbelt XXXV*, Brighton, UK

Administrative Work

- '16-'18 **Statistician** on the University of Wollongong Animal Ethics Committee.
- '17 **Academic Program Director** of the Bachelor of Medical Mathematics Program.
- '16 **Academic Program Director** of the Masters in Statistics Program.
- Chair** of the School of Mathematics and Applied Statistics Awards Committee.
- Member** of the School of Mathematics and Applied Statistics Internationalisation Committee.

'14-'16 **Member** of the School of Mathematics and Applied Statistics Computing Committee.

'14-'16 **Seminar Convener** for the National Institute for Applied Statistics Research Australia.

Service

Software

Statnet Project **an open-source project to develop a suite of R packages for analysis and statistical modeling of network data**

<http://www.statnet.org>

Contributor since 2007; Core developer since 2008

ergm **an R package in the statnet suite for fitting, visualization, and diagnosing of exponential random graph models (ERGMs)**

<http://cran.r-project.org/package=ergm>

Contributor since 2007; Core developer since 2008; Maintainer since 2012

tergm **an R package in the statnet suite for fitting, visualization, and diagnosing of dynamic network models based on ERGMs**

<http://cran.r-project.org/package=tergm>

Creator and maintainer since 2012

ergm.count **an R package in the statnet suite extending ergm to fit and simulate ERGMs for networks of counts**

<http://cran.r-project.org/package=ergm.count>

Creator and maintainer since 2012

ergm.rank **an R package in the statnet suite extending ergm to fit and simulate ERGMs for networks of ranks**

<http://cran.r-project.org/package=ergm.rank>

Creator and maintainer since 2016

ergm.ego **an R package in the statnet suite extending ergm to fit and simulate ERGMs for egocentrically sampled data**

<http://cran.r-project.org/package=ergm.ego>

Creator and maintainer since 2016

latentnet **an R package in the statnet suite for fitting latent space and latent cluster models to binary and weighted networks**

<http://cran.r-project.org/package=latentnet>

Core developer and maintainer since 2005

networkDynamic **an R package in the statnet suite for storing and processing dynamic network data**

<http://cran.r-project.org/package=networkDynamic>

Contributor since 2012

Yet Another Bayes's Rule Applet **an interactive Java applet illustrating the Bayes's Rule**

<http://www.krivitsky.net/teaching/BayesRule.html>

Creator and maintainer since 2012

Organizational

'12 **Co-Organizer and Co-Chair** of the 2012 NIPS Workshop on Algorithmic and Statistical Approaches for Large Social Networks.

Peer Review

'17 for *Statistical Science*, *Journal of the American Statistical Association*, *Journal of the Royal Statistical Society Series B*, *Journal of Selected Topics in Signal Processing*, *Computational Statistics*, *Annals of Applied Statistics*.

'16 for *Science*, *Journal of Statistical Software*, *Journal of the American Statistical Association*, *Journal of the Royal Statistical Society Series B*.

'15 for *Journal of Statistical Software*, *Social Networks*, *Sociological Methodology*, *Annals of Applied Statistics*, *Computational Statistics and Data Analysis*, *Journal of the Royal Statistical Society Series B*, Swiss National Science Foundation (Grant).

'14 for Health Research Council of New Zealand (Grant), *Journal of Computational and Graphical Statistics*, *Journal of Statistical Software*, *Annals of Applied Statistics*.

'08–'13 for *Social Networks*, *Annals of Applied Statistics*, *Journal of the American Statistical Association*, *IMS Electronic Journal of Statistics*, *Journal of Mathematical Psychology*, *Science*, *Sociological Methodology*, *Annals of Statistics*, *Journal of Statistical Theory and Practice*, *Statistica Sinica*, *Journal of Computational and Graphical Statistics*.

Memberships and Certifications

Memberships **International Network for Social Network Analysis**

Member since February 2009

Australian Network for Social Network Analysis

Founding member since November 2016

American Statistical Association

Member since July 2007

Certifications **Society of Actuaries/Casualty Actuarial Society**

Passed Level 1 Exam in June 2002

Other Information

Citizenship **United States of America**

Naturalized in 2000

Languages **Russian** (native speaker)

English (native-level)

French (some competence)

Japanese (some competence)

Programming R, PYTHON, C, C++, JAVA, SQL (MySQL and Oracle), S-PLUS, MATLAB

Software *WinBUGS*, *JAGS*, *SAS*, *MINITAB*, *DataDesk*, *SPSS*