

## BRUNO RIBEIRO

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*Research Interests* My central research interest is the principled measurement, analysis, and mining of large-scale complex social and communication networks. Networks are the natural framework of many of today's highest impact computing applications: online social networking, Web search, product recommendations, mobile ad-hoc networking, and online dating are just a few examples. My past and current research efforts coalesce into my long-term goal of developing measurement tools and explanatory and predictive models that can measure, explain, forecast, and enhance networked systems where entities interact and evolve in complex ways.

*General Areas of Interest* Data Mining  
Network Science  
Computer Networks  
Statistical Models & Inference

*Positions held*

- ◇ **Carnegie Mellon University**, Pittsburgh, PA  
Postdoctoral fellow  
Department of Computer Science  
Mentor: *Christos Faloutsos*  
June 2013 – Present.
- ◇ **Northeastern University**, Boston, MA  
Visiting Researcher  
Department of Physics  
May 2012 – May 2013.
- ◇ **University of Massachusetts Amherst**, Amherst, MA  
Postdoctoral Researcher  
Department of Computer Science  
Mentor: *Don Towsley*  
May 2010 – May 2013.

*Education*

- ◇ **University of Massachusetts Amherst**  
Ph.D. in Computer Science,  
Title: “On the Design of Methods to Estimate Network Characteristics”  
Department of Computer Science  
Advisor: *Don Towsley*.  
May 2010.
- ◇ **Federal University of Rio de Janeiro**  
B.S. & M.S. in Informatics & Computer Engineering.  
March 2001, July 2003

## Publications

under review	Flavio Figueiredo, Bruno Ribeiro, Jussara Almeida, Christos Faloutsos, “Mining User Attention Flows: An Application to Online Music Streaming”, ( <i>under review, preprint available upon request</i> ).
	Fabricio Murai, Bruno Ribeiro, Don Towsley, and Krista Gile. “ENGAGE: Online Network Recruitment in the Dark.” ( <i>under review, preprint available upon request</i> ).
	Bo Jiang, Liyuan Sun, Daniel Figueiredo, Bruno Ribeiro, and Don Towsley. “Struggle of the Fittest: Duration and Intensity of Competition under Cumulative Advantage.” ( <i>under review, preprint available at arXiv:1402:4536</i> ).
2015	Bruno Ribeiro, Minh Hoang, Ambuj Singh, “Beyond Models: Forecasting Complex Network Processes Directly from Data”, <i>WWW’15: ACM International Conference on World Wide Web, 2015</i> (accepted).
	Bruno Ribeiro, Christos Faloutsos, “Modeling Website Popularity Competition in the Attention-Activity Marketplace”, <i>WSDM’15: ACM International Conference on Web Search and Data Mining, 2015</i> .
2014	Bruno Ribeiro, “Modeling and Predicting the Growth and Death of Membership-based Websites”, <i>WWW’14: ACM International Conference on World Wide Web, 2014</i> . <b>Media Coverage:</b> This work has been covered by both the specialized (e.g., ACM Tech News) and lay media (e.g., CNET, The Pittsburgh-Post Gazette, Business Insider). CMU Press release: <a href="http://www.cmu.edu/news/stories/archives/2014/february/feb4_websitegrowth.html">http://www.cmu.edu/news/stories/archives/2014/february/feb4_websitegrowth.html</a>
	Pinghui Wang, John C.S. Lui, Bruno Ribeiro, Don Towsley, Junzhou Zhao, Xiaohong Guan, “Efficiently Estimating Motif Statistics of Large Networks”, <i>ACM Transactions on Knowledge Discovery from Data (TKDD)</i> , 2014.
	Ting-Kai Huang, Bruno Ribeiro, Harsha V. Madhyastha, Michalis Faloutsos, “The Socio-monetary Incentives of Online Social Network Malware Campaigns”, <i>COSN’14: ACM Conference On Online Social Networks, 2014</i> .
	Peng Xia, Kun Tu, Bruno Ribeiro, Hua Jiang, Xiaodong Wang, Cindy Chen, Benyuan Liu, Don Towsley, “Who is Dating Whom: Characterizing User Behaviors of a Large Online Dating Site” in <i>Social Network Analysis – Community Detection and Evolution</i> , Springer, 2014. <b>Media Coverage:</b> MIT Technology Review news from the arXiv.
	Flavio Figueiredo, Jussara M Almeida, Yasuko Matsubara, Bruno Ribeiro, Christos Faloutsos, “Revisit Behavior in Social Media: The Phoenix-R Model and Discoveries”, <i>ECML/PKDD’14: European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, 2014</i> .

(alphabetical) K. Avrachenkov, P. Basu, G. Neglia, B. Ribeiro\*, and D. Towsley, “Pay Few, Influence Most: Online Myopic Network Covering”, *NetSciCom’14: IEEE International Workshop on Network Science for Communication Networks, 2014*. **Best Paper Award.** \*Corresponding author.

Kun Tu, Bruno Ribeiro, H. Jiang, X. Wang, David Jensen, Benyuan Liu, Don Towsley, “Online Dating Recommendations: Matching Markets and Learning Preferences”, *SRS’14: ACM International Workshop on Social Recommender Systems, 2014*.

Yeon-sup Lim, Bruno Ribeiro, Don Towsley, “Classifying Latent Infection States in Complex Networks”, *SIMPLEX’14: Sixth Annual Workshop on Simplifying Complex Networks for Practitioners, 2014*.

James Atwood, Bruno Ribeiro, Don Towsley, “Efficient Network Generation Under General Preferential Attachment”, *SIMPLEX’14: Sixth Annual Workshop on Simplifying Complex Networks for Practitioners, 2014*.

2013 Peng Xia, Bruno Ribeiro, Cindy Chen, Benyuan Liu, Don Towsley, “A Study of User Behavior on an Online Dating Site”, *ASONAM’13*.

Ting-Kai Huang, Md Sazzadur Rahman, Harsha V. Madhyastha, Michalis Faloutsos, and Bruno Ribeiro, “An Analysis of Socware Cascades in Online Social Networks”, *WWW’13: ACM International Conference on World Wide Web, 2013*.

F. Murai, B. Ribeiro, D. Towsley, P. Wang, “On Set Size Distribution Estimation and the Characterization of Large Networks via Sampling”, *IEEE JSAC Special Issue on Network Science, 2013*.

Fabricio Murai, Bruno Ribeiro, Don Towsley, and Krista Gile. “Characterizing Branching Processes from Sampled Data”, *SIMPLEX’13: Fifth Annual Workshop on Simplifying Complex Networks for Practitioners, 2013*.

Bruno Ribeiro, Nicola Perra, and Andrea Baronchelli, “Quantifying the Effect of Temporal Resolution on Time-varying Networks”, *Scientific Reports, 2013*

2012 Daniel Figueiredo, Philippe Nain, Bruno Ribeiro\*, Edmundo de Souza e Silva, and Don Towsley, “Characterizing Continuous Time Random Walks on Time-varying Graphs”, *SIGMETRICS’12: ACM Conference on Measurement and Modeling of Computer Systems, 2012*.

\*Corresponding author.

Bruno Ribeiro, Don Towsley “On the Estimation Accuracy of Degree Distributions from Graph Sampling”, *CDC’12: IEEE Conference on Decision and Control, 2012 (invited)*.

Bruno Ribeiro, Prithwish Basu, and Don Towsley, “Multiple Random Walks to Uncover Short Paths in Power Law Networks”, *NetSciCom’12: IEEE International Workshop on Network Science for Communication Networks, 2012*.

- 2011  
 Bruno Ribeiro, Pinghui Wang, Fabricio Murai, and Don Towsley, “Sampling Directed Graphs with Random Walks”, *INFOCOM’12: IEEE Conference on Computer Communications, 2012*.
- Bruno Ribeiro, Daniel Figueiredo, Edmundo de Souza e Silva, and Don Towsley, “Characterizing Dynamic Graphs with Continuous-time Random Walks” (short paper), *SIGMETRICS’11: ACM SIGMETRICS Conference on Measurement and Modeling of Computer Systems, 2011*.
- Y. Lim, D. S. Menasché, B. Ribeiro, D. Towsley, P. Basu “Online estimating the  $k$  central nodes of a network”. *NSW’11: IEEE Network Science Workshop, 2011*.
- 2010  
 Konstantin Avrachenkov, Bruno Ribeiro, and Don Towsley, “Improving Random Walk Estimation Accuracy with Uniform Restarts”, *WAW’10: 7th Workshop on Algorithms and Models for the Web Graph, 2010*.
- Bruno Ribeiro and Don Towsley, “Estimating and Sampling Graphs with Multidimensional Random Walks”, In *IMC’10: ACM SIGCOMM Internet Measurement Conference, 2010*.
- William Gauvin, Bruno Ribeiro, Ben Liu, Don Towsley, and Jei Wang, “Measurement and Gender-Specific Analysis of User Publishing Characteristics on MySpace”, *IEEE Network Magazine (Special Edition on Social Networking), 2010*.
- Bruno Ribeiro, William Gauvin, Benyuan Liu, and Don Towsley, “On MySpace Account Spans and Double Pareto-Like Distribution of Friends”, *NetSciCom’10: IEEE International Workshop on Network Science for Communication Networks, 2010*.
- earlier – 2009  
 Bruno Ribeiro, Tao Ye, and Don Towsley, “A Resource-minimalist Flow Size Histogram Estimator””. *IMC’08: ACM SIGCOMM Internet Measurement Conference, 2008*.
- Bruno Ribeiro, Weifeng Chen, Gerome Miklau, and Don Towsley, “Analyzing Privacy in Enterprise Packet Trace Anonymization””. *NDSS 2008*.
- Bruno Ribeiro, Don Towsley, Tao Ye, and Jean Bolot, “Fisher Information of Sampled Packets: an Application to Flow Size Estimation””. *IMC’06: ACM SIGCOMM Internet Measurement Conference, 2006*.
- Weifeng Chen, Yong Huang, Bruno Ribeiro, Kyoungwon Suh, Honggang Zhang, Edmundo de Souza e Silva, Jim Kurose, and Don Towsley, “Exploiting the IPID field to infer network path and end-system characteristics””. *PAM’05: Passive and Active Measurement Workshop, 2005*.
- S. C. Coutinho and Bruno Ribeiro. On Holomorphic Foliations without Algebraic Solutions”. In *Experimental Mathematics*, v.10, n.4, p.529 - 536, 2001.

- Teaching*
- ◇ **Fall 2012:** Co-instructed “Statistics of Networks and Graphs” with Krista Gile & Don Towsley  
*Instructors:* Bruno Ribeiro, Krista Gile, and Don Towsley.  
(CS691SG & STAT691SG) UMass, Computer Science & Statistics Department.
  - ◇ **Fall 2011:** Co-instructed and developed “Introduction to Network Science”  
*Instructors:* Bruno Ribeiro and Don Towsley.  
(CS691NW) UMass, Department of Computer Science.  
This was the first time that a Network Science course was taught in the UMass Computer Science department.
- Grants*
- ◇ *Role:* Co-PI & Technical Lead.  
*Source:* NSF Network Science (NetSE) Medium Grant  
*Project:* Modeling and Analysis of Network Dynamics  
*Institution:* UMass, CMU  
*Duration:* June. 2011 - May. 2015  
*Website:* [http://www.nsf.gov/awardsearch/showAward?AWD\\_ID=1065133](http://www.nsf.gov/awardsearch/showAward?AWD_ID=1065133)  
*Funding:* \$780,235.
  - ◇ *Role:* Co-PI & Technical Lead.  
*Source:* ARO Network Science Collaborative Alliance  
*Project:* Extracting Network Knowledge: Exploring Large Graphs in a Dynamic and Uncertain World  
*Institutions:* CMU, UCR, UCSB, UNM, UMass  
*Duration:* Oct. 2012 - Nov. 2014  
*Website:* [http://www.ns-cta.org/ns-cta-blog/?page\\_id=916](http://www.ns-cta.org/ns-cta-blog/?page_id=916)  
*Funding:* \$735,154.
  - ◇ *Role:* Co-PI & Technical Lead.  
*Source:* ARO Network Science Collaborative Alliance  
*Project:* Extracting Network Knowledge: Exploring Large Graphs in a Dynamic and Uncertain World  
*Institutions:* UMass, Raytheon BBN Technologies  
*Duration:* Sept. 2011 – Sept. 2012  
*Website:* [http://www.ns-cta.org/ns-cta-blog/?page\\_id=397](http://www.ns-cta.org/ns-cta-blog/?page_id=397)  
*Funding:* \$109,770.
  - ◇ *Role:* External Member & Technical Lead.  
*Project:* THANES - THeory and Application of NEtwork Science  
*Institutions:* INRIA (France), UFRJ (Brazil), CMU (USA)  
*Duration:* March 2014 – March 2016  
*Website:* <https://team.inria.fr/thanes/>  
*Funding (travel only):* \$81,438 USD.
- Honors and Awards*
- ◇ **IEEE NetSciCom’14 Best Paper Award**, 2014
  - ◇ **CAPES Scholarship** to pursue Ph.D., 2004–2008
  - ◇ **CNPq Scholarship** to pursue M.S., 2002–2003

- Selected Press Coverage*
- ◇ Carnegie Mellon News: *In Age of Information Overload, Ability To Sustain Attention Determines Success*, Feb. 2014
  - ◇ CNET: *Annoyed by Facebook? Sorry, it's sticking around, study says*, Feb. 2014
  - ◇ The Pittsburgh Post-Gazette: *Reports of Facebook's imminent death have been exaggerated*, Feb. 2014.
  - ◇ ACM Tech News: *Carnegie Mellon Model Predicts Growth, Death of Facebook and Other Membership-Based Websites*, Feb. 2014.
  - ◇ MIT Technology Review: *Data Mining Reveals the Surprising Behavior of Users of Dating Websites*, Jan. 2014.
- Student Mentoring*
- ◇ Fabricio Murai, 4th year Ph.D. Candidate (UMass).
  - ◇ Minh Hoang, 3rd year Ph.D. Candidate, (UC Santa Barbara).
  - ◇ Kun Tu, 5th year Ph.D. Candidate (UMass).
  - ◇ James Atwood, 3rd year Ph.D. Candidate, (UMass).
  - ◇ Ting-Kai Huang (on one thesis chapter), Ph.D. (UC Riverside) now at Google.
- Panels*
- ◇ *Network Science: The Next Big Thing*, IEEE NetSciCom 2014, Toronto, Canada, May, 2014.
- Keynotes*
- ◇ *Challenges of Forecasting and Measuring a Complex Networked World*, SIMPLEX'15 (WWW Workshop), Florence, Italy, May, 2015.

- Talks
- ◇ *In Age of Information Overload, Ability To Sustain Attention Determines Success of Internet Startups*, **Duke University**, November, 2014.
  - ◇ *In Age of Information Overload, Ability To Sustain Attention Determines Success*, **INRIA at Sophia Antipolis**, July, 2014.
  - ◇ *In Age of Information Overload, Ability To Sustain Attention Determines Success*, **UMass Amherst**, June, 2014.
  - ◇ *In Age of Information Overload, Ability To Sustain Attention Determines Success*, **Facebook**, June, 2014.
  - ◇ *Modeling and predicting the growth and death of membership-based Internet startups*, **The Chinese University of Hong Kong**, August, 2014.
  - ◇ *The Socio-monetary Incentives of Online Social Network Malware Campaigns*, **Carnegie Mellon University**, November, 2013.
  - ◇ *Modeling and predicting the growth and death of membership-based Internet startups*, **Carnegie Mellon University**, October, 2013.
  - ◇ *Understanding the growth and death of social networks: evidence and model*, **BBN Technologies**, July, 2013.
  - ◇ *Understanding the growth and death of online social networks: evidence and model*, **Boston University**, Jul., 2013.
  - ◇ *Online Myopic Network Covering*, **Boston University**, Mar., 2013.
  - ◇ *Walking in a Changing World: Characterizing Random Walks on Dynamic Networks*, **University of California Santa Barbara**, Oct., 2012. (invited)
  - ◇ *Characterizing Continuous Time Random Walks on Time Varying Graphs*. MoBS, Department of Physics, **Northeastern University**, Apr, 2012. (invited)
  - ◇ *Searching on Complex Networks*. **INRIA, Sophia-Antipolis**, March, 2012. (invited)
  - ◇ *Exploring Networks with Random Walks*. **Technicolor**, Feb, 2012. (invited)
  - ◇ *Exploring Networks with Random Walks*. **Bell Labs**, Murray Hill, NJ. Sept 2011. (invited)
  - ◇ *Understanding Complex Networks through Incomplete Information: Mistakes, Myths, and Positive Steps*. *Invited Speaker*. **Brazilian Computing Society Conference (CSBC)**, the premier annual computer science event in Brazil, 2010. (invited)

*Community* ◇ Organization*Service*

- Co-Chair IEEE NetSciCom'15 TPC (<http://www.netsci.com.org>)
- Co-organized NetSci'14 Symposium “Temporal Networks, Human Dynamics and Social Physics”
- Co-organized Satellite Meetings @ ECCS'13 & ECCS'14: “Temporal Networks in Human Dynamics”

## ◇ Technical Program Committee

- WWW 2015 TPC
- ASONAM 2014 (book) TPC
- SIMPLEX 2013, 2014 (WWW Workshop) TPC
- INFOCOM 2013, 2014 TPC
- ICDCS 2013 TPC

## ◇ Reviewer

- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- EPJ Data Science
- Internet Mathematics (IM)
- IEEE/ACM Transactions on Networking (ToN)
- IEEE/ACM Transactions on Information Theory (ToIT)
- IEEE Journal on Selected Areas in Communications (JSAC)
- IEEE Magazine
- IEEE Communications Letters
- Elsevier Computer Communications



*References*

Prof. Don Towsley  
University of Massachusetts at Amherst  
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140 Governors Drive  
Amherst, MA, 01003  
413-545-0207 (office)  
towsley@cs.umass.edu

Prof. Ambuj Singh  
University of California Santa Barbara  
Computer Science Department  
3119 Engineering I  
Santa Barbara, CA, 93106-5110  
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