

Munmun De Choudhury

Arts, Media and Engineering
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INTERESTS

Empirical and computational analysis of social networks: Structural and temporal characterization of social networks; information diffusion; interpersonal communication analysis; network evolution; community and group dynamics.

Dynamic analysis of online social media: Characterization of rich media; analysis of social conversations; media sharing, participation and evolution.

CURRENT RESEARCH

Diffusion rates of information in the context of “homophily” among users along multiple social dimensions in online social media.

EDUCATION

Doctor of Philosophy, Arizona State University (Aug, 2005–Present)
Tempe, AZ, USA

Dissertation: Analyzing the Dynamics of Communication in Online Social Networks.

Adviser: Prof. Hari Sundaram

GPA: 3.8/4.00

Expected date of graduation: Dec, 2010

Bachelor of Technology, National Inst. of Technology (Sep, 2001–May, 2005)
Bhopal, India

Bachelor’s Thesis: Pattern Recognition of Geographic Structures in Satellite Imagery.

GPA: 3.8/4.00 (*Department Silver Medalist*)

HONORS AND AWARDS

- Selected at the Key Scientific Challenges Graduate Student Summit, Yahoo! Research, Sunnyvale, CA, 2009.
- Accepted to ACM Student Research Competition (SRC), Hypertext, 2009.
- Grace Hopper Scholarship Award, 2007, 2008.
- Student Travel Award: SocialCom 2009, WWW 2009, ICME 2009, CIKM 2008, HT 2008, WI 2007, PerCom 2007.
- Department Silver Medalist (2 out of 120), NIT Bhopal, based on academic excellence in undergraduate curriculum, 2005.
- Jagadis Bose National Science Talent Search Scholarship, based on excellence in Science and Mathematics, 2001.
- CSIR (Center for Scientific and Industrial Research) Programme on Youth for Leadership in Science Award (CPYLS), Jorhat, Assam, India, 1999.
- Top 1% in State Mathematical Olympiad Examination (10 out of 1000), 1993, 1997, 1998.
- State Merit Scholarship (1 out of 1000), 1994.

EXPERIENCE

Department of Computer Science, Arizona State University**Research Associate**, Jan, 2006–Present*Advisor*: Prof. Hari Sundaram

- **Analysis of inter-personal communication dynamics on online social networks.** Computational and empirical understanding of communication is developed at multiple scales—individual characteristics, group or community characteristics and network-level characteristics. Analysis encompasses modeling and predicting information diffusion, emergence of “sync”, evolving information roles of individuals as well as variations in group dynamics over time. Outcomes include papers published at Social-Com 2009, HT 2009, CIKM 2008, GHC 2008, HT 2008, WI 2007; an accepted book chapter in the Handbook of Social Network Technologies; an invited journal paper in the Springer International Journal of Multimedia Tools and Applications (MTAP); and two journals under review at ACM Transactions on Information Systems and ACM Transactions on the Web. On-going work includes submission at CHI 2010 and ICWSM 2010.
- **Analysis of evolving characteristics of social media.** Analysis and study of rich media properties, social conversations associated with rich media, and community dynamics in online social media. Outcomes include papers published at WWW 2009, ICME 2009. On-going work includes submission in the journal ACM Transactions on Multimedia Computing, Communications and Applications (ACM TOMCCAP).
- **Context-aware models for effective communication routing in enterprises.** Outcomes include a paper published at the PerCom 2007.

Micro-Economics and Social Systems, Yahoo! Research**Research Intern**, May, 2009–Aug, 2009*Manager*: Duncan J. Watts

- **Inference of “relevant” social networks based on inter-personal communication data.** Performed extensive empirical analysis of different network features over a host of possible networks. This was followed up with several prediction tasks to discover the relevant network with respect to a given problem. Outcomes include a paper that is under review at WWW 2010. Extensions towards a journal submission at the Proceedings of the National Academy of Sciences (PNAS) are also underway.
- **Constructing travel itineraries from geo-temporal breadcrumbs.** Mined textual tag and geo-location based information from a very large repository of data from the social media Flickr to automatically recommend itineraries on several popular tourist destinations. Extensive user studies performed on a “crowd-sourcing” marketplace, Amazon Mechanical Turk. Outcomes include a paper that is under review at WWW 2010; also includes a recently filed patent.

Collaborative Applications Research, Avaya Labs Inc.**Research Scientist Intern**, May, 2006–Aug, 2006*Manager*: Dorée Duncan Seligmann

- **Statistical modeling of enterprise context for prediction of user availability and interruptibility in communication.** Developed a proof-of-concept system that uses a dynamic Bayesian network framework to infer availability of users automatically; also conducted a user study experiment to evaluate the inferred availabilities. The work was presented at the Avaya Labs, Basking Ridge, NJ in Aug, 2006; also

extended work published in CoMoRea 2007.

Center for Evolutionary Functional Genomics, The Biodesign Institute, Arizona State University

Research Associate, Aug, 2005–Dec, 2005

- Empirical analysis of several discriminant based classifiers (PCA/LDA) for dimensionality reduction in large-scale gene expression profile and Microarray data.
- Feature selection in Microarray data; filter and wrapper models of feature selection.

Bharat Sanchar Nigam Ltd (BSNL), Agartala, India

Intern, May, 2003–Aug, 2003

- Case study in TCP/IP/Ethernet software for Internet traffic management, exposure to L2/L3 development (network drivers, packet shaping, routing, QoS).

PUBLICATIONS

Peer-Reviewed Journal Articles / Book Chapters

- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2010). *Analyzing the Dynamics of Communication in Online Social Networks*. In Handbook of Social Networks Technologies and Applications, 2010, Springer, forthcoming.
- Lin, Y-R., **Choudhury, M. D.**, Sundaram, H., Kelliher, A. (2010). *Discovering Emergent Semantics and their Diffusion in Social Media*. In International Journal of Multimedia Tools and Applications (MTAP), Special Issue on “Hot Research Topics in Multimedia”, Springer, 2010, forthcoming.

Journal Articles under Review

- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. *Extraction, Characterization and Utility of Prototypical Communication Groups in the Blogosphere*. Submitted to the ACM Trans. On Information Systems.
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. *Predicting Efficient Communication Paths in Social Networks via Context Analysis*. Submitted to the ACM Trans. On The Web.
- Lin, Y.-R., Sundaram, H., **Choudhury, M. D.** and Kelliher, A. *Discovery of Multi-relational Structures in Social Media Streams*. Submitted to the ACM Transactions on Multimedia Computing, Communications and Interaction.

Peer-Reviewed Conference Proceedings

- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2009). *Social Synchrony: Predicting Mimicry of User Actions in Online Social Media*. In Proceedings of the 2009 IEEE International Conference on Social Computing (Vancouver, Canada, August 29-31, 2009), SocialCom '09. (Acceptance rate: 9%)
- Lin, Y-R., Sundaram, H., **Choudhury, M. D.**, Kelliher, A. (2009). *Temporal Patterns in Social Media Streams: Theme Discovery and Evolution using Joint Analysis of Content and Context*. In Proceedings of the 2009 IEEE International Conference on Multimedia & Expo (Cancun, Mexico, June 28- July 3, 2009). ICME '09 (Invited Paper).
- **Choudhury, M. D.**, Sundaram, H., Lin, Y-R., John, A., and Seligmann, D. D. (2009). *Connecting Content to Community in Social Media via Image Content, User*

Tags and User Communication. In Proceedings of the 2009 IEEE International Conference on Multimedia & Expo (Cancun, Mexico, June 28- July 3, 2009). ICME '09. (Acceptance rate: 22%)

- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2009). *What Makes Conversations Interesting? Themes, Participants and Consequences of Conversations in Online Social Media*. In Proceedings of the Eighteenth International World Wide Web Conference (Madrid, Spain, April 20-24, 2009). WWW '09. (Acceptance rate: 11%)
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2008). *Can Blog Communication Dynamics be correlated with Stock Market Activity?* In Proceedings of the Nineteenth ACM Conference on Hypertext and Hypermedia (Pittsburgh, Pennsylvania, USA, June 19 - 21, 2008). HT '08. (Acceptance rate: 25%)
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2008). *Dynamic Prediction of Communication Flow Using Social Context*. In Proceedings of the Nineteenth ACM Conference on Hypertext and Hypermedia (Pittsburgh, Pennsylvania, USA, June 19 - 21, 2008). HT '08. (Acceptance rate: 25%)
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2007). *Contextual Prediction of Communication Flow in Social Networks*. In Proceedings of the IEEE/WIC/ACM international Conference on Web intelligence (Silicon Valley, California, USA, November 02 - 05, 2007). Web Intelligence. IEEE Computer Society, Washington, DC, 57-65. (Acceptance rate: 17%)

Peer-Reviewed Workshop Proceedings / Posters

- **Choudhury, M. D.** (2009). *Modeling and Predicting Group Activity over Time in Online Social Media*. Accepted to appear in Proceedings of the Twentieth ACM Conference on Hypertext and Hypermedia (Torino, Italy, June 29 - July 1, 2009). HT '09.
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2008). *Multi-scale Characterization of Social Network Dynamics in the Blogosphere*. In Proceedings of the Seventeenth ACM Conference on information and Knowledge Management (Napa Valley, California, USA, October 26-30, 2008). CIKM '08. ACM, New York, NY, 1515-1516. (Acceptance rate: 16%)
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2008). *Modeling Information Roles for Understanding Stock Market Dynamics*. Eighth Annual Grace Hopper Celebration of Women in Computing Conference - Poster Session (Keystone, Colorado, USA, October 1-4, 2008). GHC '08.
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. (2007). *Context Aware Routing of Enterprise User Communications*. In Proceedings of the Fifth IEEE international Conference on Pervasive Computing and Communications Workshops (White Plains, New York, USA, March 19 - 23, 2007). PERCOMW. IEEE Computer Society, Washington, DC, 39-44.

Publications under Review

- **Choudhury, M. D.**, Mason, Winter A., Hofman, Jake M., Watts, Duncan J. *Inferring Relevant Social Networks from Interpersonal Communication*. Conference Submission.
- **Choudhury, M. D.**, Feldman M., Amer-Yahia, S., Golbandi, N., Lempel, R., Yu, C. *Constructing Travel Itineraries from Geo-temporal Bread-crumbs*. Conference Submission.

Publications under Preparation

- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. *Modeling Homophily-based Rates of Information Diffusion in Online Social Media along Multiple Social Dimensions*. On-going work towards a conference submission.
- **Choudhury, M. D.**, Sundaram, H., John, A., and Seligmann, D. D. *Characterizing Social Media Elements via Dynamic Inference of their Interestingness*. Journal paper.

Other Publications

- **Choudhury, M. D.**, John, A., Seligmann, D. D. and Sundaram, H. (2006). *Inferring User Availability in Collaborations via Instant Messaging Activity*. Avaya Technical Report, Avaya Labs Research. Summer '06.
- **Choudhury, M. D.** (2005). *Pattern Recognition in Satellite Imagery using Artificial Neural Networks*. B.Tech (Bachelor of Technology) Thesis, National Institute of Technology, Bhopal, India.

PATENTS

Filed a legal patent (ID09-5911) at Yahoo!, under Labs/Research, dated: 2009.11.06.

INVITED TALKS

- *Taking Research into Private Sphere: My Experiences at Yahoo! Research, Summer 2009*. IEEE Computer Society, ASU Chapter, Sep, 2009.
- *Inferring Relevant Network Structures from Social Communication*. Key Scientific Challenges Graduate Student Summit, Yahoo! Research, Sunnyvale, Sep, 2009.
- *Dynamics of Communication in Online Social Networks*. Invited talk, Avaya Labs, Basking Ridge, NJ, Jun, 2009.
- *Characteristics of Conversations in Online Social Media*. CSE PhD Forum Seminar, Arizona State University, Apr, 2009.
- *Inferring Availability of Enterprise Workers based on Instant Messaging Activity*. Avaya Labs Intern Presentation, Aug, 2006.
- *Genetic Algorithm Approach for Fuzzy Controllers*. Cognizance 2004, Indian Institute of Technology, Roorkee, Mar, 2004.
- *Remote Processes and Machine Control of Windows NT based systems (2000/XP)*. SPCTS 2003, IEEE Gujarat Section, Sep, 2003.

TECHNICAL SKILLS

Large-scale Data: Extensive experience in crawling, collection, parsing and processing of web-scale large datasets (in the order of $\sim 50M$ node, $\sim 100M$ edge graphs)—Twitter, Digg, Flickr, YouTube, MySpace, Facebook, also blogs such as Engadget and Huffington Post, blog aggregators such as Technorati, and email social networks.

Distributed Computing Architectures: Apache Hadoop 0.20, Map-Reduce infrastructure, Apache Pig 0.4.0.

Programming Languages: C, C++, PHP, Python, Java, MySQL Database, HTML, JavaScript, Unix shell script.

Packages: MATLAB, Processing, Eclipse, Prefuse, Netlogo.

Problem-solving: Extensive experience in computational modeling and statistical inference, empirical studies of large-scale data, social network analysis measures and sound analytical abilities.

Subjective User Experiments: Experience in small-scale organizational level surveys and questionnaire based user studies; also in large-scale feedback-based surveys on “crowd-sourcing” platforms like Amazon Mechanical Turk.

PROFESSIONAL
SERVICES

Research Grants: Actively involved in writing grant proposals for Avaya Labs. Also currently involved in writing an NSF proposal with two senior ASU faculties.

Mentoring Experience: Guiding one graduate student towards his thesis. The student’s thesis involves design of algorithms and visualizations that can suggest “interesting” users on a social media website.

Reviewer: ACM workshop on Social Network Mining and Analysis, 2009; ACM Multimedia, 2009.

Memberships: Association for Computing Machinery; IEEE Computer Society.

Leadership Activities: CSE Graduate Student Forum (2008–Present); AME Student Association (2008–Present); Assoc. Editor, Editorial Board at NIT, Bhopal (2004-2005); Technical Editor, Chief Organizing Committee, TechnoSearch 2005 (2005); Executive Member of technical society “Zeitgeist” (2004-2005); Executive Member of literary society, “Drishtant” (2002-2005).

CITIZENSHIP

Indian Citizenship; student holding F-1 visa.

REFERENCES

Available upon request.