Graduate Seminar: Topics in Computational Social Science
Spring Semester at UW-Madison – 3 credits as Directed Study with D. Shah

Coordinating Faculty:

Joseph N. Cappella, University of Pennsylvania
Noshir Contractor, Northwestern University
Dhavan Shah, University of Wisconsin Madison

Time and Place:

1:00-4:00 CST / 2:00-5:00 EST on Tuesdays between 1/19/16 to 5/10/16
Class meetings will be synchronous across locations
Meet in 5011 Vilas Hall (Mass Communication Research Center)

Schedule:

Sixteen instructional sessions are slotted on Tuesdays at the specified time, with a required initial session on January an optional closing session on May 10. Each registering student is required to attend at least thirteen (13) of the sixteen (16) scheduled meetings. Given the three-hour meeting time of the seminar, that will generate 39.0 hours of instructional time at each participating institution. A formal schedule will follow, with the confirmed speakers and topics listed below. Each of the coordinating faculty members will also lead a session.

Structure:

After the introductory session when we discuss goals and explore points of collaboration, we will have a series of three-hour sessions, focused around the research of the scheduled speaker. Northwestern will handle the technology support, with a teleconferencing system used to connect the participating schools with the speaker. Each weekly session will have one hour dedicated to hearing a presentation from the invited researcher or coordinating faculty member, followed by about an hour of Q&A and joint discussion that will include the presenter, the participating faculty, and the students from each institution. After that, instructors will go offline for a focused session of one hour with the students at their institution, and discussion of individual/group projects, and reflections of the speaker's work.

The seminar will culminate with a workshop hosted at Northwestern University:

June 21-22, 2016 at Evanston, IL (costs of travel will be covered)

The workshop is scheduled to precede the 2016 International Conference on Computational Social Science, June 23-26 at Northwestern University: www.kellogg.northwestern.edu/news-events/conference/ic2s2/2016.aspx

Student Profile:

Students who take this class should have some familiarity with computational methods and tools, and an active research project or program that involves use of these approaches in social science inquiry. Students beginning such projects are welcome, but will be expected to develop that work over the term.

Orienting Readings:

Alverez, R. M., (2016) Introduction. *Computational Social Science: Discovery and Prediction* (Analytical Methods for Social Research), Cambridge University Press.

Boyd, D., & Crawford, K. (2012). Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. Information, communication & society, 15(5), 662-679.

Contractor, N. (2013). Some assembly required: leveraging Web science to understand and enable team assembly. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, *371*(1987), 20120385.

Japec, L., Kreuter, F., Berg, M., Biemer, P., Decker, P., Lampe, C., ... & Usher, A. (2015). Big Data in Survey Research AAPOR Task Force Report. *Public Opinion Quarterly*, *79*(4), 839-880.

Lazer, D., Pentland, A. S., Adamic, L., Aral, S., Barabasi, A. L., Brewer, D., ... & Van Alstyne, M. (2009). Life in the network: the coming age of computational social science. *Science (New York, NY)*, *323* (5915), 721.

Murphy, J., Link, M. W., Childs, J. H., Tesfaye, C. L., Dean, E., Stern, M., ... & Buskirk, T. D. (2014). Social Media in Public Opinion Research: Report of the AAPOR Task Force on Emerging Technologies in Public Opinion Research. *American Association for Public Opinion Research*.

Shah, D. V., Cappella, J. N., & Neuman, W. R. (2015). *Toward Computational Social Science: Big Data in Digital Environments*. The Annals of the American Academy of Political and Social Science, *659*, 6-307.

Topic Areas and Confirmed Speakers: (Scheduling and reading TBD)

Computational approaches to language processing and prediction:

Lyle Ungar, U. of Pennsylvania

"Inferring Individual and County Level Traits from Social Media"

Readings:

Schwartz, H. A., & Ungar, L. H. (2015). Data-Driven Content Analysis of Social Media A Systematic Overview of Automated Methods. The ANNALS of the American Academy of Political and Social Science, 659(1), 78-94.

Schwartz, H. A., Eichstaedt, J. C., Kern, M. L., Dziurzynski, L., Ramones, S. M., Agrawal, M., ... & Ungar, L. H. (2013). Personality, gender, and age in the language of social media: The open-vocabulary approach. PloS One, 8(9).

Munmun De Choudhury, Georgia Tech

"Opportunities and Challenges of Social Media in Personal and Societal Well-being"

Readings:

De Choudhury, M., Counts, S., & Horvitz, E. (2013). Predicting Postpartum Changes in Emotion and Behavior via Social Media. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI).

De Choudhury, M., Gamon, M., Counts, S., & Horvitz, E. (2013). Predicting Depression via Social Media. In Proceedings of the 7th International AAAI Conference on Weblogs and Social Media (ICWSM).

De Choudhury, M., Sharma, S. S., & Kıcıman, E. (2016). Characterizing Dietary Choices, Nutrition, and Language in Food Deserts via Social Media. In Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW).

Catalina Toma, U. of Wisconsin

"Language and Social Dynamics in Computer-Mediated Communication: Theory, Methods, and Empirical Finding"

Readings:

Pennebaker, J. W. (2002). What our words can say about us: Toward a broader language psychology. Psychological Science Agenda, 15, 8-9.

Hancock, J.T., Beaver, D.I., Chung, C.K., Frazee, J., Pennebaker, J.W., Graesser, A., & Cai, Z., (2010). Social language processing: A framework for analyzing the communication of terrorists and authoritarian regimes. Behavioral Sciences of Terrorism and Political Aggression 2, 108-132.

Toma, C. & Hancock, J.T. (2012). What lies beneath: The linguistic traces of deception in online dating profiles. Journal of Communication, 62, 78-97.

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Dhavan Shah, U. of Wisconsin

"Tracing Sentiment in Networked Spheres: Rethinking the Nature of Communication Influence"

Readings:

Shah, D. V., Culver, K. B., Hanna, A., Macafee, T., & Yang, J. (2015). 16. Computational approaches to online political expression: rediscovering a 'science of the social'. *Handbook of Digital Politics*, 281.

Namkoong, K., McLaughlin, B., Yoo, W., Hull, S. J., Shah, D. V., Kim, S. C., ... & Gustafson, D. H. (2013). The effects of expression: how providing emotional support online improves cancer patients' coping strategies. *Journal of the National Cancer Institute. Monographs*, *2013*(47), 169.

Shah, D. V., Hanna, A., Bucy, E. P., Lassen, D. S., Thomme, J. V., Bialik, K., Yang, J. & Pevehouse, J. (forthcoming). Dual screening during Presidential debates: Political nonverbals and the volume and valence of online expression. American Behavioral Scientist.

Computational approaches in network science:

Ron Burt – U. of Chicago

"Social networks and structural holes: Evidence of Network Advantage"

Readings:

Burt, R., "Structural Holes in Virtual Worlds: Evidence on Personality and History Affecting Network Advantage, June 2016 draft introductory chapter in a book tentatively titled *Structural Holes in Virtual Worlds*.

Burt, R. S. (2012). Network-related personality and the agency question: Multirole evidence from a virtual world1. *American Journal of Sociology*, *118*(3), 543-591.

Burt, R., & Merluzzi, J. (2016). Network Oscillation. *Academy of Management Discoveries*, amd-2015.

Sandra Gonzalez Bailon, U. of Pennsylvania

"Tools to Map the Structure of Large-Scale Coordination – and Applications to the Study of Political Mobilization."

Readings:

Borge-Holthoefer, Javier, and Sandra González-Bailón. 2015, forthcoming. "Scale, Time and Activity Patterns: Advanced Methods for the Analysis of Online Networks." in Handbook of Online Research Methods, edited by Nigel Fielding, Ray Lee, and Grant Blank. London: Sage.

Barberá, Pablo, Ning Wang, RIchard Bonneau, John Jost, Jonathan Nagler, Joshua

Tucker, and Sandra González-Bailón. 2015. "The Critical Periphery in the Growth of Social Protests." PloS ONE 10(11).

González-Bailón, Sandra, and Ning Wang. 2016. "Networked Discontent: The Anatomy of Protest Campaigns in Social Media." Social Networks 44:95-104.

Duncan Watts - Microsoft Research

"Collective Dynamics of 'Small-World' Networks"

Readings:

Goel, S., Anderson, A., Hofman, J., & Watts, D. J. (2015). The structural virality of online diffusion. *Management Science*, *62*(1), 180-196.

Goel, S., Watts, D. J., & Goldstein, D. G. (2012, June). The structure of online diffusion networks. In *Proceedings of the 13th ACM conference on electronic commerce* (pp. 623-638). ACM.

Mao, A., Mason, W., Suri, S., & Watts, D. J. (2016). An experimental study of team size and performance on a complex task. *PloS one*, *11*(4), e0153048.

Lada Adamic, U. of Michigan

"Social Networks, Information Diffusion, and Online Communities"

Readings:

Adamic, L. A., Lento, T. M., Adar, E., & Ng, P. C. (2014). Information evolution in social networks. *arXiv preprint arXiv:1402.6792*.

Cheng, J., Adamic, L. A., Kleinberg, J. M., & Leskovec, J. (2016, April). Do Cascades Recur?. In *Proceedings of the 25th International Conference on World Wide Web* (pp. 671-681). International World Wide Web Conferences Steering Committee

Computer-based and agent-based modeling:

Michael Macy, Cornell

"Computational Thought Experiments using Agent Based Models"

Readings:

Macy, M. and R. Willer. 2002. "From Factors to Actors: Computational Sociology and Agent-Based Modeling." Annual Review of Sociology, 28:143-66.

Della Posta, Daniel J., Yongren Shi, and Michael W. Macy. 2015. "Why Do Liberals Drink Lattes?" American Journal of Sociology, 120: 1473-1511.

Centola, D. and M. Macy. 2007. "Complex Contagions and the Weakness of Long Ties." American Journal of Sociology 113:702-34.

Centola, D., R. Willer, and M. Macy. 2005. "The Emperor's Dilemma: A Computational

Model of Self-Enforcing Norms." American Journal of Sociology, 110:1009-1040.

Damon Centola, U. of Pennsylvania

"Large Networks and Agent-based Modeling"

Readings:

Centola, D. (2010). The spread of behavior in an online social network experiment. *science*, *329*(5996), 1194-1197.

Centola, D. (2015). The Social Origins of Networks and Diffusion. *American Journal of Sociology*, *120*(5), 1295-1338.

Centola, D., & Macy, M. (2007). Complex contagions and the weakness of long ties1. *American journal of Sociology*, *113*(3), 702-734.

Nosh Contactor, Northwestern

"Computational Models of Communication and Knowledge Networks"

Readings:

Contractor, N. S., & DeChurch, L. A. (2014). Integrating social networks and human social motives to achieve social influence at scale. *Proceedings of the National Academy of Sciences*, *111*(Supplement 4), 13650-13657.

Contractor, N. (2013). Some assembly required: leveraging Web science to understand and enable team assembly. *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences*, *371*(1987), 20120385.

Welles, B. F., & Contractor, N. (2015). Individual Motivations and Network Effects A Multilevel Analysis of the Structure of Online Social Relationships. *The ANNALS of the American Academy of Political and Social Science*, *659*(1), 180-190.

Carter, D. R., Asencio, R., Wax, A., DeChurch, L. A., & Contractor, N. S. (2015). Little Teams, Big Data: Big Data Provides New Opportunities for Teams Theory. *Industrial and Organizational Psychology*, *8*(04), 550-555.

Sullivan, S. D., Lungeanu, A., Dechurch, L. A., & Contractor, N. S. (2015). Space, time, and the development of shared leadership networks in multiteam systems. *Network Science*, *3*(01), 124-155.

Uri Wilensky, Northwestern

"Connected Learning, Computer-Based Modeling, NetLogo Agent-based Modeling Software"

Readings:

Wilensky, U., & Rand, W. (2015). *An introduction to agent-based modeling: modeling natural, social, and engineered complex systems with NetLogo*. MIT Press.

Maroulis, S., Bakshy, E., Gomez, L., & Wilensky, U. (2014). Modeling the transition to public school choice. *Journal of Artificial Societies and Social Simulation*, *17*(2), 3.

Wilensky, U., & Resnick, M. (1999). Thinking in levels: A dynamic systems approach to making sense of the world. *Journal of Science Education and technology*, *8*(1), 3-19.

Algorithmic tools and recommender systems:

Paul Resnick, U. of Michigan

"Recommender Systems, Collaborative Filtering, and SocioTechnical Capital"

Readings:

Resnick, P., Adar, E., & Lampe, C. (2015). What social media data we are missing and how to get it. *The ANNALS of the American Academy of Political and Social Science*, *659*(1), 192-206.

Jannach, D., Resnick, P., Tuzhilin, A., Zanker, M.: Recommender Systems - Beyond Matrix Completion, Communications of the ACM, (accepted for publication)

Jen Golbeck – U. of Maryland

"Uncovering Hidden Personal Attributes from Social Media"

Readings:

Kosinski, Michal, David Stillwell, and Thore Graepel. "Private traits and attributes are predictable from digital records of human behavior." Proceedings of the National Academy of Sciences 110.15 (2013): 5802-5805.

De Choudhury, Munmun, Scott Counts, and Eric Horvitz. "Predicting postpartum changes in emotion and behavior via social media." Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. ACM, 2013.

Golbeck, Jennifer, and Derek Hansen. "A method for computing political preference among Twitter followers." Social Networks 36 (2014):177-184.

Joseph Cappella, U. of Pennsylvania

Recommender systems, algorithms, and effective health messages

Readings:

Arunachalam, K., & Thambidurai, P. (2010). Collaborative web recommendation systems-a survey approach. *Global Journal of Computer Science and Technology*, *9*(5).

Cappella, J. N., Yang, S., & Lee, S. (2015). Innovations in Computational Social Science: Constructing Recommendation Systems for Effective Health Messages Using Content, Collaborative, and Hybrid Algorithms. *Annals*, *659*, 290-307.

Diakopoulos, N. (2015). Algorithmic accountability: Journalistic investigation of computational power structures. *Digital Journalism*, *3*(3), 398-415.

Fu, W. W. (2012). Selecting online videos from graphics, text, and view counts: The moderation of popularity bandwagons. *Journal of Computer-Mediated Communication*, *18*(1), 46-61.

Ricci, F., Rokach, L., Shapira, B., & Kantor, P. B. (2011). Recommendation systems handbook. *Heidelberg (ao): Springer*. (Chapter 1 only; full version available online)

Projects and Data:

Individual or group projects are permitted, with collaborations across universities
Available data sets include:

Twitter Archive at UW- Madison - for collaboration with UW researchers
English Gigaword Archive - https://catalog.ldc.upenn.edu/LDC2011T07
CHESS Health Social Networking Data – request data access w/ absrract

Schedule, Speaker, and Session Topics

Meeting Date	Session Topic
Jan 19	Joe Cappella, Nosh Contractor, and Dhavan Shah - Introduction: Goals and Structure
Jan 26	Jen Golbeck – U. of Maryland - "Uncovering Hidden Personal Attributes from Social Media"
Feb 2	Catalina Toma, U. of Wisconsin - "Language and Social Dynamics in Computer-Mediated Communication: Theory, Methods, and Empirical Finding"
Feb 9	Michael Macy, Cornell - "Computational Thought Experiments using Agent Based Models"
Feb 16	Dhavan Shah, U. of Wisconsin - "Tracing Sentiment in Networked Spheres: Rethinking the Nature of Communication Influence"
Feb 23	Lyle Ungar, U. of Pennsylvania - "Inferring Individual and County Level Traits from Social Media"
Mar 1	Lada Adamic, U. of Michigan - TOPIC: Social networks, information diffusion, and online communities
Mar 8	Sandra Gonzalez Bailon, U. of Pennsylvania - "Tools to Map the Structure of Large-Scale Coordination – and Applications to the Study of Political Mobilization."
Mar 15	Ron Burt – U. of Chicago – TOPIC: Social networks and structural holes
Mar 22	Duncan Watts - Microsoft Research - TOPIC: Collective dynamics of 'small-world' networks
Mar 29	Damon Centola, U. of Pennsylvania - TOPIC: Large networks and agent-based modeling
Apr 5	Joseph Cappella, U. of Pennsylvania – TOPIC: Recommender systems, algorithms, and effective health messages
Apr 12	Nosh Contactor, Northwestern – TOPIC: Computational models of communication and knowledge networks
Apr 19	Paul Resnick, U. of Michigan – TOPIC: Recommender Systems, Collaborative Filtering, and SocioTechnical Capital
Apr 26	Munmun De Choudhury, Georgia Tech – "Opportunities and Challenges of Social Media in Personal and Societal Well-being"
May 3	Uri Wilensky, Northwestern - TOPIC: Connected Learning and Computer-Based Modeling Jure Leskovec, Stanford – TOPIC: Massive networks, higher order network structures
May 10	Optional Closing: Reflections and Collaborations