



Seminar: Computational Social Science

Spring Term 2017

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Description

This applied research seminar introduces students to the field of computational social science. It covers four core research areas in the field: automated data extraction, social complexity, computational simulations and social network analysis. Each topic is introduced over several sessions. Assigned readings cover foundational work and key methodological contributions as well as current examples from social science research. The course highlights technical strengths and limitations of the various approaches introduced. It also critically reflects on where and how specific computational approaches can contribute to answering substantial social science research questions. It further provides an overview of existing tools implementing the various approaches discussed. As part of the seminar, students pursue an independent research project using computational social science approaches. For students in the SEDA master, the course is recommended to satisfy the Data Analysis Project requirement. There are no strict formal prerequisite requirements for this course but good programming skills and a strong background in (quantitative) research methods and statistics are expected.

Requirements and Grading

Students will have to fulfill the following requirements:

- Participate at the sessions of the seminar.
- Read the required readings assigned for each week.
- Write three short response papers on the topics. The memos should develop a critique and analysis of the week's readings. These memos are due on Friday evening prior to the week in which this topic is scheduled. Students need to be prepared to briefly present their main arguments in class.
- Prepare a research design (due in week 12) that outlines the research question and the relevant literature and methods for the research paper (see below).
- Discuss a research design of another student.
- Write a research paper on a topic chosen by the students (in agreement with the instructors).

Grades for the seminar will consist of the following elements:

- 70 % term paper
- 10 % response papers
- 20 % research presentation and class participation

All readings are available on ILIAS at:

[https://ilias.uni-konstanz.de/ilias/goto ilias uni crs 652229.html](https://ilias.uni-konstanz.de/ilias/goto%20ilias%20uni%20crs%20652229.html)

Course Schedule

Week 1 (April 24th). Introduction – What is Computational Social Science

Lazer, David, Alex Pentland, Lada Adamic, Sinan Aral, Albert-László Barabasi, Devon Brewer, Nicholas Christakis, Noshir Contractor, James Fowler, Myron Gutmann, Gary King, Michael Macy, Deb Roy and Marshall Van Alstyne. (2009). “Computational Social Science.” *Science* 323: 721–723.

Giles, Jim. (2012) “Computational Social Science: Making the Links.” *Nature* 488: 448–450.

Week 2 (May 1st). No Seminar (public holiday)

Week 3 (May 8th). Automated Data Extraction – Basics

Jürgens, Pascal and Andreas Jungherr. (2016). “A Tutorial for Using Twitter Data in the Social Sciences: Data Collection, Preparation, and Analysis.” Available at *SSRN*: <http://dx.doi.org/10.2139/ssrn.2710146>.

Munzert, Simon, Christian Rubba, Peter Meißner and Dominic Nyhuis. (2015). *Automated Data Collection with R: A Practical Guide to Web Scraping and Text Mining*. Chichester, UK: Wiley. [Chapter 1](#)

Ruths, Derek, and Jürgen Pfeffer. (2014). “Social Media for Large Studies of Behavior.” *Science* 192: 59–60.

Week 4 (May 15th). Automated Data Extraction – Media Data

Earl, Jennifer, Andrew Martin, John D. McCarthy and Sarah A. Soule. (2004). “The Use of Newspaper Data in the Study of Collective Action.” *Annual Review of Sociology* 30(1): 65–80.

Grimmer, Justin and Brandon M. Stewart. (2013). “Text as Data: The Promise and Pitfalls of Automatic Content Analysis Methods for Political Texts.” *Political Analysis* 21(3): 267–297.

Chadefaux, Thomas. (2014). “Early Warning Signals for War in the News.” *Journal of Peace Research* 51(1): 5–18.

Week 5 (May 22nd). Automated Data Extraction – Social Media Data

Golder, Scott A., and Michael W. Macy. (2011). “Diurnal and Seasonal Mood Vary with Work, Sleep, and Daylength Across Diverse Cultures.” *Science* 333: 1878–1881.

King, Gary, Jennifer Pan and Margaret E. Roberts. (2014). “Reverse-Engineering Censorship in China: Randomized Experimentation and Participant Observation.” *Science* 345: 1251722-1–1251722-10.

Spaiser, Viktoria, Thomas Chadeaux, Karsten Donnay, Fabian Russmann and Dirk Helbing. (2017). “Communication Power Struggles on Social Media: A Case Study of the 2011–12 Russian Protests.” *Journal of Information Technology & Politics* 14(2): 132–153.

Week 6 (May 29th). Social Complexity - Basics

Helbing, Dirk. (2010). “Pluralistic Modeling of Complex Systems.” *Science and Culture* 76(9-10): 315–329.

Miller, John H. and Scott E. Page. (2004). “The Standing Ovation Problem.” *Complexity* 9(5): 8–16.

Clauset, Aaron, Cosma R. Shalizi and M. E. J. Newman. (2009). “Power-Law Distributions in Empirical Data.” *Siam Review* 51(4): 661–703.

Week 7 (June 5th). No Seminar (public holiday)

Week 8 (June 12th). Social Complexity - Applications

Cederman, Lars-Erik. (2003). “Modeling the Size of Wars: From Billiard Balls to Sandpiles.” *American Journal of Political Science* 97(1): 135–150.

Schich, Maximilian, Chaoming Song, Yong-Yeol Ahn, Alexander Mirsky, Mauro Martino, Albert-László Barabasi and Dirk Helbing. (2014). “A Network Framework of Cultural History.” *Science* 345: 558–562.

Clauset, Aaron, Maxwell Young and Kristian S. Gleditsch. (2007). “On the Frequency of Severe Terrorist Events.” *Journal of Conflict Resolution* 51(1): 58–87.

Week 9 (June 19th). Computational Simulations – Basics

Schelling, Thomas C. (1971). “Dynamic Models of Segregation.” *Journal of Mathematical Sociology* 1: 143–186.

Epstein, Joshua M. (1999). “Agent-Based Computational Models and Generative Social Science.” *Complexity* 4(5): 41–60.

Riolo, Rick, Michael Cohen, and Robert Axelrod. (2001). “Evolution of Cooperation without Reciprocity.” *Nature* 414: 441–443.

Week 10 (June 26th). Computational Simulations - Applications

Axtell, Robert L., Joshua M. Epstein, Jeffrey S. Dean, George J. Gumerman, Alan C. Swedlund, Jason Harburger, Shubha Chakravarty, Ross Hammond, Jon Parker and Miles Parker. (2002). "Population Growth and Collapse in a Multiagent Model of the Kayenta Anasazi in Long House Valley." *Proceedings of the National Academy of Sciences* 99: 7275–7279.

Weidmann, Nils and Idean Salehyan. (2013). "Violence and Ethnic Segregation: A Computational Model Applied to Baghdad." *International Studies Quarterly* 57(1): 52–64.

Bhavnani, Ravi, Karsten Donnay, Dan Miodownik, Maayan Mor, and Dirk Helbing. (2014). "Group Segregation and Urban Violence." *American Journal of Political Science* 58(1): 226–245.

Week 11 (July 3rd). Social Network Analysis - Basics

Watts, Duncan J. (2004). "The 'New' Science of Networks." *Annual Review of Sociology* 30(1): 243–270.

Lazer, David. (2011). "Networks in Political Science: Back to the Future." *PS: Political Science & Politics* 44(1): 61–68.

Easley, David and Jon Kleinberg. (2010). *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*. New York: Cambridge University Press. Chapters 1 & 2

Week 12 (July 10th). Social Network Analysis – Applications

Conover, Michael D., Jacob Ratkiewicz, Matthew Francisco, Bruno Goncalves, Alessandro Flammini and Filippo Menczer. (2011). "Political Polarization on Twitter." *Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media*, p. 89–96.

Robins, Garry, Jenny M. Lewis, and Peng Wang. (2012). "Statistical Network Analysis for Analyzing Policy Networks." *Policy Studies Journal* 40 (3): 375–401.

Centola, Damon. (2010). "The Spread of Behavior in an Online Social Network Experiment." *Science* 329: 1194–1197.

Christakis, Nicholas A. and James H. Fowler. (2007). "The Spread of Obesity in a Large Social Network Over 32 Years." *New England Journal of Medicine* 357(4): 370–379.

Week 13 (July 17th). Student Presentations 1

Week 14 (July 24th). Student Presentations 2

Final Papers Due: September 15th 2017