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COMM 621 Quantitative Methods in Research

Spring 2019

Wed. 4:00PM - 6:45PM; ILC S418

WHY THIS COURSE?

There is a great myth about everything quantitative: statistics is upheld by many as the pathway to truth. We need to look no further than the society we live in. It is effectively run by algorithms and numbers. However, there are heated debates about the so-called replication crisis in social science¹. We are also dismayed by the failure of computer models in foreseeing Brexit, the rise of Trumpism, and the 2008 financial crisis. Many books, since the advent of social science, have talked about pitfalls in trusting numbers, from Darrell Huff's classic *How to Lie with Statistics* to Cathy O'Neil's 2016 bestseller *Weapons of Math Destruction*.

This course takes you on a journey to dispel the myth. You will learn to critically appreciate social science by applying basic concepts such as *deductive logic*, *reliability*, *validity*, *p-value*, *effect size*, and etc. We will cover conventional quantitative designs (i.e., survey, content analysis, and experiment), as well as inferential statistic tests (i.e., correlation, t-test, and regression).

Additionally, We will explore how to leverage the latest computational approaches (e.g., network analysis, text mining, and supervised machine learning) to answer questions in social science & humanities. The motto of the class is *learning by getting hands dirty*. So, each student is expected to learn the open-source programming language R to collect data, churn out numbers, and visualize patterns.

COURSE OBJECTIVES

- To critically appreciate social science by understanding the strengths and weaknesses of each quantitative method;
- To understand the logic of deductive, hypothesis-testing research and data-driven exploratory analyses;

¹<https://www.economist.com/science-and-technology/2018/03/17/are-research-papers-less-accurate-and-truthful-than-in-the-past>

- Acquire practical skills in using R to conduct data cleaning, analysis, and visualization. (Of course, I am not able to pack everything you need to know about R into one course. Hopefully, this course will ignite your interest in R and lead you to many great online courses).

COURSE STRUCTURE

Discussion: through in-class discussions, we will become familiar with the terms, concepts, and statistical tests necessary for conducting and critiquing quantitative research.

Hands-on workshops: I will hold a series of workshops to teach you how to use R. To aid the workshops, I will use interactive tutorials hosted on my website (curiositybits.cc/tutorial/). You will practice the R codes first through the tutorial and then on your own local machine.

Article critique: you will bring in an example of published quantitative research project for critique in class.

Your own research project: integrate one of the quantitative methods covered in the class into your existing line of research. The final research project you will develop for the class should be something that you intend to publish in the future.

LEARNING MATERIALS

Required texts for inferential statistics

- Babbie, E. (2013). *The practice of social research*. 14th Edition. Belmont, CA: Wadsworth;
- Wheelan, C. (2013). *Naked statistics: Stripping the dread from the data*. WW Norton & Company;
- Additional readings may be added.

Required text for R

- Arnold, T., & Tilton, L. (2015). *Humanities data in R: Exploring networks, geospatial data, images, and text*. Cham: Springer International Publishing AG. <https://humanitiesdata.org/>

Great e-books and online resources about R

- *R-bloggers* (www.r-bloggers.com);
- Stack Overflow (stackoverflow.com) for posting questions about R;

- Silge, J., & Robinson, D. (2018). *Text Mining with R*. Cham: Springer International Publishing AG. <https://www.tidytextmining.com/> (free).

DEVICE & SOFTWARE REQUIREMENT

We will use two essential open-source software: *R* (www.r-project.org) and *RStudio* (www.rstudio.com). They run on Windows, Mac OS, and Linux systems (e.g., Ubuntu). They don't work with your Chromebook. If your primary computing device is a Chromebook, talk to me and we can set up a cloud server so that you can run R codes in the cloud using the Chrome browser.

EVALUATION

- Research Project Design 60%
 - Proposal Draft 10%
 - Paper 50%
- Article Critique & Presentation 15%
- Completion of tutorials 10%
- Class Participation 15%

COURSE SCHEDULE

* Please come to class having done the readings, prepared to define major concepts and terms and provide communication-oriented examples.

* We MAY adjust due dates and scheduling of topics and concepts as needed throughout the semester based on the progress of the original research projects.

| Date | Topic | Readings | Due |
|---------|---|---|-----|
| W1 1/23 | Introduction & Overview | Required readings on Moodle | |
| W2 1/30 | Social Science Inquiry, Deductive Logic and Research Design | Ch. 1, 2, 3,4 of Babbie's Ch. 1 of Wheelan's | |

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| W3 2/6 | Measurement and Indexes/Scales | Ch. 5, 6 of Babbie's Ch. 1, 2, 3 of Wheelan's | |
| W4 2/13 | Sampling & Statistics | Ch. 7, 16 of Babbie's Ch. 5, 6, 8, 10 of Wheelan's | |
| W5 2/20 | Surveys & Experiments Article critique 1 | Ch. 8, 9 of Babbie's | |
| W6 2/27 | Content Analysis, Introducing R Article critique 2 | Ch. 11 of of Babbie's; Ch. 1, 2 in Arnold, T., & Tilton's required tutorials | |
| W7 3/6 | Text as data part 1 Article critique 3 | Ch.9, 10 in Arnold, T., & Tilton's required tutorials | |
| W8 | SPRING RECESS | | |
| W9 3/20 | Text as data part 2 Article critique 4 | Ch.9, 10 in Arnold, T., & Tilton's required tutorials | Research proposal draft |
| W10 3/27 | Network as data part 1 Article critique 5 | Ch.6 in Arnold, T., & Tilton's required tutorials | |
| W11 4/3 | Network as data part 2 Article critique 6 | Ch.6 in Arnold, T., & Tilton's required tutorials | |
| W12 4/10 | Descriptive and inferential stats using R (correlations, t-tes) | Ch.4 of Wheelan's . required tutorials | Research proposal second draft |
| W13 | NO CLASS, MONDAY SCHEDULE OBSERVED | | |
| W14 4/24 | Inferential Statistics using R (ANOVA, regression) | Ch. 11, 12 of Wheelan's required tutorials | |
| W15 5/1 | Presentation | | |

FAQs

I am in humanities, why should I care about social science?

There are a couple of reasons why you should learn to appreciate social science. First, advances in computational methods have ushered in an era of digital humanities. Many of the methods covered in the class (e.g., network analysis and text mining) are widely used in digital humanities. You can expand your methodological repertoire to become a more valuable contributor to your field. Second, the schism between social science and humanities is not just methodological but ideological. Some qualitative disciplines have become the target of attacks from the opposing camps (see the latest criticism of grievance studies²). To understand where the criticism is coming from and to defend your field, you must understand the logic, strengths, and vulnerability of social science.

I am not in humanities & social science, why should I care about social science?

Social science matters as solving problems in engineering and urban development require an understanding of human factors. It means digging through the vast body of social science literature to find relevant insights. You might be already familiar with basic inferential statistics, or even well equipped with knowledge of computational methods. If that is the case, you are more than welcome to chime in to help me and your fellow social science & humanities colleague to accurately apply computational techniques. I also count on you to provide perspectives from your discipline to bridge gaps between disciplines.

What if I don't like numbers at all?

No previous knowledge of quantitative methods or statistics or computer programming is needed. In fact, this course is designed with students in humanities in mind. That said, some course content may seem technical. Thus, I invite you to step out of your intellectual comfort zone and try out new things.

Are you following any social scientist on Twitter?

Yes. Twitter is a great place to keep up with what is going on in social science, particularly in the area of computational social science and digital humanities. I have a list of my favorite social scientists, listed as below:

² <https://heterodoxacademy.org/academic-grievance-studies/>

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- Deen Freelon: dfreelon.org, @dfreelon
 - Pablo Barberá, pablobarbera.com, @p_barbera
 - Christopher Andrew Bail, chrisbail.net, @chris_bail
 - Paul DiMaggio, @paul_dimaggio

You can, of course, create a list of your own.

What is your Positionality?

I identify with the field of computational communication research. I believe in objective reality and reckon that social science is one of the ways to fathom the reality. If used well, quantitative methods can complement many qualitative inquiries. I believe scholars in social science & humanities have the social and civic responsibility to care for the poor and the needy. Our primary role lies in the discovery of knowledge guided by qualitative and quantitative evidence to prescribe solutions to address societal problems.

That is the paradigm I subscribe to. What is yours?

Academic Honesty Policy Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. For more information about what constitutes academic dishonesty, please see the Dean of Students' website:

http://umass.edu/dean_students/codeofconduct/acadhonesty/

Disability Statement

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you are in need of accommodation for a documented disability, register with Disability Services to have an accommodation letter sent to your faculty. Please initiate these services and to communicate with faculty ahead of time to manage accommodations in a timely manner. For more information, consult the Disability Services website at

<http://www.umass.edu/disability/>.

Commitment to Mutual Understanding, and Constructive Disagreement

In order to create a classroom environment that supports respectful, critical inquiry through the free exchange of ideas, the following principles will guide our work:

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- Treat every member of the class with respect, even if you disagree with their opinion;
 - Bring light, not heat;
 - Reasonable minds can differ on any number of perspectives, opinions, and conclusions;
 - Because constructive disagreement sharpens thinking, deepens understanding, and reveals novel insights, it is not just encouraged, it is expected;
 - No ideas are immune from scrutiny and debate;
 - You will not be graded on your opinions.