EDMS 769M: Social Network Models

Dr. Tracy Sweet

Fall 2017

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Office Hours: W 1-2 and by appointment
Office: 1230A Benjamin

Class Hours: M 4:15-7
Class Room: Benjamin 1315

Course Description

Social networks are defined by a set of relationships, such as friendship or collaboration, among a group of individuals and are common in any discipline in which individuals interact. Where as social network analysis refers to general quantitative methods involving social networks, social network models refer to statistical models that can be fit to social network data. This course focuses primarily on models however we will spend some time during the course learning about exploratory analysis as well. This course will focus primarily on selection models but we may discuss social influence models and longitudinal models as well.

Textbooks

We will use the following textbook throughout the first half of the semester.


Other Resources


Course Objectives

Students taking this class come a variety of programs and have different levels of prerequisite skills (although everyone should be familiar with linear models and R), have different interests
and will use the information provided in this course in a different way. At the same time, this is
an EDMS seminar course, which means that we will focus on methodology and applications but
not on social network theory.

The overall goal is for each of you to complete this course knowing how to analyzing social
network data, what social network models are and what it means to be a social network model,
what some areas of methodological research are, and most importantly with a better understand-
ing of how independence assumptions drive the creation (or create the necessity) for additional
statistical models. I hope at the same time, you become even more proficient with coding in R.

1. Summarize and describe social network data
2. Understand why standard statistical models may not be appropriate for social network data
3. Choose and specify an appropriate model for a given dataset and research question
4. Fit an array of social selection models using standard R packages
5. Use posterior predictive checks or other model assessment features to assess model fit
6. Study the social network literature and learn about additional models, assist in method-
ological research, or develop new methods

Instruction

Our class time will consist of lecture, individual and group work as well as data analysis. Please
bring your (charged) computers to class each week.

Assessment

There will be a variety of assessments and feedback so that you have a sense of your under-
standing of these topics and proficiency in using tools in R. There will be several homework
assignments, several short group presentations and a final project.

Homework

Homework assignments will generally consist of applying the skills gained in class to solve a
particular set of problems. While typical homework problems require executing code covered in
class in a new context, you will also be asked to learn new things on your own or research topics
as part of homework.

Presentations

Students will give a short (10-15 minutes) presentation on an assigned topic throughout the
course. These presentations can be done in pairs. See course schedule below. The topic of the
presentations depend on the ability and interest of the students. Think of these presentations as
short lectures in which you will teach the rest of the class something.
Final Project

In lieu of a final exam, students will complete a final project of their choice. They will propose a project by Week 10 and all projects will be due on the last day of class. Because the skills and interests likely vary, a wide range of projects will be accepted. We will discuss projects in more detail throughout the course.

Expectations

**Courtesy** Lateness, disruptive behavior, cellphone use, etc is discourteous and not tolerated.

**Communication** Keep the lines of communication open. Return emails in a timely fashion. I’ll keep you apprised of changes to the schedule or other class information by email.

**Engage** Participate, pay attention, ask questions, take notes, etc.

**Feedback** I will provide feedback to you in the form of grades or class level feedback during lecture. If you want more individual feedback, come to office hours or send me an email. In return, I expect you to give me feedback (before the course evaluation).

**Extra Help** I have office hours 9-10 on Tuesday mornings, but you must notify me if you plan to attend. Additional times/days are also available. Please contact me by email to schedule an appointment.

Grades

This course is not graded on a curve. Grades are calculated based on the following weights:

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<tr>
<td>Homework</td>
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<td>Presentations</td>
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<td>Final Project</td>
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<td>Attendance and Participation</td>
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**Letter Grade**

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<td>90 – 91.9</td>
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Academic Accommodations

If you have a documented disability, please let me know. Note that the academic achievement standards for the course will remain the same but there are various accommodations that we can discuss. For further information concerning disability accommodations, please contact Dr. Jo Ann Hutchinson at the Disability Support Service (301) 314-7682.
Make-up Examinations

The University policy states: “An instructor is not under obligation to offer a substitute assignment or to give a student a make-up assessment unless the failure to perform was due to an excused absence, that is, due to illness (of the student or a dependent), religious observance (where the nature of the observance prevents the student from being present during the class period), participation in university activities at the request of university authorities, or compelling circumstances beyond the student’s control. Students claiming excused absence must apply in writing and furnish documentary support for their assertion that absence resulted from one of these causes.”

Course Evaluations

As a student member of our academic community, your course evaluations are extremely important. Think of it as your responsibility as a student to provide accurate and fair evaluations. Your feedback is confidential and important for both improving the teaching and learning as well as tenure and promotion. Go to www.courseevalum.umd.edu/ to complete your evaluations. **If you complete all of your course evaluations each year, you can access the summary reports for thousands of courses at Testudo. See https://www.irpa.umd.edu/Assessment/CourseEval/stdt_faq.shtml/ for more information.**

Scheduled Topics

**Week 1, 08/28:** Introduction to EDMS 769M/Social Network Analysis
- Graph theory and notation: nodes, ties, degree, etc.
- Types of social networks
- *Readings:* Chapter 1 and 2;

**Week 2, 09/04:** NO CLASS Labor Day

**Week 3, 09/11:** Manipulating and visualizing network data (**Hw1 due**)
- What is social network data
- Importing network data
- igraph R package

**Week 4, 09/18:** Exploratory data analysis of network data
- Centrality, reciprocity, transitivity
- Community detection
Week 5, 09/25: Presentations of SNA topics (Presentation 1 due)

- Structural equivalence
- Small World
- Homophily, Popularity and
- Ego networks
- Embeddedness and Social Capital
- Structural holes

Week 6, 10/02: Statistical network models (Hw 2 due)

- Social Selection Models
- Erdos-Renyi-Gilbert graphs
- Markov graphs
- ERGMs
- statnet R package

Week 7, 10/09: Statistical network models: ERGMs

- ERGMs
- statnet R package
- Rethinking dependence assumptions
- What is wrong with ERGMs?

Week 8, 10/16: Statistical network models: CID (Hw 3 due)

- CID Models
- Latent space models
- Stochastic block models
Week 9, 10/23:  Statistical network models: CID
  • Mixed membership stochastic block models
  • More practice with CID networks
  • A comparison between statnet and CIDnetworks

Week 10, 10/30:  Presentations of Applications of Social Selection Models (Presentation 2 due)

Week 11, 11/06:  Catch up/exploration lab

Week 12, 11/13:  Longitudinal network models

Week 13, 11/20:  Hierarchical network models (Final Project Proposal due)

Week 14, 11/27:  Modeling social influence and diffusion

Week 15, 12/04:  Other topics (Hw 4 due)

Week 16, 12/11:  Final projects due