

Special Topics in Information Science: Critical Data Studies INF385T - 27269

School of Information, University of Texas at Austin
Amelia Acker
2019

Course Information

Class location UTA 1.504
Unique Number: 27269
Class day and time: Wednesdays, 3:00-6:00pm

Instructor Information

Instructor: Dr. Amelia Acker
Email: aacker@ischool.utexas.edu
Telephone: 512-471-8487
Office hours: Tuesdays 3:30 – 5 pm (and by appointment) Office location: 5.434

Teaching Assistant Information

TA: Hannah Cahoon
Email: johannacahoon@gmail.com

Course Overview

This course introduces students to the critical study of data through the landscape of networked information and communication technologies (ICTs)—their history, present, and future. It will examine the social impact and technical developments of data technologies, defined as any system designed to gather, process, or distribute information and data through network architecture. Given this broad definition, we will consider a wide range of data technologies: from databases, to mobile apps, to data centers, and more. One goal for the course is to approach “data” from different information studies perspectives. We will do this in two ways. First, by exploring contemporary research on the impact of data technologies in society; and second, using information studies theories and frameworks to explore data in society.

Given the broadness of the topic, the course is loosely structured around weekly themes. While neither historically nor thematically exhaustive, these themes capture significant horizons in the history and present of data, both in terms of technical innovation and social change in society. We will be especially concerned with how information professionals and information institutions figure into these themes, and how our roles may change. While it is usual to cast a distinction between technical and social dimensions when discussing technology, in this course we consider technological innovation as a complex process involving not only technical objects, but also people, ideas, organization, social coordination, money, politics, and culture.

By the end of the course, students will be familiar with the history of data structures and databases, the affordances that the internet and mobile networks have had on the rise of data collection contexts, and the social and political debates surrounding the shifts to platforms and algorithms in these collection contexts, including information created and transmitted with mobile devices and mobile networks. One goal is for participants to acquire the investigative skills necessary to assess how technological innovations such as tacit data collection affect society—creating new opportunities and ethical dilemmas. Another goal is to learn about the history, standardization, and commercialization of personal and community data in the US and throughout the world.

Course Objectives

The approach of this course is to expose participants to a range of data technologies that currently shape and have a history of shaping our everyday lives. The student will expand their knowledge base about the history of data collection, database technology, internet infrastructures and network architecture, develop critical skills in applying it to ICTs, and by the end of the course you will:

- Define the conceptual and theoretical dimensions of data and metadata from an information studies perspectives.
- Learn historical facts about data infrastructures that allow you to understand how technological innovation is a complex process involving people, ideas, social coordination, money, and culture.
- Become familiar with the fundamental approaches, debates and themes of database technologies over the second half of the twentieth century and the beginning of the twenty-first century, including how data applications currently figure into information institutions.
- Review, critique, and evaluate how the practice and implementation of data technologies are changing various facets of society
- You will learn concepts and methods that allow you to identify and analyze emerging technologies and innovations in order to recognize and implement relevant technological, ethical, or policy improvements

- You should learn to write clearly and concisely about complex social and technological phenomena.

Method of instruction

Each week we shall discuss a small set of readings, all of which are required (recommended readings will sometimes be provided). It is important that everyone comes to class well prepared and having read the material ready to discuss the week's readings. After discussing the readings, each week will feature a study of data that showcases a different way that individuals, institutions, or a community of experts creates, understands, uses, and applies data in different contexts. There is now an increasing amount of scholarly research in the area, and there is no way to cover it comprehensively, but we'll cover a number of themes, including:

- Defining data, defining critical data studies
- Personal data and the self
- Data capitalism
- Critical methods
- Human rights
- Bias and risk
- Capturing data
- Infrastructures
- Data Science and data analytics
- Data Centers
- Open data, governance and participation
- Algorithms

Course Readings and Materials

All course readings are available on the course Canvas site or available online. Please make sure to complete all readings before coming to class each week. You will need to do additional readings and outside research to complete your final paper.

Course Objectives

The course is intended to enable you to:

1. Define the conceptual and theoretical dimensions of big data.
2. Review big data technologies
3. Critique the practice of big data tools.

4. Evaluate how data collection and data analytics is changing various facets of society
5. Professional craft of research--reading analytically, critiquing readings, providing constructive criticisms, communicating effectively in your writing and oral communication skills.

Basic guidelines for discussion

This is a seminar style discussion course. Course participants will be expected to discuss the readings each week. Here are some basic guidelines.

Generosity. All readings selected for the syllabus are insightful and theoretically innovative. If you find yourself rejecting an argument in toto, this indicates your reading is insufficiently generous.

Provisionality. You are allowed (indeed, encouraged) to think out loud, say something and then take it back, and speak in a provisional manner, knowing that those around you will be patient, supportive, and slow to take offense.

Community. Some individuals are quite comfortable speaking at length: this is desirable, but I may ask persons to wrap up their comments, or to solicit comments from anyone.

Active participation. This course is designed for students who are pursuing research in information science and related fields, it is open to students from all campus units but will be taught at the graduate level. If you are not interested in reading to discuss materials in class at length, this may not be the course for you.

Time Commitment

This course requires a weekly time commitment. From the University's general catalog, "The credit value of courses is expressed in semester hours. Most courses are designed to require approximately three hours of work a week throughout the semester for each semester hour of credit given; that is, for each hour a class meets, an average of two additional hours of preparation is expected of the student. The time requirement in the laboratory, field, or studio varies with the nature of the subject and the aims of a course, so there is no fixed ratio of laboratory to class hours." Given that we'll meet approximately 2-3 hours each week, **a minimum of 6 hours per week outside of class** is expected for an onsite class of 3 hours of instruction.

Course Policies

Instructor Communication: E-mail is the official mode of communication for the university and the most reliable means of contact for me. It is always helpful if your e-mail includes a targeted subject line that begins with “INF 384M.” Do not use the messaging facilities in Canvas; these messages do not arrive in my e-mail in-box. Please allow a 24-hour window for email responses and plan accordingly. Please limit emails to 5 sentences or less. If your query about a reading or an assignment for the class takes more than 5 sentences to express, please come see me face to face in office hours. If you do not receive a sufficient answer to a question in more than one follow-up email (that is, a total of 2 personal emails from me) about the same question, please come meet with me. If you cannot make office hours, please email me to arrange an appointment. These policies are based on my belief in the sanctity and value of high-bandwidth communication (that is, face to face conversations).

Classroom Etiquette: Please come on time to class prepared, bringing soft or hard copies of readings for reference; bring appropriate tools for writing and note taking. Bring personal machines powered up, or plug them in before class begins, silence phones. *Drinks are welcome but food is not. Please eat before class or during the break period.*

Habits of mind: Respect for others; imagination; wonder; willingness to try and fail in front of others; empathy for others—in the past, present and future. I will discuss what I mean by habits of mind on the first day and throughout the course.

Copyright Notice: These materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials.

Statement on Classroom Recording: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student’s own private use.

On original work: cheating and plagiarism will not be tolerated. If an assignment turned in for credit is found to have been plagiarized, you will receive a grade of 0 points and a formal reprimand in your student file. You will be subject to the University’s disciplinary penalties, including the possibility of failure in the course.

Late assignments: *I do not accept late assignments.* Students who anticipate difficulties with completing assignments on time should consult with the instructor as soon as possible so that

alternate solutions can be discussed. When negotiated in advance, arrangements can often be made.

Attendance: Attendance is not taken. You do not need to inform me of absences, nor do you need to “make up” anything if you are absent. While participation is an important part of your grade, and attendance is important, there are no specific requirements for mandatory attendance. However, please be aware that a substantial in-class component of the course will be hands-on labs that are successive and cumulatively build skills. Missing a class may impact your ability to follow along in the next week’s lab component.

Style manual: Please use the American Psychological Association’s [style manual](#). In particular, please be sure to follow its citation formats and rules on language bias.

Gun policy: Please ask me about my policy on guns in my office when you visit.

University Policies

Religious holy days: A student who misses classes or other required activities, including examinations, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

Use of E-mail for Official Correspondence: All students should become familiar with the University's official e-mail student notification policy. It is the student's responsibility to keep the University informed as to changes in his or her e-mail address. Students are expected to check e-mail on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that e-mail be checked daily, but at a minimum, twice per week. The complete text of this policy and instructions for updating your e-mail address are available at <http://www.utexas.edu/its/help/utmail/1564>

Documented Disability Statement: You will need to provide documentation to the Dean of Student’s Office so the most appropriate accommodations can be determined. Specialized services are available on campus through Services for Students with Disabilities (SSB 4.104, 471-6259). Any student who requires special accommodations must obtain a letter that documents the disability from the Services for Students with Disabilities area of the Division of Diversity and Community Engagement (471-6259 voice or 471- 4641 TTY for users who are deaf or hard of hearing). Present the letter to the professor at the beginning of the semester so that needed accommodations can be discussed. The student should remind the professor of any testing accommodations no later than five business days before an exam. *If you plan to make use of specialized services through SSD please inform me before the second class meeting.* For more information, visit <http://www.utexas.edu/diversity/ddce/ssd/>

Behavior Concerns Advice Line (BCAL): If you are worried about someone who is acting differently, you may use the Behavior Concerns Advice Line to discuss by phone your concerns about another individual's behavior. This service is provided through a partnership among the Office of the Dean of Students, the Counseling and Mental Health Center (CMHC), the Employee Assistance Program (EAP), and The University of Texas Police Department (UTPD). Call 512-232-5050 or visit <http://www.utexas.edu/safety/bcal>.

Emergency Evacuation Policy: Occupants of buildings on the UT Austin campus are required to evacuate and assemble outside when a fire alarm is activated or an announcement is made. Please be aware of the following policies regarding evacuation:

- Familiarize yourself with all exit doors of the classroom and the building. Remember that the nearest exit door may not be the one you used when you entered the building.
- If you require assistance to evacuate, inform me in writing during the first week of class.
- In the event of an evacuation, follow my instructions or those of class instructors. Do not re-enter a building unless you are given instructions by the Austin Fire Department, the UT Austin Police Department, or the Fire Prevention Services office.

Policy on Scholastic Dishonesty: Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. For further information, please visit the Student Judicial Services web site at <http://deanofstudents.utexas.edu/sjs/>

University of Texas Core Values and Honor Code: The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. As a student of the University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.

University Resources for Students

The university has numerous resources for students to provide assistance and support for your learning, use these to help you succeed in your classes

The University Writing Center

The University Writing Center offers free, individualized, expert help with writing for any UT student, by appointment or on a drop-in basis. Consultants help students develop strategies to improve their writing. The assistance we provide is intended to foster students' resourcefulness and self-reliance. <http://uwc.utexas.edu/>

Counseling and Mental Health Center

The Counseling and Mental Health Center (CMHC) provides counseling, psychiatric, consultation, and prevention services that facilitate students' academic and life goals and enhance their personal growth and well-being. <http://cmhc.utexas.edu/>

Basic Needs Security: Any student who faces challenges of affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believe this may affect their performance in the course, is encouraged to contact the Office of the Dean of Students – Student Emergency Services (SES) for support. Please notify the instructor if you are comfortable doing so and I will make efforts to provide any resources that I may possess to help you navigate issues of food insecurity or residential displacement.

- SES Concerns and Emergencies:
<http://deanofstudents.utexas.edu/emergency/concernsemergencies.php>
- SES Food Pantry:
<http://deanofstudents.utexas.edu/emergency/pantry.php>
- SES Confidential Advocacy and Support:
<http://deanofstudents.utexas.edu/emergency/advocacysupport.php>

ITS

Need help with technology? <http://www.utexas.edu/its/>

Libraries

Need help searching for information? <http://www.lib.utexas.edu/>

Canvas

Canvas help is available 24/7 at <https://utexas.instructure.com/courses/633028/pages/student-tutorials>

Assignment Overview

1. Class Participation (30%)
2. Reading critiques, 10 total (20%)
3. Class facilitation (10%)
4. Final term paper (40%)

Grading Scale

| Meets major requirement | | Does not meet requirement | |
|-------------------------|-------------|---------------------------|-------------|
| Grade | Points | Grade | Points |
| A | ≥93.00 | C- | 70.00-72.99 |
| A- | 90.00-92.99 | D+ | 67.00-69.99 |
| B+ | 87.00-89.99 | D | 63.00-66.99 |
| B | 83.00-86.99 | D- | 60.00-62.99 |
| B- | 80.00-82.99 | F | <60.00 |
| C+ | 77.00-79.99 | | |
| C | 73.00-76.99 | | |

Assignment descriptions

1. Class participation (30%) - participation will be graded by evaluating your participation in class, speaking, listening, and engaging with the course materials and conversations with your colleagues.
2. Reading critiques (20%) - You will do 10 reading critiques which we will share with each other. Each critique should be 2,500–3,500 characters in length. is approximately 400–500 words, or 1.5–2 double-spaced pages. Critiques should take the form of commentary, questions, and synthesis from at least 2 of the readings for that week. I encourage you to write about more than two readings, you will not receive full credit if you only discuss one reading. You should scan all the readings for each week and be prepared to discuss them at length, even if you do not plan to turn in a critique that week. You are not allowed to turn in a reading critique for credit the week you facilitate class discussion. Reading critiques will be uploaded to the course's Canvas website before the beginning of class. Late reading critiques will not be accepted for credit.
3. Class facilitation (10%) - One week during the semester you will be responsible for facilitating class. You can create a handout, a slidedeck, bring in an artifact, or simply prepare notes to facilitate class discussion of each of the readings. You will be responsible for covering the main themes and argument from each reading and then encourage thoughtful engagement with the emergent topics or the overall theme of that week. We will choose our preferred classes to facilitate during Week 2.
4. Final term paper (40%) - You will write a final term paper which will be 40% of your overall grade. The final paper must be turned into the Canvas website by

the deadline negotiated by the class during week 1. Due to the emphasis on reading and writing critiques, the final paper is relatively short. It should be 4-5,000 words, inclusive of the title, notes, and references. The paper topic can be on any technology or context related to the course. You will seek approval of the topic from me by week 8 of the course. If you would like to write a final paper that connects to outside research interests, including a master's report, a master's thesis, a doctoral qualifying paper, or a publication, you must engage significantly with the course texts and class discussions in a significant manner. Please use APA reference style, include a full reference section. You should bring in outside sources--primary, secondary, and scholarly sources, in addition to texts assigned in the course. These outside references should not substitute substantial engagement with the texts we have read.

Course at a glance

Meeting weekly on Wednesdays, this Fall from August 28 to December 4, 2019 unless otherwise noted.

| Week, Date | Theme | Note or Major Deadline |
|--------------------------|--------------------------------|-------------------------------|
| Week 1, August 28 | Introductions | |
| Week 2, Sept 4 | Defining Data | No class* |
| Week 3, Sept 11 | Defining Critical Data Studies | |
| Week 4, Sept 18 | Personal Data | |
| Week 5, Sept 25 | Data Capitalism | |
| Week 6, Oct 2 | Critical Methods | |
| Week 7, Oct 9 | Human Rights | |
| Week 8, Oct 16 | Bias and Risk | |
| Week 9, Oct 23 | Capturing Data | No Class* |

| | | |
|------------------------|--------------------------|------------------------|
| Week 10, Oct 30 | Data Infrastructures | |
| Week 11, Nov 6 | Data Science + Analytics | |
| Week 12, Nov 13 | Data Centers | |
| Week 13, Nov 20 | Open Data | |
| Week 14, Nov 27 | Thanksgiving Holiday | No Class* |
| Week 15, Dec 4 | Algorithms | In class presentation* |
| Week 16, Dec 11 | Finals Week | Final Projects due* |

Course Schedule

Week 1 How to read

1. How to read a book in two hours or less
<https://www.insidehighered.com/blogs/gradhacker/how-read-book-two-hours-or-less>
2. Keshav, S. et al 2016 “How to read a paper”
3. Edwards, Paul N. “How to read a book v. 5”

Week 2-3 Defining Data, Critical Data Studies

1. Kitchin, R., & Lauriault, T. (2014). Towards critical data studies: Charting and unpacking data assemblages and their work.
2. Iliadis, A., & Russo, F. (2016). Critical data studies: An introduction. *Big Data & Society*. <https://doi.org/10.1177/2053951716674238>
3. Rosenberg, D. (2013). Data before the fact.
4. Boellstorff, T. (2013) Making data big
<https://firstmonday.org/article/view/4869/3750>
5. Keyes, Os (2019) The Gardeners Vision of Data <https://reallifemag.com/the-gardeners-vision-of-data/>

Week 4 Self + Personal Data

1. Humphreys, L. 2018. "Introduction." In *Thee Qualified Self: Social Media and the Accounting of Everyday Life*, 1–28. Cambridge, MA: MIT Press.
2. Rahman, Z. (2019) Can data ever know who we really are? <https://deepdives.in/can-data-ever-know-who-we-really-are-a0dbfb5a87a0>
3. Igo, S. E. (2018). Me and My Data. *HIST STUD NAT SCI*, 48(5), 616-626.
4. Lupton, D. (2018). How do data come to matter? Living and becoming with personal data. *Big Data & Society*. <https://doi.org/10.1177/2053951718786314>

Week 5 Data Capitalism

1. Hoffmann, A. L. (2018). Making data valuable: Political, economic, and conceptual bases of big data. *Philosophy & Technology*, 31(2), 209-212. When is data capital <https://journals.sagepub.com/doi/full/10.1177/2053951718820549> T
2. Thatcher, J., O'Sullivan, D., & Mahmoudi, D. (2016). Data colonialism through accumulation by dispossession: New metaphors for daily data. *Environment and Planning D: Society and Space*, 34(6), 990-1006.
3. {TBD}
4. Airbnb teams up with 23andMe to recommend heritage travel destinations <https://venturebeat.com/2019/05/21/airbnb-teams-up-with-23andme-to-recommend-heritage-travel-destinations/>

Week 6 Critical Methods

1. Bates, J., Lin, Y.-W., & Goodale, P. (2016). Data journeys: Capturing the socio-material constitution of data objects and flows. *Big Data & Society*. <https://doi.org/10.1177/2053951716654502>
2. Brooker, P., Barnett, J., & Cribbin, T. (2016). Doing social media analytics. *Big Data & Society*. <https://doi.org/10.1177/2053951716658060>
3. Acker, A. and J. Donovan (2019). "Data Craft: A Theory/Methods Package for Critical Internet Studies," *Information, Communication & Society*. 1-20.
4. Can data be humane? <https://www.newyorker.com/culture/culture-desk/can-data-be-human-the-work-of-giorgia-lupi>

Week 7 Human Rights

1. Seltzer, William, and Margo Anderson. "The Dark Side of Numbers: The Role of Population Data Systems in Human Rights Abuses." *Social Research* 68.2 (2001): 481-513.
2. Dillard, Jesse F. "Professional Services, IBM, and the Holocaust." *Journal of Information Systems* 17.2 (2003): 1-16.

3. Latonero, Mark and Zachary Gold. "Data, Human Rights, & Human Security." *Data & Society Primer*, 22 Jun 2015.
https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2643728
4. The Titan Release of Palatir Gotham <https://ctovision.com/the-titan-release-of-palantir-gotham/>

Week 8 Bias and risk

1. Sweeney, Latanya. "Discrimination in Online Ad Delivery." *Communications of the ACM* 56(5) (2013): 44-54.
2. Ananny, Mike. "The Curious Connection Between Apps for Gay Men and Sex Offenders." *The Atlantic*, 2011 Apr 14.
<http://www.theatlantic.com/technology/archive/2011/04/the-curious-connection-between-apps-for-gay-men-and-sex-offenders/237340/>
5. Flawed Face Data <https://www.flawedfacedata.com/>
6. Data Justice //Green Ben Data Science as Political Action Grounding Data Science in a Politics of Justice <https://arxiv.org/abs/1811.03435>
7. Counting the Countless Os Keys
3. Are facebook's ad discriminatory <https://www.wired.com/story/are-facebook-ads-discriminatory-its-complicated/>
4. Facebook's ad data may be putting millions of gay people at risk
<https://www.newscientist.com/article/2214309-facebooks-ad-data-may-put-millions-of-gay-people-at-risk/>

Week 9 Capturing Data

1. Dencik, L., Hintz, A., & Cable, J. (2016). Towards data justice? The ambiguity of anti-surveillance resistance in political activism. *Big Data & Society*.
<https://doi.org/10.1177/2053951716679678>
2. Agre, P. E. (1994). Surveillance and capture: Two models of privacy. *The Information Society*, 10(2), 101-127.
3. Big Mood Machine
<https://thebaffler.com/downstream/big-mood-machine-pelly>
4. David Lyon (2002) Everyday Surveillance: Personal data and social classifications, *Information, Communication & Society*, 5:2, 242-257, DOI: 10.1080/13691180210130806
5. Consent to our Data Bodies: lessons from feminist theories to enforce data protection

Week 10 Data Infrastructures

1. Raetzsch, C., Pereira, G., Vestergaard, L. S., & Brynskov, M. (2019). Weaving seams with data: Conceptualizing City APIs as elements of infrastructures. *Big Data & Society*. <https://doi.org/10.1177/2053951719827619>
2. Baker, K. S., & Karasti, H. (2018, August). Data care and its politics: Designing for local collective data management as a neglected thing. In *Proceedings of the 15th Participatory Design Conference: Full Papers-Volume 1* (p. 10). ACM.
3. The Political Economy of Social Data: A Historical Analysis of Platform-Industry Partnerships

Week 11 Data Science + Data Analytics

1. Beaton, B. (2016). How to respond to data science: Early data criticism by Lionel Trilling. *Information & Culture*, 51(3), 352-372.
2. The Mythical False Narrative of Data Driven Analysis
<https://www.forbes.com/sites/kalevleetaru/2019/06/25/the-mythical-false-narrative-of-data-driven-analysis/#558d355c6b19>
3. Beer, D. (2018). Envisioning the power of data analytics. *Information, Communication & Society*, 21(3), 465-479.
4. Facebook and Google are the new data brokers
<https://www.dli.tech.cornell.edu/post/facebook-and-google-are-the-new-data-brokers>
5. {TBD}

Week 13 Data Centers

1. Special issue on Data Centers
<http://culturemachine.net/vol-18-the-nature-of-data-centers/>
2. Let's just Keep everything Forever in the cloud
<https://blog.dshr.org/2012/05/lets-just-keep-everything-forever-in.html>
3. Hogan, M. (2015). Data flows and water woes: The utah data center. *Big Data & Society*, 2(2), 20539517115592429.
4. Where the Internet Lives: Data Centers as Cloud Infrastructure in Parks, L., & Starosielski, N. (Eds.). (2015). *Signal traffic: Critical studies of media infrastructures*. University of Illinois Press.
5. Estimating the Energy Use and Efficiency Potential of U.S. Data Centers
6. Why a former nazi sub base in marseille is becoming a data center
<https://arstechnica.com/information-technology/2019/06/why-a-former-nazi-sub-base-in-marseille-is-becoming-a-data-center/>

Week 14 "Open data" - Governance & Participation

1. Levy, Karen E.C. and David Merritt Johns. "When Open Data is a Trojan Horse: The Weaponization of Transparency in Science and Governance." *Big Data & Society* 3.1 (2016): 1-6.
2. Thornham, H., & Gómez Cruz, E. (2016). Hackathons, data and discourse: Convolutions of the data (logical). *Big Data & Society*.
<https://doi.org/10.1177/2053951716679675>
3. Gray, J., Gerlitz, C., & Bounegru, L. (2018). Data infrastructure literacy. *Big Data & Society*, 5(2), 2053951718786316.

Week 15-16 Algorithms (I & II)

1. Kitchin, R. (2017). Thinking critically about and researching algorithms. *Information, Communication & Society*, 20(1), 14-29.
2. Burrell, Jenna. "How the Machine 'Thinks': Understanding Opacity in Machine Learning Algorithms." *Big Data & Society* 3.1 (2016): 1-12.
3. Diakopoulos, Nicholas. "Accountability in Algorithmic Decision Making." *Communications of the ACM* 59.2 (2016): 56-62.
4. Ananny, Mike, and Kate Crawford. "Seeing Without Knowing: Limitations of the Transparency Ideal and Its Application to Algorithmic Accountability." *New Media & Society* (2016): 1-17.
5. Sandvig, Christian, Kevin Hamilton, Karrie Karahalios, and Cedric Langbort. "[Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms.](#)" ICA Preconference on Data and Discrimination: Converting Critical Concerns into Productive Inquiry, 2014 May 22.
6. Dourish, P. (2016). Algorithms and their others: Algorithmic culture in context. *Big Data & Society*. <https://doi.org/10.1177/2053951716665128>
7. Seaver, Nick. 2017. "Algorithms as Culture: Some Tactics for the Ethnography of Algorithmic Systems." *Big Data & Society* 4 (2): 1–12.
doi:10.1177/2053951717738104.