

Course: CS243: Advanced Computer Networks

<i>Course level:</i> Graduate	
<i>Course instructor(s):</i> Minlan Yu	
<i>Course description:</i> “This is a graduate-level course on computer networks. It provides a comprehensive overview on advanced topics in network protocols and networked systems. The course will cover both classic papers on computer networks and recent research results. It will examine a wide range of topics including routing, congestion control, network architectures, network management, datacenter networks, software-defined networking, and programmable networks, with an emphasis on core networking concepts and principles and their usage in practice.” (Course Description)	
<i>Module title:</i> Tracking Censorship at the (Potential) Cost of Privacy	
<i>Module author:</i> Cat Wade	
<i>Semesters taught:</i> Fall 2019-2020	
<i>Tags:</i> human rights [phil], principle of beneficence [phil], respect for persons [phil], consent [phil], cost benefit analysis [phil], right to privacy [phil], privacy [both], censorship [both], cross-origin requests [CS], networks [CS], web security [CS]	
<i>Module Overview:</i> This module opens up with a discussion of the concept of censorship: what forms it can take, whether it ever violates any rights, and whether it can ever be justified (see annotation 2). We then turn to the concept of privacy, especially informational privacy. The idea of a ‘right to privacy’ is introduced and the students are asked to consider the ways in which the ‘Encore’ program discussed in the technical paper might pose a threat to this right (see annotation 3). With the primary ethical concepts in place, we then turn to the second assigned reading, the ‘Menlo Report,’ which suggests the following four principles for guiding ethical practice with respect to research on and with technology users: respect for persons, beneficence, justice, respect for law and public interest (see annotation 4). Building on the previous discussions we then consider the following: given that protecting against unjustified censorship and protecting the privacy of individuals are important ethical aims pertinent to CS research, how are these ethical aims protected	<ol style="list-style-type: none"> (1) The typical structure of the sessions for CS243 is: 1-2 assigned readings with homework questions to answer and submit beforehand and then a discussion in class lead by a student. The module, therefore, follows this model except the Embedded EthiCS TA leads the discussion instead of a student. (2) The technical paper assigned almost takes for granted that tracking censorship is worthwhile, for the purpose of identifying and stopping it, implying that censorship is always wrong. It was important, therefore, to open the class with a consideration of the ways in which censorship might be justified. (3) The technical paper describes a program called ‘Encore.’ If a webmaster opts to install Encore, when a user visits a website under that webmaster a cross-origin request will be performed, unbeknownst to the user, to suspected censored websites, to see if a suspected

<p>by some or all of the principles advocated for in the Menlo Report. Moreover, are they adequately captured by the four principles or do they need amending/augmenting (see annotation 5)? This discussion takes up a significant chunk of the class as it is the point at which both assigned readings are put into conversation with each other. Following this more general discussion the Embedded EthiCS TA then asks students to think more specifically about how two of the Menlo Report's principles might bear on Encore. First, the principle of beneficence is considered by asking students to identify the putative risks and benefits of Encore and, then, whether the authors of the technical paper have done enough to identify all the possible risks (see annotation 6). Second, the principle of respect for persons, and especially how it relates to informed consent, is considered. Encore operates unbeknownst to potential users and therefore fails to acquire their informed consent. The defense given by the authors is critiqued and the students are asked to consider whether a more persuasive defense could be given. The module ends by recapping some of the critical questions and considerations raised by both the technical paper and the philosophical paper. Students are encouraged to revisit these questions and considerations as they continue their CS research career (see annotation 7).</p>	<p>website is indeed censored in the region from which the user is visiting the uncensored website.</p> <ol style="list-style-type: none"> (4) If these principles sound familiar, that's probably because the Menlo Report explicitly appropriates the Belmont Report (a guide to ethical practice for research involving human subjects in the biomedical and behavioral sciences) for the context of research involving technology users. (5) The Embedded EthiCS TA keeps the overview of the Menlo Report neutral here. Even though there are philosophical reasons to bring the principles themselves into question, it is important to solicit the opinions of the students and ask them to think critically about them (6) Because this is a graduate class, we took it to be important to raise the issue of author/researcher responsibility when it comes to producing CS research <i>in addition to</i> merely asking about the ethical implications of the content of their class (in this case, networks). (7) Questions and considerations raised by the papers include: what are the values and rights that guidelines, codes, rules, etc. are trying to protect? Are these the right ones? Are they doing enough to protect them? Am I able to explain to others why they are important?
<p><i>Connection to Course Material:</i> The technical paper assigned was directly connected to the course material in that it detailed an advanced exploitation of the way websites are networked with each other (i.e., cross-origin requests).</p>	
<p><i>Module Goals:</i></p> <ul style="list-style-type: none"> ● Give students the opportunity to reflect on both the vices <i>and</i> virtues of censorship. ● Familiarize students with the concept of human rights and, more specifically, a right to privacy as well as identifying a variety of reasons for the importance of privacy (both ethical and economic). ● Encourage students to be curious about and critical of 'ethical guidelines' such as the Menlo Report so that they can understand what is good about them, what ethical values they are trying to promote, 	

<p><i>and</i> how to identify when and where they might be falling short.</p> <ul style="list-style-type: none"> ● Give students practice at evaluating whether a technical piece of research has succeeded or failed at meeting some set of ethical criteria, such as the Menlo Report. ● Allow students the opportunity to reflect on what responsibilities authors themselves might have to meet ethical standards in their research and reporting, in addition to reflecting on the ethical implications of the results of that research. 	
<p><i>Key Philosophical Questions:</i></p> <ul style="list-style-type: none"> ● What is censorship and can it ever be justified? ● What is privacy and why is it valuable to us? ● Is there a right to privacy? ● What sorts of principles should we endorse for research in CS that involves human users of technology? ● What can justify not getting the informed consent of technology users who are unwittingly the subject of CS research? 	
<p><i>Key Philosophical Concepts:</i></p> <ul style="list-style-type: none"> ● Censorship ● Ethical justification ● Privacy ● Rights ● Cost benefits analysis ● Consent 	
<p><i>Assigned Readings</i></p> <ul style="list-style-type: none"> ● Dittrich, D., & Kenneally, E. (2012). <i>The Menlo Report: Ethical principles guiding information and communication technology research</i>. US Department of Homeland Security. ● Burnett, S., & Feamster, N. (August, 2015). “Encore: Lightweight measurement of web censorship with cross-origin requests.” In <i>Proceedings of the 2015 ACM conference on special interest group on data communication</i>. pp. 653-667. 	<p>As noted above, the Menlo Report seeks to appropriate the Belmont Report, which provides guidelines for research in biomedicine and behavioral sciences that involves human participants, for the context of CS research that involves human participants (or technology users). It is an especially useful piece to assign because it both offers a number of useful and insightful ethical prescriptions for CS research <i>and</i> seems to potentially fall short in a number of ways. It is therefore a great example of a set of principles that, while very helpful, are nonetheless something that ought to be read and understood with a critical eye.</p> <p>The ‘Encore’ paper presents two big hitters in the world of ethics and technology: privacy <i>and</i> censorship. For instructors who want to use this piece, the crucial thing to remember is that when a</p>

	<p>user from a country that censors the web visits an innocuous and <i>not censored</i> website (say, a university’s home page) on which Encore has been installed, a cross-origin request to a suspected censored page would happen <i>behind the scenes</i>.</p> <p>Two further things to note about the paper. First, the authors are very clear that the Encore program only records the location of the cross-origin request (i.e. where the user is) and the success or failure of the request to the suspected censored website. It does not record anything about the user that could be identifying such as their specific IP address, what the innocuous website was, what time of day or anything else of that nature. So, the breach of privacy, as it stands, could be said to be minimal. However, second, the risk is that Encore could very easily be manipulated to record identifying information. And, were the user’s cross-origin requests somehow traced back to them, in some countries the penalty associated with this is highly severe.</p>
<p><i>Class Agenda:</i></p> <ol style="list-style-type: none"> 1. Censorship: as a virtue and as a vice 2. Privacy: why it matters to us 3. How are these two ethical issues safeguarded in the Menlo Report 4. The principle of beneficence and Encore: risk assessment 5. The principle of respect for persons and Encore: acquiring informed consent 6. Resources for future ethical guidance 	
<p><i>Sample Class Activity:</i> The module opens with an activity based on the definition of censorship provided by the ACLU:</p> <p>“Censorship, the suppression of words, images, or ideas that are "offensive," happens whenever some people succeed in imposing their personal, political or moral values on others. Censorship can be carried out by the government as well as private pressure groups. Censorship by the government is unconstitutional [in the US].”</p> <p>The students are asked to answer the following questions in pairs before splitting into smaller groups to compare answers. Finally, the answers are discussed as a class:</p>	<p>The Embedded EthiCS TA structures the class activity by: (a) providing a concrete definition of censorship to serve as a common point of reference; and (b) breaking the discussion down into stages so that there is time for the Embedded EthiCS TA to visit the students, both while in pairs and while in small groups. The point of these visits is to assist with and contribute to the student-led discussions.</p>

<ul style="list-style-type: none"> - On what grounds can we <u>justify</u> censorship? In what circumstances do we usually permit the imposition of personal, political or moral values on others? - On what grounds can we <u>condemn</u> censorship? Does censorship <u>violate any rights</u>? - How does Encore ensure it is combatting <u>unjustified</u> censorship? 	
<p><i>Module Assignment:</i> The students were assigned the two readings listed above and asked to do the following:</p> <p>Questions on the ‘Encore’ paper:</p> <ol style="list-style-type: none"> 1. What is the primary way in which the authors anticipate Encore to augment our current understanding of online censorship? (1-2 sentences) 2. What are some of the risks associated with the small-scale implementation of Encore described by the authors? (1-2 sentences) 3. In what ways have the authors explicitly adjusted their design of Encore to address a potential ethical concern? Identify the ethical concern, state how they addressed the concern, and explain whether or not you think their response is satisfactory. (3-4 sentences) <p>Questions on the Menlo Report, as it pertains to the ‘Encore’ paper:</p> <ol style="list-style-type: none"> 1. Choose one the four principles identified in the Menlo Report (Respect for Persons, Beneficence, Justice and Respect for Law and Public Interest) and do the following: <ol style="list-style-type: none"> a. Briefly explain the principle and what it intends to protect or secure. (1-2 sentences) b. Explain why the use of Encore might compromise this principle. (1-2 sentences) c. Explain how the potential compromising of this principle was addressed in the Encore paper OR how it could have been better addressed in the Encore paper. (2-3 sentences) 	<p>The purpose of this assignment is threefold: first, it prompts students to identify and reflect on what aspects of the <i>technical</i> paper have ethical implications. Second, it primes students for the discussion of how the Menlo Report fares with respect to the ethical issues raised by the technical paper. Third, and finally, it gives students practice in applying lessons and principles from non-technical ethics papers to technical papers.</p>
<p><i>Lessons Learned:</i> The Embedded EthiCS TA found it very helpful to discuss the paper with a</p>	

CS expert, making sure their understanding of the technical paper was correct.

Student responses to the question of whether Encore poses a threat to privacy were extremely varied. While useful for sparking interesting discussion, this is something worth preparing for. Some of the topics covered were sensitive issues for students coming from countries with strict censorship regimes. One should be aware of and sensitive to this fact.

Future iterations might benefit from providing an alternative set of ethical guidelines to compare and contrast.