

MIS 381N.15: Introduction to Electronic Commerce

Spring 2012, Unique Number 03755

CBA 4.338

Wednesday 2:00PM to 5:00PM

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COURSE DESCRIPTION:

The focus for this course will be on evolving E-commerce research issues. These issues will include both technology infrastructure developments and challenges presented by such technologies. In this course we will study the academic literature that deals with issues in E-commerce. The following general topics will be included:

1. Technology infrastructure
 - a. Mobile Advertising;
 - b. Cyber Physical Systems;
 - c. Security;
 2. E-commerce business models
 - a. Keyword Advertising;
 - b. Prediction Market;
 - c. Online Reputation;
 3. Social Network Issues
 - a. Overview;
 - b. Economic Perspective;
 - c. Herding;
 - d. Twitter, YouTube, Spotify;
- i. With the growth of the Internet infrastructure and the recognition of this environment as a business platform, more general questions arise on public distributed computing (Grid Computing, Especially) and information security. Many computing issues have business-economics interrelationships. For example, different profit oriented organizations have invested in the technology with the hope of making money and thus have a self-interest profit goal. At the same time, there needs to be a large degree of cooperation to ensure that the Infrastructure is effective. Therefore, understanding the driving forces behind the

technology and the incentive issues associated with the technology from an economics perspective are the main objectives in this part.

- ii. The Internet provides an impressive computing environment that forms the basis for commerce. Examples include search engine portals (e.g. Google, Yahoo!), virtual community sites with review and moderation (e.g. Slashdot), online forecasting markets (e.g. Iowa Electronic Market, Hollywood Stock Exchange Market).

For example, Google is very unique in that it grew in market value exceeding 50 billion dollars based on its very unique innovative business model and enormous profitability. We will explore carefully what it has accomplished and where its future direction may be.

In many scenarios, information held by individual agents needs to be elicited and collected to generate accurate forecasts. In this course, we will explore various incentive mechanisms which improve the effectiveness of information elicitation and transfer and thus guarantee the accuracy and reliability of the forecast. We begin our review by first looking at the new forms of e-markets in which people can trade contingent future contracts based on future uncertain events. The typical market includes Iowa Electronic Market (<http://www.biz.uiowa.edu/iem/>) and the Hollywood Stock Exchange Market (<http://www.hsx.com>). We will discuss the underlying theory supporting the predictability of such a market mechanism and review the related literature on those prediction markets. Then we will introduce another research direction on how to generate reliable business forecasts, which focus more on direct information elicitation mechanisms.

1. Social networks are the fabric of many of our interactions. Such networks include the relationships among friends and relatives with whom we share information and favors on a regular basis, and reach as far as influencing decisions by many of the world's companies regarding with whom and how they conduct their business. The many regularities in network structure across applications makes a scientific study of social networks a possibility. The deep and pervasive impact that networks have on behavior makes such a study a necessity.

The science of social networks was initiated by sociologists more than a century ago, and has grown to be a central field of sociological study over the past fifty years. Over that same period, a mathematical literature on the structure of random graphs moved steadily along, with intermittent ties to the sociological literature. While economists have occasionally showed interest in networks, an explosion of studies of networks using game-theoretic modeling techniques and with economic perspectives has occurred over the last decade. A recent awakening of an interest in social networks has also occurred in the computer science and statistical physics literatures, mainly over the past five or six years. While these literatures are (slowly) becoming aware of each other, and on occasion drawing from one another, they are still largely distinct in their methods, interests, and approaches. Our goal here is to provide some perspective on the research from these literatures, with a focus on the formal modeling of social networks, and to highlight some of the strengths, weaknesses, and potential synergies between the two main approaches.

ASSESSMENT:

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|------------------------|-----|
| 1. Class Participation | 10% |
| 2. Assignments | 30% |
| 3. Final Project | 30% |
| 4. Research Report | 30% |

Class Participation:

You are graded based on your attendance and relative contributions to the class discussion. To obtain high grade, you should actively participate in the class discussion by raising good questions and making valuable comments.

Assignments:

Some Initial Assignments:

- 1- Some people believe that Facebook's success will be short lived and that soon there will be a new "big thing" to replace the popular social network. Your assignment is to identify two or three sites that you feel will represent a threat to Facebook in the future. Make sure to justify your choices. Due Feb. 10th.
- 2- Twitter recently turned down a \$500 million offer from Facebook. Twitter's CEO said they would like to find a way to make the site profitable before they think about selling it. After reading the New York Times article "Why Twitter Turned Down Facebook" (available on Blackboard) propose one way for Twitter to become profitable, and how an alliance with Facebook would be beneficiary to both parties. Due March 3rd.

Research Report (PhD students):

You must write a four-page or more research report for a research question that you think is interesting and promising. It could either be theoretical or empirical. You can combine this with your final project if you want to. In the report, you should identify the research question, review previous literature relating to your research question, construct your model or propose your hypotheses, and how to verify it. The final due date is the end of the semester.

SCHOLASTIC DISHONESTY:

The McCombs School of Business has no tolerance for acts of scholastic dishonesty. The responsibilities of both students and faculty with regard to scholastic dishonesty are described in detail in the Policy Statement on Scholastic Dishonesty for the McCombs School of Business:

By teaching this course, I have agreed to observe all of the faculty responsibilities described in that document. By enrolling in this class, you have agreed to observe all of the student responsibilities described in that document. If the application of that Policy Statement to this class and its assignments is unclear in any way, it is your responsibility to ask me for clarification. 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 an/or dismissal from the University. Since dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. You should refer to the Student Judicial Services website at <http://deanofstudents.utexas.edu/sjs/> or the General Information Catalog to access the official University policies and procedures on scholastic dishonesty as well as further elaboration on what constitutes scholastic dishonesty.

SPECIAL ACCOMODATIONS:

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, 471-4641 TTY.

CLASS SCHEDULES

Jan 18	<p>Course Overview</p> <p>This session is to give students an overview of this course, including what topics are discussed in the class, how the students are going to be evaluated, and the importance of this course for IS doctoral students.</p>
Jan 25	<p>Online Social Networks - An Epic Throw-Down</p> <p>The birth of new forms of communication has completely revolutionized the way customers, shop as well as the way companies reach out to them. It is no secret that social networks have become a phenomenon that businesses cannot ignore. Some social networks encourage users to put a great deal of information about themselves and share with their friends. Other networks give users the option to broadcast small snippets of information and don't necessarily require users to give information about themselves. Throughout the semester we will look at these new online communities in detail, however, this session is meant to give students an overview of how sites such as Twitter, Facebook, LinkedIn and Google + have gained popularity, and what makes them game-changers.</p> <p>Moreover, we will look at ways to use social networks to conduct market research, and different types of field experiments. We will study a model developed by CREC which uses Twitter to predict sales of movies.</p> <p>References:</p> <ol style="list-style-type: none">1.Rui, Whinston, Winkler "Follow the Tweets", <i>The Wall Street Journal</i>, November 30, 20092.Carrington P, Scott J, Wasserman S, <i>Models and Methods in Social Network Analysis</i>, Cambridge University Press, 2005.3.Jackson, Matthew O, <i>Social and Economic Networks</i>, Princeton University Press, 2008

Feb 1	<p>Word-of-Mouth Communication on Social Broadcasting Networks: The Case of Twitter</p> <p>The rise of social media has fundamentally changed the way information is produced, disseminated, and consumed in the digital age, which has profound economic and business effects. Among many different types of social media, social broadcasting networks such as Twitter in the U.S. and “Weibo” in China are particularly interesting from a business perspective. In the case of Twitter, the huge amounts of real-time data with extremely rich text, along with valuable structural information, makes Twitter a great platform to build Business Intelligence (BI) systems. We propose a framework of social-broadcasting-based BI systems that utilizes real-time information extracted from these data with text mining techniques. To demonstrate this framework, we designed and implemented a Twitter-based BI system that forecasts movie box office revenues during the opening weekend and forecasts daily revenue after 4 weeks.</p> <p>Reference</p> <ol style="list-style-type: none"> 1.Huaxia Rui, Andrew Whinston. “Designing a Social Broadcasting-Based Business Intelligence System”, <i>ACM Transactions on Management Information Systems</i>, 2011, December. 2.Huaxia Rui, Yizao Liu, Andrew Whinston. “Chatter Matters: How Twitter Can Open the Black Box of Online Word-of-Mouth”, with Yizao Liu and Andrew Whinston, under 1st round revision for <i>Marketing Science</i>.
Feb 8	<p>Link Structure and Prediction</p> <p>Social networks are highly dynamic objects; they grow and change over time through the creation of new links (and destruction of existing ones). In practice, successfully predicating new links can help increase user utility and network engagement: “People You May Know” of Facebook and LinkedIn, and “Who to Follow” of Twitter are popular real world examples. In this lecture, we study approaches to link predication based on measures of “proximity” of nodes in a network.</p> <p>Reference:</p> <ol style="list-style-type: none"> 1.David Easley, Jon Kleinberg. “Chapter 5: Positive and Negative Relationships”, <i>Networks, Crowds, and Markets: Reasoning About a Highly Connected World</i>. Cambridge University Press, 2010. 2.David Easley, Jon Kleinberg. “Chapter 6: Games”, <i>Networks, Crowds, and Markets: Reasoning About a Highly Connected World</i>. Cambridge University Press, 2010. <p>Available online: www.cs.cornell.edu/home/kleinber/networks-book/</p>

Feb 15	<p>Tweeting, Retweeting, and Geotagging</p> <p>Over the past few years, Twitter has been changing the way people interact online. Often referred to as a social network, it is more of a social broadcasting tool. The openness of the network has allowed people to connect with individuals they would not usually have contact with and has completely shifted the way companies communicate with customers.</p> <p>By observing interactions within Twitter we can identify influencers, watch as word of mouth develops, and through geotagging, get an idea of who is saying what and where.</p> <p>Reference:</p> <ol style="list-style-type: none"> 1. Huaxia Rui, Zhan Shi, Andrew Whinston. "Content Sharing in a Social Broadcasting Environment: Evidences from Twitter", under revision for MIS Quarterly. 2. Teddy Wayne, "On Twitter, a Close Knit Network" <i>The New York Times</i>, July 4, 2010. 3. Danah Boyd, Scott Golder, Gilad Lotan, "Tweet, Tweet, Retweet: Conversational Aspects of Retweeting on Twitter," <i>hicss</i>, pp.1-10, 2010 43rd Hawaii International Conference on System Sciences, 2010 4. Huaxia Rui, Andrew Whinston and Elizabeth Winkler, "Follow the Tweets", MIT Sloan Management Review, Nov 30, 2009 5. D Zhao, MB Rosson, "How and Why people Twitter: the role that micro-blogging plays in informal communication at work", Proceedings of GROUP 2009 (pp. 243-252).
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Feb 22

Naive Herding and Network Structure

The herding literature implicitly relies on two crucial assumptions: Players are connected by a complete network, and network structure is common knowledge. This paper shows that relaxing either of these assumptions could lead to the naive inference behavior proposed by Eyster and Rabin (2010). Naive inference is an equilibrium outcome of rational players in a binomial tree network. Thus, no striking difference arises between naive inference and rational inference if the network structure is considered. In the model, the player's inference behavior is driven by the network structure or, more specifically, the strength of social ties. We also develop a social network theory of coupons, and examine the key difference between that theory and the price discrimination theory of coupons. Coupons provide a price cut to consumers, which can be seller-induced learning through social networks when the products have a feature of an experienced goods.

We examine how firms can create word-of-mouth peer influence and social contagion by designing viral features into their products and marketing campaigns. Word-of-mouth (WOM) is generally considered to be more effective at promoting product contagion when it is personalized and active. Unfortunately, the relative effectiveness of different viral features has not been quantified, nor has their effectiveness been definitively established, largely because of difficulties surrounding econometric identification of endogenous peer effects. We therefore designed a randomized field experiment on a popular social networking website to test the effectiveness of a range of viral messaging capabilities in creating peer influence and social contagion among the 1.4 million friends of 9,687 experimental users. Overall, we find that viral product design features can indeed generate econometrically identifiable peer influence and social contagion effects.

References

1. Eyster, E., and M. Rabin. 2010. "Naive Herding in Rich-Information Settings," *American Economic Journal: Microeconomics*, 2(4): 221--43.
2. Aral, S., L. Muchnik, and A. Sundararajan. 2011. "Engineering Social Contagions: Optimal Network Seeding and Incentive Strategies." Working paper. New York University.
3. Galeotti, A. and S. Goyal. 2009. "Influencing the Influencers: A Theory of Strategic Diffusion." *The RAND Journal of Economics*, 40(3), 509-532.
4. Jing, B. 2011. "Social Learning and Dynamic Pricing of Durable Goods." *Marketing Science*, 30(5) 851-865.
5. Qiu, L., H. Rui, and A. B. Whinston. 2011, "A Twitter-Based Prediction Market." *Proceedings of the 32th International Conference on Information Systems (ICIS)*.
6. Taylor, S. and S. Aral. 2011. "Peer Effects and the Dynamics of Product Use." Working paper. New York University.

Feb 29	<p>Content Contribution in Social Media: Evidence from YouTube</p> <p>A key feature of social media is that it allows individuals and businesses to contribute contents for public viewing. However, little is known about how content generators derive payoffs from such activities. In this study, we build a dynamic structural model to recover the utility function for content providers. Our model distinguishes short-term payoffs such as those based on ad revenue sharing from long-term payoffs that are driven by content generators' reputation. The model was estimated using a panel data from YouTube. Our results demonstrate that, while content generators receive more short-term payoffs from public viewing of their contents, subscriptions lead to higher long-term payoffs.</p> <p>References:</p> <ol style="list-style-type: none"> 1.Tang, Q., Gu, B., Whinston, A.B. 2011. "Social Contribution under Revenue Sharing and Reputation Concern: The Case of YouTube", <i>Working Paper</i>. 2.Susarla, A., Oh, J., Tan, Y. "Social Networks and the Diffusion of User-Generated Content: Evidence from YouTube," <i>Information Systems Research</i>, forthcoming 3.Holmstrom, B. 1999. "Managerial Incentive Problems: A Dynamic Perspective," <i>Review of Economic Studies</i> (66:1), pp. 169-182. 4.Huang, Y., Singh, P.V., Ghose, A. 2010. "A Structural Model of Employee Behavior Dynamics in Enterprise Social Media," <i>Workshop on Information Systems and Economics (WISE)</i>, St. Louis, December 11. 5.Ludwig, J. Kling, J.R., Mullainathan, S. 2011. "Mechanism Experiments and Policy Evaluations," <i>Journal of Economic Perspectives</i>, (25:3), pp. 39-62
Mar 7	<p>Statistical Issues for Social Network Environment System</p> <p>References:</p> <ol style="list-style-type: none"> 1.Charles F. Manski. Nonparametric bounds on treatment effects. <i>American Economic Review</i>, 80(2):1990, 1996. 2.Charles F. Manski and John V. Pepper. Monotone instrumental variables: with an application to the returns to schooling. <i>Econometrica</i>, 68(4):997-1010, 2000. 3.Charles F. Manski and John V. Pepper. More on monotone instrumental variables. <i>Journal of Econometrics</i>, 12:s200-s216, 2000. 4.Wenjing Duan, Bin Gu, Andrew B. Whinston, The dynamics of online word-of-mouth and product sales—An empirical investigation of the movie industry, <i>Journal of Retailing</i> Volume 84, issue 2, 2008, 233-242 5.Shen, S., Xu, L., Chen, J., Whinston, A. B. Conversion Effects of Online Advertising Vehicles : Nonparametric Bounds and Parametric Estimates, <i>Working paper</i>, 2011. 6.Aral, S., Walker, D. Creating Social Contagion Through Viral Product Design: A Randomized Trial of Peer Influence in Networks. <i>Management Science</i>, forthcoming.
Mar 14	Spring break

Mar 21	<p>Introduction to Field Experiments with Application to Internet Security</p> <p>This research project attempts to improve the Internet security (infosec) problem caused by insufficient resource allocation. Organizations are reluctant to take adequate efforts to improve their infosec because of the lack of transparency on their security situations, negative externality imposed on other Internet users, and high cost of preventional monitoring and intrusion detection. We suggest that public policy could provide additional incentives for organizations to have a well-configured infosec. Specifically, mandatory reporting of security issues plus presenting this information in a relative way (as rankings) to the public, can impose shame and fame on organizations through publicity and peer influence by comparison with major competitors. This project uses outbound spam as a major proxy for overall security. Spam is a prominent symptom of poor infosec, since most spam is sent via botnets or phished accounts that exploit security problems. The project team continually collects data on outbound spam volume observed for IP addresses and maps these IP addresses to organizations. The proposal is centered around a field experiment to test the impact of information disclosure on outbound spam and the relative effectiveness of different information presentations including absolute volume and relative rankings. As preliminary tests, SpamRankings.net already publishes selected top outbound spam rankings, which have already produced tentative positive results with medical and other organizations.</p> <p>References:</p> <ol style="list-style-type: none"> 1.J.S. Quarterman, S. Sayin, J. Reinikainen, E.V. Kumar, A.B. Whinston, "Data, reputation, and certification against spam," In DDCSW: Collaborative Data-Driven Security for High Performance Networks. Internet2 and WUSTL, August 2010. 2.J.S. Quarterman, A.B. Whinston, "Economic incentives for internet security through reputation and insurance," invitation-only first APWG and IEEE-SA Roadmapping Session, Toward a Global Public Health Initiative Model for eCrime Response, APWG and IEEE-SA, October 2010 3.J.S. Quarterman, A.B. Whinston, S. Sayin, E. Vijaya Kumar, J. Reinikainen, J. Ahlroth, "Transparency as incentive for internet security: Organizational layers for reputation," RIPE 61, November 2010. 4.J.S. Quarterman, S. Sayin, A.B. Whinston, "Rustock botnet and ASNs," TPRC 2011, September 2011. 5.N. Perlroth, "Retail-site attacks may rattle shoppers," <i>New York Times</i>, January 18, 2012.
Mar 28	<p>Wireless Location Based Services</p> <p>References:</p> <ol style="list-style-type: none"> 1.W. Dong, V. Dave, L. Qiu, Y. Zhang, "Secure Friend Discovery in Mobile Social Networks", In <i>Proc. of Infocom 2011</i>.

Apr 4	<p data-bbox="342 197 1404 231">Cyber Physical Systems</p> <p data-bbox="342 262 1404 955">A cyber-physical system (CPS) is a system featuring a tight combination of, and coordination between, the system's computational and physical elements. Unlike more traditional embedded systems, a full-edged CPS is typically designed as a network of interacting elements with physical input and output instead of as standalone devices. The potential of CPS is vast with possible applications including automated traffic control, robotic surgery, energy conservation, infrastructure control, algorithmic financial trading, etc. The business potential of CPS is enormous as it would restructure many industries in the way of doing business. It is argued that applications of CPS have the potential to dwarf the 20th century IT revolution (Lee 2008). On the other hand, the design and development of safe and reliable CPS is also qualitatively different from that of general-purpose computing. Unlike a traditional computing device for example, CPS operates in a not entirely predictable physical world. Unexpected conditions may disrupt CPS operation, causing losses to the CPS users. Hardware components may malfunction because of hostile environment, defects in the design or manufacturing process, or even randomness of the underlying substrate. The software systems of CPS also become more complex and unpredictable as there will be more concurrent use of shared resources in such systems. The problem gets worse as more cyber attacks are now targeting at CPS. The recent example of high-speed train crash accident in China and the example of the Stuxnet worm subverting the Iranian nuclear systems demonstrate how devastating such damage could be.</p> <p data-bbox="342 987 1404 1018">References:</p> <ol data-bbox="389 1018 1404 1144" style="list-style-type: none">1.H. Rui, A.B. Whinston, "Dynamic warranty for cyber physical system," paper available on BlackBoard2.H. Rui, A.B. Whinston, "The design of cyber-physical system: Building economics on top of engineering," power point available on BlackBoard.
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Apr 11	<p>N Step Pricing</p> <p>Markdown and priority pricing schemes facilitate complex pricing schedules for sellers and enable strategic buyers to purchase products at desirable prices. In a preannounced markdown mechanism, the price of a product declines over time according to a specific schedule until it sells out, inducing high value customers to purchase the item earlier and at higher prices. In priority pricing scheme, each contract is assigned a ranking order and a corresponding price, according to which supply is rationed among customers in the case of shortage. Supply could be scarce on several occasions, when there is high demand, failures and congestion, or low output in the supply system. In both models, the higher price customers pay, the earlier they obtain the product or the higher quality of service they service. Seminal works by Elmaghraby et al. (2008), Wilson (1989), Stokey (1979), Harris and Raviv (1981), and Liu and Van-Ryzin (2008), among others investigate optimal allocation and pricing schedule, in diverse environments, varying from single unit to multiunit demand, from known to uncertain demand and from complete to incomplete information environments. This paper characterizes efficient and revenue maximizing pricing schemes in the presence of either uncertain supply or random demand. Under these conditions, we add to the literature by offering a model that determines a producer's optimal allocation rule as a preannounced multistep priority scheme or markdown pricing schedule. The mechanism focuses on the operational implications of allotting uncertain and scarce resources, when, at the same time, customers are heterogeneous in their valuations and in their sensitivities towards quality of service or probability of receiving the product. The proposed mechanism suggests that the pricing schedule could incorporate contingent contracts or multistep markdowns. Further we discuss the inefficient outcome of "commodity burning", where monopolist may consider disposing of a portion of the supply in equilibrium. Finally, we suggest that a profit maximizing monopolist could achieve greater revenue by offering insurance options to risk averse customers.</p> <p>References:</p> <ol style="list-style-type: none"> 1. Elmaghraby, W., A. Gulcu, P. Keskinocak, <i>Optimal Markdown Mechanisms in the Presence of Rational Consumers with Multi-unit Demands</i>, Manufacturing & Science Operations Management, (2008), Vol. 10, pp. 126-148. 2. Harris, M., A. Raviv, <i>A Theory of Monopoly Pricing Schemes with Demand Uncertainty</i>, American Economic Review, (1981), Vol. 71, pp. 347-365. 3. Liu, Q., G. Van Ryzin, <i>Strategic Capacity Rationing to Induce Early Purchases</i>, Management Science, (2008), Vol. 54(6), pp. 1115-1131. 4. Stokey, N., <i>Intertemporal Price Discrimination</i>, Quarterly Journal of Economics, (1979), Vol. 94, pp. 355-371.
Apr 18	<p>Two-sided Markets</p> <p>References:</p> <ol style="list-style-type: none"> 1. Hopenhayn, H. and R. Rogerson. 1993. "Job Turnover and Policy Evaluation: A General Equilibrium Analysis", Journal of Political Economy, 101, p. 915-38. 2. Ericson, R. and A. Pakes. 1995. "Markov-Perfect Industry Dynamics: A Framework for Empirical Work", Review of Economic Studies, 62, p. 53-82.

Apr 25	Mini Conference – Student presentations
May 2	Mini Conference – Student presentations