

Workshop on Games and Networks

11th July, 2022, IEOR, IIT Bombay, Mumbai, India

Program Booklet



Industrial Engineering & Operations Research
Indian Institute of Technology Bombay, Mumbai

1 IEOR@IITB

Industrial Engineering & Operations Research is the first interdisciplinary programme established in IIT Bombay and focusses on both basic and applied research in the allied areas including operations research, optimization, probability, simulation, game theory, stochastic optimization with applications to supply chain management, logistics, machine learning and artificial intelligence. Its faculty comes from diverse disciplines from engineering to mathematics and operations research. IEOR offers research based M.Tech., Ph.D. and M.Sc.-Ph.D. dual degree programmes, and is actively involved in sponsored research, consulting and continuing education.

2 Program Schedule

Session Chair	⌚	Speaker
Shubhro Sarkar	9.30 - 10.30	Sudipta Sarangi
	10:45 - 11.45	Ruhi Sonal
	12:00 - 13.00	Omkar Desai Palsule-Desai
Lunch Break		
Subrato Banerjee	14.30 - 15.30	Rajnish Kumar
	15:45 - 16.45	Raghul S Venkatesh
	17:00 - 18.00	Jaideep Roy

All the sessions will take place in Room 21, 2nd Floor, VMCC at IITB. Lunch will be served in Padmavihar Guest House.

3 Abstracts of Talks

Rajnish Kumar

Expected Values for Variable Network Games

A network game assigns a level of collectively generated wealth to every network that can form on a given set of players. A variable network game combines a network game with a network formation probability distribution, describing certain restrictions on network formation. Expected levels of collectively generated wealth and expected individual payoffs can be formulated in this setting. We investigate properties of the resulting expected wealth levels as well as the expected variants of well-established network game values as allocation rules that assign to every variable network game a payoff to the players in a variable network game. We establish two axiomatizations of the Expected Myerson Value, originally formulated and proven on the class of communication situations, based on the well-established component balance, equal bargaining power and balanced contributions properties. Furthermore, we extend an established axiomatization of the Position Value based on the balanced link contribution property to the Expected Position Value.

Omkar Desai Palsule-Desai

Self-selecting No-Pay Service Delivery Strategies: A Rising Tide that Lifts All Boats?

Services such as housing, food, and healthcare are expected to be universally accessible and affordable. However, rapidly increasing cost structures and income inequality are proving to be significant impediments. Some service organizations, having recognized this situation and wanting to ensure that everyone (including those that cannot pay) meets their needs, are implementing schemes under which customers can choose not to pay the required fees. Instead of resulting in a reduction in profits, these strategies, which literally give away services for free, can lead to profit enhancement for such organizations. Competing firms and consumers may also benefit, resulting in superior societal welfare. The reasons underlying this outcome are (i) philanthropic amplification of paying customers' willingness to pay, (ii) lower cost, no-frills service (and the associated utility reduction) designed for the non-paying customers, (iii) faster transition of service professionals up the learning curve, and (iv) service professionals' appreciation for the societal contribution and the associated compensation savings. We develop a mathematical framework capturing these characteristics, perform a rigorous analytical and computational analysis, characterize conditions under which service providers should introduce these strategies in a competitive environment, and determine the optimal parameter values they should use to get the highest benefits. We show that the strategy of offering free services to the needy can, in addition to benefiting the firm, the consumer, and the society, also benefit the competitor. Thus, it is a strategy that lifts all boats akin to a rising tide.

Jaideep Roy

Automation, Displacement and Democracy

We study an economy where aggregate automation, which displaces particular sections of the labor force based on their industry-specific skills, is determined through collective bargaining and competitive politics. A central trade union negotiates with the robot-owners for funds to redistribute to the entire labor force, while two office-seeking parties commit to policy platforms which determine economy-wide automation drives. We find that in any political equilibrium, parties converge in their platforms on aggregate automation. When the trade union cares (relatively) less about the displaced workers, the bargaining does not affect the democratic choice of automation and only those workers whose skills farthest from the median-skilled worker are displaced. On the other hand, when the union cares more about the displaced workers, collective bargaining and electoral politics become mutually interdependent. If the robot-owners are very powerful, automation remains the same as in the previous case. If the trade union is very powerful, automation displaces the median-skilled workers with maximum probability, approaching a fully-automated luxury communist social order. In the intermediate zone of bargaining powers, automation is more likely to displace workers with skills lower than the median worker but not the lowest. We introduce and characterize Paretian Democracies that are political equilibria on the social contract curve and show such ideal forms of democracies exist only if the union is more sympathetic towards workers displaced by the rise of automation.

Sudipta Sarangi

Social Networks and Intergenerational Mobility

We examine intergenerational mobility in the context of networks under different institutional structures. We consider a dynastic overlapping generations model where each generation lives for two periods: young and adulthood. As youth, each generation inherits the network of their parents and chooses whether to acquire accumulate human capital. Parental centrality helps increase the children's productivity. Human capital on the other hand is necessary to form the professional network. Both human capital and formation of a professional network are costly. Effort in the professional network provides utility which is finally used for

consumption by adults. Parental networks thus have a bearing on their children’s networks and productivity. This allows us to study mobility of dynastic families and the importance of human capital for this. Thus, we explain why lack of mobility is entrenched in some societies across generations and not in others.

Ruhi Sonal

Sequential entry and perfect equilibrium

We study a class of infinite horizon games in which agents enter the game in an exogenously given sequence. The outcome of the game is modeled as the formation of a network. We characterize the class of perfect equilibria in this setting and provide conditions under which behavioral phenomena such as “herding” occur. The setting and the results are applicable to the formation of networks on social media platforms and to the market for internships faced by medical and law school graduates.

Raghul S Venkatesh

On Verifiable Communication and Propagation of Fake News

We consider a standard model of strategic communication à la Crawford and Sobel (1982) when the receiver has an option to verify the sender’s message at some cost. Verification entails a trade-off for the receiver: learning the state perfectly against not paying the cost of checking. We show that, in equilibrium, the receiver verifies more as the cost of verification increases. This counter intuitive result implies that social welfare under verification (i) is non-monotonic in both the cost of verification and polarization between sender and receiver, and (ii) could be either higher or lower than the social welfare under no verification. These insights have implications in the context of fake news and fact-checking platforms that verify misinformation. Verification can be socially beneficial if the source of misinformation is costlier to verify and when the agents are only moderately polarized. Further, committing to not employing the verification technology is sometimes welfare improving. This is joint work with Sebastian Bervoets.

