International Workshop on Game Theory and Networks

3rd August, 2019, Mumbai, India

Program Booklet

Industrial Engineering & Operations Research

Indian Institute of Technology Bombay, Mumbai

1 Program Schedule

Session Chair		Speaker
K. Narayanan	9.30 - 10.15	Kaushik Basu
	10:15 - 11.00	Saptarshi Ghosh
	11:00 - 11.30	* Arko Chatterjee
N Hemachandra	11:30 - 12.15	Jaideep Roy
	12:15 - 13.00	Sudipta Sarangi
Lunch Break		
Saptarshi Ghosh	14:00 - 14.45	Jayakrishnan Nair
	14:45 - 15.30	Surajit Borkotokey / Rajnish Kumar
Shubhro Sarkar	15:45 - 16.30	Alexandre Reiffers
	16:30 - 17:15	Diganta Mukherjee
	17:15 - 18:00	Ankur Kulkarni

* Tea Break and problem discussion by Arko Chatterjee. Another Tea Break at 15.30. All the sessions take place in the Lecture Hall LC201.

Abstracts of Talks

Kaushik Basu

The Samaritan's Curse: The Challenge of Group Morality

The paper uses elementary game theory to examine a question that philosophers have discussed at length, namely, when a group behaves badly, how do you apportion responsibility for such behavior?

Surajit Borkotokey / Rajnish Kumar

Group Contributions in TU-games : A class of k-lateral Shapley values

In this paper we introduce the notion of group contributions in TU-games and propose a new class of values which we call the class of k-lateral Shapley values. Most of the values for TU-games implicitly assume that players are independent in deciding to leave or join a coalition. However, in many real life situations players are bound by the decisions taken by their peers. This leads to the idea of group contributions where we consider the marginality of groups upto a certain size. We show that group contributions can play an important role in determining players' shares in the total resource they generate. The proposed value has the flavor of egalitarianism within group contributions. We provide two characterizations of our value.

Saptarshi Ghosh

Extraction versus aggregation of information in committees under expert persuasion

We analyze flow of information in non-deliberating majoritarian committees when members with private signals can be strategically persuaded by a biased and informed expert. We characterize the extent to which information from the expert can be extracted, and the degree of aggregation of the private signals

of the committee members. Our analysis also sheds light on the optimal size of the committee under such persuasion. We find that when the bias of the persuading expert is small, the optimal size is one; when it is intermediate, the optimal size increases monotonically in the precision of members' private information; when it is large this relation is non-monotonic. However the optimal committee-size never exceeds five. We also show that biased persuasion typically hurts a larger committee more severely. These results provide important implications on issues like universal enfranchisement, role of expert commentary in a democracy or size of governing boards in firms.

Ankur Kulkarni

The Essentialness of the Free-rider in Games on Networks of Strategic Substitutes

Abstract: A game on a network involves a graph G with a player on each node of the graph. We consider the games of strategic substitutes introduced by Bramoulle and Kranton where each player makes a scalar effort and the benefit obtained by the player is a function of his own effort and the total effort of his neighbours. Games like these have a wide variety of equilibria, making their use for predictive purposes extremely challenging. Despite this we show that certain aggregate measures on the set of all equilibria can be ascertained by only looking at the underlying structure of the graph. In particular, we show that certain specific maximum independent sets in G capture the weighted aggregate effort and welfare, significantly reducing the problem of a social planner or principal. Moreover, we find counter-intuitive results that show that free-riding is essential for maximum total effort, and direct attempts at reducing free-riding are bound to fail.

Diganta Mukherjee

Mixed Membership Stochastic Blockmodel for Multiplex networks

Stochastic Blockmodels are one of the most popular Random Graph models used in modelling Social Networks. It assumes the existence of a latent community structure and the probability of edge formation depends only on the community (cluster) membership of the nodes being connected. The latent stochastic blockmodel suffers from a limitation that each object can only belong to one cluster, or in other words, play a single latent role. In real life, it is not uncommon to encounter more intriguing data on entities that are multi-faceted. For example, when a protein or a social actor interacts with different partners, different functional or social contexts may apply and thus the protein or the actor may be acting according to different latent roles they can possibly play. The class of mixed membership model associates each unit of observation with multiple clusters rather than a single cluster, via a membership probability-like vector. The concurrent membership of a data in different clusters can capture its different aspects, such as different underlying topics for words constituting each document.

The mixed membership formalism is a particularly natural idea for relational data, where the objects can bear multiple latent roles or cluster memberships that influence their relationships to others. Airoldi et al., 2008 introduced the Mixed Membership Stochastic Blockmodel which allows nodes to belong to multiple clusters depending on the type of interaction. In this paper, we extend the Mixed Membership Stochastic Block Model to a multigraph by representing dependence structure between network views through a Multivariate Bernoulli likelihood, providing a representation of between-view association. We apply it on real world data-sets to carry out inference. We study asymptotic efficiency by providing empirical (simulation-based) guarantees.

Jayakrishnan Nair

Sharing within limits: Partial resource pooling in loss systems

Fragmentation of expensive resources, e.g., spectrum for wireless services, between providers can introduce inefficiencies in resource utilisation and worsen overall system performance. In such cases, resource pooling between independent service providers can be used to improve performance. However, for providers to agree to pool their resources, the arrangement has to be mutually beneficial. The traditional notion of resource

pooling, which implies complete sharing, need not have this property. For example, under full pooling, one of the providers may be worse off and hence have no incentive to participate. In this paper, we propose partial resource sharing models as a generalization of full pooling, which can be configured to be beneficial to all participants. We formally define and analyze two partial sharing models between two service providers, each of which is an Erlang-B loss system with the blocking probabilities as the performance measure. We show that there always exist partial sharing configurations that are beneficial to both providers, irrespective of the load and the number of circuits of each of the providers. A key result is that the Pareto frontier has at least one of the providers sharing all its resources with the other. Furthermore, full pooling may not lie inside this Pareto set. The choice of the sharing configurations within the Pareto set is formalized based on bargaining theory.

Alexandre Reiffers

Reputation-Based Information Design for Inducing Prosocial Behavior

We study the idea of information design for inducing prosocial behavior in the context of electricity consumption. We consider a continuum of agents. Each agent has a different intrinsic motivation to reduce her power consumption. Each agent models the power consumption of the others via a distribution. Using this distribution, agents will anticipate their reputational benefit and choose a power consumption by trading off their own intrinsic motivation to do a prosocial action, the cost of this prosocial action and their reputation. Initially, the service provider can provide two types of quantized feedbacks of the power consumption. We study their advantages and disadvantages. For each feedback, we characterize the corresponding mean field equilibrium, using a fixed point equation. Besides computing the mean field equilibrium, we highlight the need for a systematic study of information design, by showing that revealing less information to the society can lead to more prosociality. In the last part of the paper, we introduce the notion of privacy and provide a new quantized feedback, more flexible than the previous ones, that respects agents' privacy concern but at the same time improves prosociality. The results of this study are also applicable to generic resource sharing problems.

Jaideep Roy

Expert Captured Democracies

Does public cheap talk by a biased expert benefit voters? The answer depends on the nature of democratic institutions and the extent and form of communication possibilities. Expert endorsements of party politics induce office-seeking parties to serve the expert's interests, hurting voters. Expert advocacy makes policies respond to information, helping voters. Together, policy advocacy and platform endorsements are often better than either alone. Their interaction creates a delegation benefit of representative democracy. Voters may prefer this institution to one where policymaking is geared to serving the public interest alone. Direct capture of party leadership by the expert can improve the lot of the voter further, but the ideal institution remains to be the one where one party is governed by the expert while the other remains uninformed and the two fight competitive elections. It beats expert dictators, Plato's Philosopher Kings.

Sudipta Sarangi

An Introduction to Multigraph Network Formation

We explore the simultaneous formation of multiple networks taking strategic considerations into account. First, fix one network and study how it determines the formation of the other network. After the formation of both networks, players utilize both networks by incurring costly effort in each. We study network formation and equilibrium effort in this context. Second, we study the simultaneous formation of both networks under different conditions like submodularity and supermodularity.