

Game theoretic mechanism design for group decision making

Game theory analyses multi-person decision making where each agent's welfare is dependent on actions of another agent. We work on game theoretic mechanism design that seeks to construct institutions that lead to desirable outcomes in society. An example of such an institution would be the 'Boston School Choice' mechanism that is used to admit students in US public school system. Apart from this, we also study formation bidding rings at auctions. Such rings can undermine the efficiency objectives of any auction, including spectrum auctions; and so, need careful scrutiny to eliminate such collusive behavior. Another recurring theme in my research is to devise methods of dividing resources that fulfill desirable ethical axioms. Such problems have been studied for long in human history, even finding mention in the age old Jewish religious book of civil law: Talmud.

In general, the real world is plagued with scarcity of resources. Matters are further compounded by the inherent indivisibilities of these resources. For example, the Singur agitation on land acquisition in West Bengal. Here, fertile agricultural land holdings needed to be acquired for the sake of establishing a factory that clearly had immense economic benefits. However, the whole enterprise failed for the simple reason that land is scarce and indivisible. While the indivisibility can be overcome by introduction of monetary payments, the problem of finding suitable compensation still remains. This necessitates careful game theoretic modeling that analyses voluntary group formation by agents who are driven by non-cooperative motives.

In fact, one can think of several other public decision problems like allotting; licenses to operate in a market, antique artifacts to connoisseurs, landing and takeoff time-slots at airport, inter-domain routing for autonomous systems, kidneys to transplant patients; that may call for such analysis. In short, our research devises methods of accomplishing such allocation exercises in a robust and truthful manner; both by centralised methods like auction, as well as decentralised methods like bargaining.