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AN AXIOMATIC THEORY OF NON BAYESIAN SOCIAL LEARNING

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In this talk, I will present the latest results on my group's decade long study of social learning and opinion dynamics. We study the behavioral foundations of non-Bayesian models of learning over social networks and present a taxonomy of conditions for information aggregation in a very general framework. As our main behavioral assumption, we postulate that agents follow social learning rules that satisfy "imperfect recall," according to which they treat the current beliefs of their neighbors as sufficient statistics for the entire history of their observations. We augment this assumption with various restrictions on how agents process the information provided by their neighbors and obtain representation theorems for the corresponding learning rules (including the popular canonical consensus model of DeGroot). We then obtain general long-run learning results that are not tied to the learning rules' specific functional forms, thus identifying the fundamental forces that lead to learning, non-learning, and mislearning in social networks. We will also present formal results on complexities of fully Bayesian information aggregation and learning. If time permits, I will also present our new PhD program in Social and Engineering Systems, an interdisciplinary PhD program that combines information and decision theory and social sciences to address complex societal problems.

BIO

Ali Jadbabaie is the JR East Professor of Engineering and Associate Director of the Institute for Data, Systems and Society at MIT, where he is also on the faculty of the department of civil and environmental engineering and is a principal investigator in the Laboratory for Information and Decision Systems (LIDS). He is the director of the Sociotechnical Systems Research Center, one of MIT's 13 research laboratories and serves as the director of the Social and Engineering systems PhD Program. He received his Bachelors (with high honors) from Sharif University of Technology in Tehran, Iran, a Master's degree in electrical and computer engineering from the University of New Mexico, and his PhD in control and dynamical systems from the California Institute of Technology. He was a postdoctoral scholar at Yale University before joining the faculty at Penn in July 2002. Prior to joining MIT faculty, he was the Alfred Fittler Moore a Professor of Network Science and held secondary appointments in computer and information science and operations, information and decisions in the Wharton School. He was the inaugural editor-in-chief of IEEE Transactions on Network Science and Engineering, a new interdisciplinary journal sponsored by several IEEE societies. He is a recipient of a National Science Foundation Career Award, an Office of Naval Research Young Investigator Award, the O. Hugo Schuck Best Paper Award from the American Automatic Control Council, and the George S. Axelby Best Paper Award from the IEEE Control Systems Society. His students have been winners and finalists of student best paper awards at various ACC and CDC conferences. He is an IEEE fellow and a recipient of the 2016 Vannevar Bush Fellowship from the office of Secretary of Defense, and a member of the national Academic of Science, Engineering, and Medicine's Intelligence Science and Technology Expert Group (ISTEG). His current research interests are in distributed decision making, social learning, multi-agent coordination and control, distributed optimization, network science, and network economics.