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Computer and Information Sciences

Optimal Control of Opinion Dissemination Through Advertising

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Abstract: Opinion dissemination and influence through advertising is one of the most capital intensive industries today, further stimulated by the advent of new media such as the social media. We show how such opinion influencing may be formulated as optimal control problems and optimal strategies obtained through application of engineering tools. We analyze optimal strategies for the allocation of a finite budget that can be invested in different advertising channels over time with the objective of influencing social opinions in a network of individuals. In our analysis, we consider both exogenous influence mechanisms, such as advertising campaigns, as well as endogenous mechanisms of social influence, such as word-of-mouth and peer-pressure, which are modeled using diffusion dynamics. We characterize the optimal influence strategies for a broad family of objective functions, and identify some simple underlying structures. Our results would find application in election campaign, product advertising and social opinion formation

Bio: Saswati Sarkar received her Master of Engineering degree from the Electrical Communication Engineering Department at the Indian Institute of Science, Bangalore in1996 and the Ph.D. degree from the Electrical and Computer Engineering Department at the University of Maryland, College Park, in 2000. She joined the Electrical and Systems Engineering Department at the University of Pennsylvania, Philadelphia, as an Assistant Professor in 2000 where she is currently a Professor. She received the Motorola gold medal for the best masters' student in the division of electrical sciences at the Indian Institute of Science and a National Science Foundation (NSF) Faculty Early Career Development Award in 2003. She was an Associate Editor of the IEEE Transactions on Wireless Communications from 2001 to 2006, and of the IEEE/ACM Transactions on Networks from 2008 to 2013. Her research interests are in stochastic control, resource allocation, dynamic games, and economics of networks.