Information Design in Non-atomic Network Congestion Games *

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Abstract

Car navigation system is one of the real-life applications of the information design framework invented by Kamenica and Gentzkow (2011) and Bergemann and Morris (2016). I study an information design problem in a static non-atomic congestion game in which a unit of agents try to move from an origin to a destination through minimum cost paths, and the information designer tries to minimize total expected costs of the agents. In this paper I focus on the two kinds of signaling policies, public signaling policies and private i.i.d. signaling policies. Public signaling policies always provide a same signal to all agents. Private i.i.d. signaling policies determine a probability receiving each signal and the agents get a signal with respect to the probability distribution. I first show that if ex-post cost functions of all edges are affine to their shares, the perfect disclosure of true states is always optimal among all public policies. Then, since the resulting shares and thus the expected total costs of the perfect disclosure policy can be replicated by an i.i.d. policy, the optimal i.i.d. policy always achieves weakly lower total expected costs than the optimal public policy does. Finally I analyze in a simple setting exactly when the optimal i.i.d. policy is strictly better than the optimal public policy.

Keywords: *congestion games, information design, potential games, public signals, concavification, revelation principle*

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