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An Agent-Based Model of Innovation Diffusion Using Heterogeneous Social Interaction and Preference

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Abstract : The advent of the Internet, mobile communications, and social network services has stimulated social interactions among consumers, allowing people to affect one another's innovation adoptions by exchanging information more frequently and more quickly. Previous diffusion models, such as the Bass model, however, face limitations in reflecting such recent phenomena in society. These models are weak in their ability to model interactions between agents; they model aggregated-level behaviors only. The agent based model, which is an alternative to the aggregate model, is good for individual modeling, but it is still not based on an economic perspective of social interactions so far. This study assumes the presence of social utility from other consumers in the adoption of innovation and investigates the effect of individual interactions on innovation diffusion by developing a new model called the interaction-based diffusion model. By comparing this model with previous diffusion models, the study also examines how the proposed model explains innovation diffusion from the perspective of economics. In addition, the study recommends the use of a small-world network topology instead of cellular automata to describe innovation diffusion. This study develops a model based on individual preference and heterogeneous social interactions using utility specification, which is expandable and, thus, able to encompass various issues in diffusion research, such as reservation price. Furthermore, the study proposes a new framework to forecast aggregated-level market demand from individual level modeling. The model also exhibits a good fit to real market data. It is expected that the study will contribute to our understanding of the innovation diffusion process through its microeconomic theoretical approach.

Keywords : innovation diffusion, agent based model, small-world network, demand forecasting
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