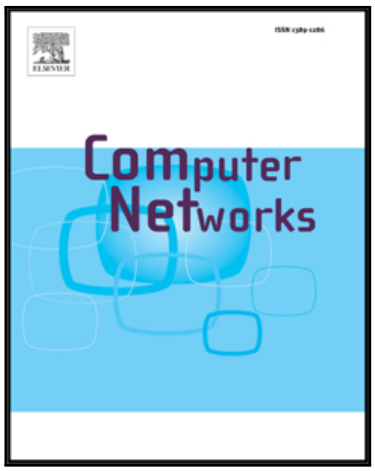

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Heterogeneous Incentive Mechanism for Time-sensitive and Location-dependent Crowdsensing Networks with Random Arrivals

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Abstract

With the rapid development and ubiquity of mobile devices, crowdsensing has become an effective technique by taking advantages of mobile users to collect massive sensing data. Many incentive mechanisms have been proposed to encourage mobile users to participate in crowdsensing tasks. However, most of them allocate homogeneous rewards to sensing tasks and assume a fixed set of participants, while inherent inequality among tasks and randomness of participants' arrival have been ignored for a long time, especially for time-sensitive and location-dependent crowdsensing systems. In this paper, we focus on time-sensitive and location-dependent crowdsensing systems with random arrivals, and propose a two-level heterogeneous pricing mechanism to balance the participation of participants among tasks. In particular, the reward budget of each task is determined based on its relative popularity among tasks by considering the spatio-temporal inequality of tasks at the *inter-task level*, and the reward of a task to each participation dynamically changes as the demand of measurements changes at the *intra-task level*. Moreover, we prove that the task selection problem for randomly arriving participants with time budget is NP-hard, and further propose several efficiently greedy task selection algorithms to help each participant select tasks to maximize its total payoff. Experimental results show that the proposed heterogeneous incentive mechanism outperforms existing incentive mechanisms.

Keywords: Crowdsensing, incentive, time-sensitive, location-dependent, randomly arriving participants.

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