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PII: S0140-3664(17)30366-3
DOI: 10.1016/j.comcom.2017.10.015
Reference: COMCOM 5589

To appear in: *Computer Communications*

Received date: 26 March 2017
Revised date: 10 October 2017
Accepted date: 17 October 2017

Please cite this article as: Rim Ben Messaoud, Yacine Ghamri-Doudane, Dmitri Botvich, Incentives-based preferences and mobility-aware task assignment in participatory sensing systems, *Computer Communications* (2017), doi: 10.1016/j.comcom.2017.10.015

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Incentives-based preferences and mobility-aware task assignment in participatory sensing systems

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Abstract

Participatory Sensing (PS) systems rely essentially on users' willingness to dedicate their devices' resources (energy, processing time..) to contribute high-quality data about various phenomena. In this paper, we study the critical issue of participants' recruitment in PS systems in the aim of minimizing the overall sensing time. First, we design the users' arrival and acceptance/rejection models. Further, we introduce two variants of task assignment mechanisms; without and with incentives. In the former model, we enhance our proposed scheme, P-MATA, for preferences and mobility-aware task assignment, by introducing a logit regressing-based preferences model. Thus, we estimate the users' acceptance probabilities as function of the number and loads of sensing tasks. We incorporate rewards as a third attribute in the second variant of assignment scheme and propose two different incentivizing policies to study their impact on enhancing users' acceptance. Incentives are either task priority-based or data quality-based. All proposed algorithms adopt a greedy-based selection strategy and address the minimization of the average makespan of all sensing tasks. We conduct extensive performance evaluation based on real traces while varying the number of tasks and associated workloads. Results proved that incentivizing participants has intensified their commitment by achieving lower average

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