

DISSERTATION
DEFENSE

*Recommender System and Information Fusion in Spatial
Crowdsourcing*

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Abstract: Spatial Crowdsourcing (SC) refers to a series of data collection mechanisms where a set of users with a sensing or computing device are asked to perform a set of tasks at different locations and times.

In this work, we explore some of the challenges that arise with SC and propose some solutions. These challenges concern a proper recommendation of tasks to users in such a way that they maximize their expected utility while at the same time maximizing the probability that all the tasks are performed. The utility for the users can be based on the tasks the expected reward they are planning to obtain, and the distance to the assignments. These aspects can be predicted through tensorfactorization techniques. To set an example, a high-paying assignment might be far from a user, while a low paying assignment is nearby. Depending on the users preference, we seek to recommend a set of tasks that maximize the users utility. On the other hand, we also want to maximize the sum of probabilities that the tasks are performed, considering the interdependencies between users. We define the system utility as a convex linear combination of the user and the task utility and suggest approximation methods to recommend the tasks that yield the highest system utility.

We also deal with the problem of truth inference, which focuses on integrating the responses from a mobile crowdsourcing scenario and determining the true value. Many times, the answers from a mobile crowdsourcing scenario are noisy, contradicting or have missing values. We developed a recursive Bayesian system that updates the reputation model of the users, the probability that the users where in the correct time and location, and the probability that the reports are true or false. We further enhanced this algorithm using a Kalman filter that predicts the true state of the event at each time-stamp using a hidden event model and which is updated with the reports from the users. Our method was compared against the naive majority voting method as well as other state-of-the-art truth inference algorithms and our method shows a considerable improvement.

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