Worker-Centricity Could Be Today's Disruptive Innovation in Crowdsourcing

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Abstract

Organizational studies have been focusing on understanding human factors that influence the ability of an individual to perform a task, or a set of tasks, alone, or in collaboration with others, for over 40 years [10,11]. The reason crowdsourcing platforms have been so successful is that tasks are small and simple, and do not require a long engagement from workers. The crowd is typically volatile, its arrival and departure asynchronous, and its levels of attention and accuracy diverse. Today, crowdsourcing platforms have plateaued and, despite a high demand, they are not adequate for emerging applications such as citizen science and disaster management. I will argue that workers need to be brought back into the loop by enabling worker-centric crowdsourcing. My current research seeks to verify how human factors such as skills, expected wage and motivation, contribute to making crowdsourcing kick-off again. In particular, I will discuss team formation for collaborative tasks, adaptive task assignment, and task composition to help workers find useful tasks.

1 Motivation and Approach

A recent ethnomethodological study on Turker Nation [10] argued that it is critical to enable worker-centric optimization. My research on this question has proposed to account for human factors such as skills, and expected wage [5] when assigning tasks to workers. The first piece of work I have done in this space is to study team formation in order to enable task assignment optimization in collaborative crowdsourcing. Yet, even when tasks are perfectly matched to workers, we observed that in practice it is difficult to keep workers motivated and engaged in task completion. Therefore, I have decided to focus on how to improve workers' experience during task completion. The first question we are addressing is how to gather workers' intrinsic and extrinsic motivations during task completion and take necessary action to reassign partially-completed tasks. The second question is how to help workers find tasks they can complete within the time they have and that satisfy their expected wage.

2 Research Axes

Team formation (with Senjuti Basu Roy) [1,3,4] Many popular applications, such as document editing, sentence translation, or citizen science resort to collaborative human-based computing, where, crowd workers with appropriate skills and expertise work in a team to solve complex tasks [1]. Central to this process is the aspect of successful collaboration that we were the first to formalize in [3]. Our formalism considers two main factors, affinity and upper critical mass [4], appropriately adapted from organizational science and social theories. We developed a comprehensive model for collaborative crowdsourcing optimization, rigorous theoretical analyses to understand the hardness of task assignment in this context, and an array of efficient exact and approximation algorithms with provable theoretical guarantees. Our experiments on two real-world examples, citizen journalism and fansubbing, used real workers in Amazon Mechanical Turk, and validated the scalability of our algorithms and the quality of completed tasks.

Adaptive crowdsourcing (with Senjuti Basu Roy, Dongwon Lee and Julien Pilourdault) [6] Factors such as task significance and feedback highly depend on the nature of tasks a worker is undertaking and directly affect motivation during task completion [10]. We advance the state-of-the-art in crowdsourcing by proposing a mathematical abstraction for worker-centric optimization with a special focus on human factors that impact workers' motivation during task completion. Specifically, given a set of partially-completed tasks and a set of workers who are not working at full capacity, we study how to make task assignment adaptive during task completion and identify which tasks are to be re-assigned to which workers, considering their motivation. This work is different from our previous work on learning human factors [2], as we focus here on re-assigning tasks on-the-fly. A departure from existing work is the proposal of a formalization of worker motivation that is grounded in social sciences and its use in a constrained optimization framework. We are currenly implementing this framework and we plan to run experiments with workers on Amazon Mechanical Turk.

Task composition (with Vincent Leroy and Julien Pilourdault) [7] Task composition greatly differs from task decomposition. The latter refers to breaking a complex task into micro-tasks and caters to requester. The former is concerned with equipping workers with the ability to express a total duration and an expected total wage and let the system find the best set of tasks satisfying those constraints. We extend the fuzzy clustering approach we developed in [7] to personalize task composition for each worker. Instead of having to sift through ranked lists of tasks as in Amazon Mechanical Turk, workers see bundles of tasks that satisfy their constraints. Our experiments on Mechanical Turk confirm that workers experience in finding tasks they want to perform, is greatly improved. We are currently preparing a draft to be submitted soon.

Collaborators These efforts are joint work with Senjuti Basu Roy from the University of Washington, Dongwon Lee, Penn State University, Vincent Leroy from University Grenoble Alps and our PhD student, Julien Pilourdault from the University Grenoble Alps.

We are currently developing an extension of Crowd4U [8] to enable worker-centric crowdsourcing. One other feature we plan to integrate into our platform is the detection of cheaters among workers [9].

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