Platform-independent Reputation and Qualification System for Crowdwork

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1 Introduction

Crowdwork is a variant of crowdsourcing (c.f. crowdsourcing definition of Estellés-Arolas and González-Ladrón-De-Guevara 2012) in which the crowd provides its labor in exchange for monetary rewards. As is typical in crowdsourcing, crowdwork features three stakeholder groups, the crowd (workers), requesters and a platform. Requesters have tasks for which the crowd provides solutions for a certain amount of money. The platform mediates between requesters and the crowd. To that end, the platform manages its crowd, publishes requesters' tasks and may recommend tasks to qualified workers from the crowd, gathers solutions from workers, pays workers for their labor and bills requesters in return. Typically, there are various types of task, e.g. innovation, software development, product design, product analysis, etc. (Saxton et al. 2013), and platforms specialize in one specific type of task to publish.

Platforms often categorize workers in multiple tiers depending on workers' experience and success, i.e. workers' reputation and qualification (RQ). In turn, workers' payments depend on their tier. High tier workers, who frequently provide high quality solutions to requesters' tasks, receive greater rewards than their lower tier counterparts. We stress that, when assigning tiers to workers, platforms rely on their own data. Thus, platforms generally categorize workers based on the quantity and quality of solutions that they have provided on that platform and outside data is typically not considered.

This information asymmetry between platforms' and workers' views regarding RQ information has drawbacks for all the parties involved. For workers, it results in vendor lock-in where there is no shared information regarding workers' RQ among different platforms, because leaving a platform for good results in the worker losing reputation. In a similar vein, workers working for

multiple platforms become undervalued when compared to their peers working for a single platform. As a consequence of being undervalued, the workers' qualities are underused. Platforms may benefit from vendor lock-in of workers in the short term, by binding workers tightly to platforms. However, in the long term, the potential of underusing workers' qualities negatively impacts the quality of solutions provided to requesters.

We therefore see a need for platform-independent management and storage of crowd workers' RQ data. Platform-independent management and storage of RQ data mitigates the vendor lock-in discussed before. At the same time, making workers' RQ information available to all platforms allows them to improve their task recommendation, which improves requesters satisfaction. Furthermore, platforms can reduce costs for establishing workers' qualifications if the respective qualifications are already registered with a platform-independent reputation and qualification system (RQS); workers benefit from this as well because they only need to pass the respective tests once, rather than once per platform they work on.

We not only want to establish a platform-independent RQS as a theoretic artifact, but want to establish it as a usable technical artifact as well. However, the nature of this extended abstract prohibits extensive discussion of technical aspects. So we stick to theory-based discussions of our proposed system. In Section 2, we discuss our systems' theoretical background from the viewpoints of signaling theory and personnel selection. In Section 3, we briefly describe how we envision our system, so we can discuss the system's implications in Section 4.

2 Theoretical Background

As mentioned in the introduction, currently there is an information asymmetry regarding worker's RQ on the platforms' part. This is of particular importance if the platform recommends tasks to workers. An RQS considers RQ data from many types of sources, e.g. educational institutions and former employers (requesters), and reduces such information asymmetries by allowing workers to signal their qualities to platforms in a structured and credible way. This proposition bases on Spence's signaling theory (Spence 1973), which states that decision makers can use signals to reduce uncertainty associated with decisions if information about available options is incomplete or asymmetrically distributed (Spence 1973; Spence 2002).

According to signaling theory, in order to achieve an information equilibrium between decision makers and (providers of) options, four essential elements need to be considered. First, there must be a decision maker faced

with incomplete or asymmetrically distributed information. A signaler, i.e. a (provider of an) option, may use signals to communicate unobservable qualities to the decision maker, i.e. the signal receiver (Bergh et al. 2014).

Second, sending signals must be costly to realize and imitate as to prevent signal abuse (Bergh et al. 2014). This necessitates the costs of credible signals to be inversely related to the signaler's qualities, so the signal receiver is able to reliably distinguish low quality options from high quality ones (Spence 1973).

Third, a Pareto optimal decision is sought (Bergh et al. 2014). A decision is Pareto optimal if there is no other feasible decision that improves the outcome for one (provider of) options without degrading the outcome for any other (provider of) options (Gibbons and Roberts 2013). Fourth, there needs to be signal confirmation, i.e. a way to check whether the signaled quality is actually experienced (Bergh et al. 2014).

Assuming an RQS satisfies these four criteria, it is a powerful tool to address the problems of asymmetrically distributed information. Workers can send structured and credible signals about their qualifications and therefore reduce information asymmetry in their favor. Platforms and other authorised actors who want to access RQ data benefit from standardized comparability's of these workers.

3 System Overview

The RQS we want to establish can be seen as a natural extension of reputation systems. In a reputation system, a ratee gets rated by raters and the ratee's reputation is a function of all ratings obtained by the ratee, for example the average rating of the ratee on a 1–5 star scale. However, reputation systems do not need to limit themselves to simple numerical ratings, and indeed many reputation systems deployed in practice allow textual reviews to accompany the numerical value as part of the rating.

Extending ratings to take qualification certificates instead of or in addition to reviews and numerical values allows us to process and maintain crowd workers' RQ data within the same system. While this is the basic idea of our RQS, the description makes it seemingly simple to realize our proposed system. This, however, is not the case, because our description omits features that a qualification system has to provide, e.g. the ability to search for qualifications, glares over relevant details, e.g. semantics of qualification information in light of workers' reputation, and ignores the challenges that arise from integrating RQ information into a secure system, e.g. a system that forces signals to be costly and credible.

In an RQS, we have at least six roles: (1) persons of interest, who are

the subjects of RQ data, (2) raters, who provide reputation data, (3) testers, who provide qualification data, (4) readers, who want to access RQ data, (5) operators, who run the RQS, and (6) platforms, which certify that persons of interests (crowd workers) and raters (requesters), have interacted via the platform. Of course, a party may hold multiple roles simultaneously. For example, platforms act as readers during task recommendation. Note that certificates handed out by platforms give validity to requesters' reviews of workers by countering fake reviews and thus making signals costly.

4 Implications and Discussion

First, we check whether our RQS satisfies the four criteria of signaling theory in order to establish the usefulness of the RQS in achieving an information equilibrium between decision makers and (providers of) options. During task recommendation, platforms are decision makers, while crowd workers are the options to choose from. As before, information asymmetry in this setting originates from the platforms not being informed about aspects of workers' pasts, e.g. education, and their activities outside the respective platforms. Our RQS allows workers to signal such qualities to platforms via reputation data provided by raters (requesters) and qualification data provided by testers, e.g. educational institutions. Certificates handed out by platforms make false signals costly, so signals sent via our RQS are credible.

Platforms operating procedures naturally result in Pareto optimal decisions for as long as high quality workers are preferred in task recommendation. Preferring such workers is in the platforms' self-interest. Signal confirmation is achieved by checking the quality of workers' solutions to a task to expected solution quality that is based on the workers' signaled qualities. All in all, the four essential elements of signaling theory are present in our proposed RQS.

Of course we have to consider our RQS in light of data protection regulation. A major advantage of our RQS is its potential to give crowd workers a high degree of control over what RQ data is available and who can access the data. Thus, the RQS addresses a major concern of data protection advocates. Furthermore, there are options to realize the operator role of the RQS in a distributed fashion, ensuring strong data protection guarantees for as long as at least one operator behaves honestly.

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