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Using past contribution patterns to forecast fundraising outcomes in crowdfunding

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A B S T R A C T

The crowdfunding mechanism has proven to be a practical way of raising funds, especially with the widespread use of the Internet. However, one limitation of current crowdfunding platforms is that it is hard for creators and backers to anticipate the success of a campaign. This paper tackles this limitation. We take a two-pronged approach to building our forecasting model. First, we explore the nature and heterogeneity of contribution dynamics in crowdfunding campaigns and compare them across two natural groups (successful and unsuccessful campaigns). We then use insights generated from our exploratory analysis and draw upon the general laws of motion for stochastic processes in order to introduce a new dynamic model for predicting crowdfunding outcomes. Our model incorporates the history and dynamics of both the focal crowdfunding campaign and other campaigns for predicting outcomes. We compare our model to other parametric and semi-parametric benchmark models, and show substantial improvements.

1. Introduction

In the recent years, crowdfunding (individuals collectively contributing money to back different goals and projects through the internet) has proven to be a viable alternative for raising funds (Kuppuswamy & Bayus, 2014). Businesses, entrepreneurs, and individuals have all used this alternative fundraising mechanism to raise the finances to support their businesses, creative projects, and personal goals. There is evidence on both very successful fundraising campaigns (e.g., Pebble smart watches on Kickstarter.com) and unsuccessful fundraising campaigns (e.g., Meatballs LLC in Ahlers, Cumming, Günther, & Schweizer, 2015). Various different factors have been claimed to drive fundraising campaign outcomes, such as goal size, fundraising duration, creator's network size, and signals of quality (Mollick, 2014). However, despite the growing importance and popularity of the crowdfunding mechanism, most platforms still do not provide any analytics tools for creators and backers beyond simple aggregates. For instance, the major crowdfunding platform provider Kickstarter does not provide analytics tools for tracking projects (Wired.com, 2012). Reports from Huffington Post (2013) and Wired.com (2012) show that both creators and backers are interested in tools that can help them to forecast fundraising outcomes and make more informed decisions.

To the best of our knowledge, there are no known or proposed approaches for forecasting crowdfunding outcomes using granular day-by-data data, which makes the approach described here a first attempt.

This paper (1) explores the dynamics of contributions during crowdfunding campaigns, drawing upon the laws of motion; (2) compares the nature and heterogeneity of the contribution dynamics in successful and unsuccessful crowdfunding campaigns; (3) proposes a novel method of forecasting crowdfunding outcomes based on the contribution dynamics of the focal fundraising campaign derived from our exploratory analyses; and (4) compares our method with other parametric and semi-parametric forecasting methods. Our study provides several insights into the crowdfunding phenomenon and offers various

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practical advantages, while also contributing to the growing body of literature on crowdfunding and forecasting. Theoretically, we present insights into the nature of backers' contribution patterns and the differences between these patterns in successful and unsuccessful crowdfunding campaigns. Practically, our approach offers advantages to several stakeholders in crowdfunding campaigns. First, it benefits crowdfunding platforms by presenting a forecasting model that can be used to provide users with up-to-date analytics. Second, it provides creators with a method for forecasting fundraising outcomes before the end of their campaign. This allows creators to know in time whether or not they will need to shore up their promotion efforts by aggressively seeking donors outside their networks or persuasively pitching to and closing on investors in order to meet their funding goals. A knowledge of probable outcomes can also help creators in planning. For instance, creators who need to deliver short-term rewards to backers can use their forecasts to plan. Finally, backers who are looking for a better way of cherry-picking winners or making better contribution decisions can benefit from our method too.

The rest of this paper is organized as follows. Section 2 presents a short introduction to crowdfunding and its mechanisms, while Section 3 discusses our study context and data. Section 4 presents our methodology, before we round off with the discussion and conclusion.

2. Crowdfunding

Crowdfunding refers to a fundraising campaign where a creator issues an open call to the public through the internet to raise funds either in the form of donations or in exchange for some reward, equity or voting rights to support initiatives for specific purposes (Belleflamme, Lambert, & Schwienbacher, 2014). It has proven to be a practical way for fledgling entrepreneurs to seek early stage funding (Kuppuswamy & Bayus, 2014), and has also generated a lot of interest in academic circles (Agrawal, Catalini, & Goldfarb, 2011; Mollick, 2014). The number of platforms supporting crowdfunding has grown over the past few years, and crowdfunding platforms like Kickstarter, Gofundme, and IndieGoGo now handle millions of dollars' worth of fundraising transactions. It is estimated that over a million projects were funded successfully by crowdfunding platforms in 2012, raising about $2.7 billion (Massolution, 2013). Recently, crowdfunding has drawn the attention of policy makers and regulators, as can be seen from the Jumpstart Our Business Startups Act (JOBS Act) that has been signed into law in the United States. Further, with local governments and non-profits turning to crowdfunding to finance civic projects and programs designed for the common good (Lindsay, 2015), crowdfunding analytics tools could also provide insights that could benefit their fundraising.

2.1. Factors affecting crowdfunding success

Prior studies have identified a number of factors that tend to be associated with successful crowdfunding campaigns. These factors include the project or campaign goal (Kuppuswamy & Bayus, 2014; Mollick, 2014), the crowdfunding campaign duration (Mollick, 2014), the project creator's network size (Kuppuswamy & Bayus, 2014; Zheng, Li, Wu, & Xu, 2014), the contribution frequency (Burtch, Ghose, & Wattal, 2013), and the amount outstanding to the campaign goal (Burtch et al., 2013; Kuppuswamy & Bayus, 2014). Mollick (2014) and Kuppuswamy and Bayus (2014) found that projects with higher campaign goals had a lower probability of being successful, and that the average goal for unsuccessful campaigns is five times that of successful ones. Hou, Wang, and Ge (2015) suggest that this goal size effect may be a result of relatively large funding goals requiring relatively large amounts of contributions from backers to meet the set target. Further, individuals may use a campaign's goal as a proxy for the project's complexity and feasibility, and decide whether or not to fund the campaign based on the goal (Frydrych, Bock, Kinder, & Koeck, 2014; Koch & Siering, 2015).

Researchers have established that individuals' social networks play a significant role in their fundraising success (Shane & Cable, 2002; Shane & Stuart, 2002; Zheng et al., 2014). Not only does the project creator's network serve as an early pool of backers for the project campaign (Mollick, 2014), they also provide endorsements which can serve as quality cues and lead to more external backers (Shane & Cable, 2002). Hence, a project creator's network should have a positive impact on his chances of success.

The crowdfunding literature has also documented that the duration of the fundraising can impact a campaign's success (Cordova, Dolci, & Gianfrate, 2015; Zvilichovsky, Inbar, & Barzilay, 2015). Cordova et al. (2015) show that a project's fundraising duration has a positive impact on its chances of success in a crowdfunding campaign. This may be because fundraising campaigns that run for longer periods of time are more likely to be exposed to higher numbers of potential funders, and as such are more likely to reach their goals eventually.

Burtch et al. (2013) showed that contribution dynamics, which they conceptualized as the *contribution frequency*,[1] are important for predicting crowdfunding outcomes. Likewise, Kuppuswamy and Bayus (2014) and Burtch et al. (2013) showed that the amount required to reach the funding goal also predicts outcomes. Table 1 provides a summary of the factors that we use as predictors and their sources. Our work focuses on using the contribution dynamics of the focal crowdfunding campaign to forecast future values or outcomes. Although this paper is similar to that of Burtch et al. (2013) in that we include dynamic properties of crowdfunding campaigns, we conceptualize these dynamics in a different and more nuanced way. For instance, unlike Burtch et al. (2013), our conceptualization avoids the use of aggregates, instead relying on the natural information flow that happens during a crowdfunding campaign, albeit discretized at the daily level.

[1] This measure was operationalized by Burtch et al. (2013) as the total number of contributions standardized by the number of days over which the campaign was conducted.