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Using Analytics and Dashboard Technologies to Improve Physician Selection Decisions

Research-in-Progress

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Abstract:

Physician review websites have become a major source of information for patients when making physician selection decisions. However, the reviews provided on those websites have shortcomings and are not highly accessible to users. Accordingly, in this research in progress, we propose a study to 1) develop an algorithm to accurately integrate numeric and narrative reviews of physicians collected from different websites, 2) develop an interactive dashboard to present the integrated reviews to users, and 3) assess the impact of using a dashboard on the efficiency and accuracy of physician selection decisions. We will employ a design science methodology followed by experimental studies. The artifacts developed as part of this study, including an algorithm and a dashboard, will potentially enable patients to make more informed, efficient, and accurate decisions. Results of the experimental studies will also help us understand the value of such user-centered dashboard systems in decision-making processes.

Keywords: Physician review websites, online physician reviews, physician selection decisions, dashboards, information integration algorithms, sentiment analysis, Latent Dirichlet Algorithm

Introduction

Choosing suitable healthcare providers is often a challenging and complex decision. In the past, patients relied on recommendations from family members, friends, neighbors, and existing care providers to select a physician (Duhan, Johnson, Wilcox, & Harrell, 1997). More recently, physician review websites (PRWs) such as HealthGrades, RateMDs, and Vitals have become a major source of information for individuals (Carbonell & Brand, 2018). Patients use the numeric ratings and narrative comments posted for physicians on those websites and make a choice accordingly (Gao, Greenwood, Agarwal, & McCullough, 2015). The results of a survey study conducted in 2015 showed that nearly 40% of the respondents had visited at least one PRW (Holliday, Kachalia, Meyer, & Sequist, 2017). This adoption rate jumped to 94% in 2019 (Hedges, 2019), highlighting the increasing role of online reviews of physicians in patients' decisions. In line with this trend, healthcare institutions such as the Brigham and Women's hospital in Boston and the Reliant Medical Group in the Worcester area collect patients' satisfaction data and publish the results on their websites, supporting the notions of quality transparency and patient-centered care processes and decision-making (Kordzadeh, 2019a, 2019b; Lagu et al., 2019).

Despite the growing importance of patient reviews of physicians in the healthcare system, they have some shortcomings that have prevented them from being used to their full potential. First, online physician reviews are scattered across commercial PRWs and hospital websites, requiring patients to visit multiple platforms to search for physicians (Gilbert et al., 2015; Kordzadeh, 2019b). Second, the number of reviews per physician on commercial PRWs is generally low, making overall physician scores unreliable and highly sensitive to single favorable and unfavorable reviews. For example, RateMDs hosts more than 2.6 million reviews posted for 1.7 million providers (n.d., 2018), equivalent to an average of less than two reviews per doctor as demonstrated in the literature (Trehan, DeFrancesco, Nguyen, Charalel, & Daluiski, 2016). Third, rating platforms and hospitals use different patient satisfaction metrics and measurement systems, making

physician rating scores heterogeneous and incomparable across websites (Emmert, Sander, & Pisch, 2013; Kadry, Chu, Kadry, Gammas, & Macario, 2011; Rothenfluh & Schulz, 2018). Fourth, systematic differences exist between ratings of each physician posted on different websites (Kordzadeh, 2018). Hospital-prompted ratings, for example, are shown to be significantly higher than the corresponding ratings published on commercial PRWs (Kordzadeh, 2019b; Ramkumar et al., 2017). These systematic differences could partially be due to the dissimilar measurement items that websites use in their satisfaction surveys (Emmert et al., 2013). Sixth, the narrative comments posted for physicians are not always comprehensible, informative, and useful unless they are consolidated, summarized, and presented to patients in an appropriate format. These shortcomings may negatively influence the quality of decisions related to choosing doctors. Wrong provider selection decisions can entail negative financial and clinical consequences for patients and the healthcare system as a whole. Hence, it is crucial to address the problems associated with inconsistent online physician reviews and enhance their usability and completeness.

To the best of our knowledge, no study has yet focused on providing a single integrated solution for consolidating physician reviews, systematically removing biases, developing a consistent metric, and presenting them in an easy-to-use and understandable format for patients to make reliable decisions. This study proposes a sustainable analytics-driven, patient-centric, dashboard-based solution for resolving the shortcomings of current PRWs.

Study objectives and research questions

The present study aims to achieve the following objectives:

1. Developing an analytics-driven algorithm that consolidates patient reviews of physicians, including numeric ratings and narrative comments published on commercial and institutional websites.
2. Designing and developing an interactive information presentation system containing tabular and graphical components that can effectively convey physician quality ratings, including the consolidated reviews, to users. The dashboard will enable users to perform descriptive analytics on demand.
3. Conducting usability testing to evaluate patient efficacy and use feedback to improve the design of the integrated dashboard system developed in this project (Albshrawi, Kartal, Oztekin, & Motiwalla, 2019; Nawaz, Motiwalla, & Deokar, 2018).

The research questions that we seek to address as part of this project are as follows:

1. How does an integrated dashboard improve the *efficiency* of physician selection decisions?
2. How does an integrated dashboard improve the *accuracy* of physician selection decisions?

Methodology

To achieve the project objectives, we will use the Design Science Research methodology, which combines technology design with behavioral science to evaluate the design effect on users and thus, to increase the efficacy of a technology (Hevner, 2004; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007). We will also conduct a series of experimental studies to address the two research questions.

Innovation, potential impact, and conclusion

This is the first study that aims to integrate online reviews of physicians through a systematic, analytics-driven process. In particular, consolidating both numeric ratings and narrative comments using data analytics techniques is an innovative solution. Moreover, using interactive dashboards in this context is a novel approach. Accordingly, researchers in future studies will be able to adapt the design science approach we use in this study to develop similar systems in other contexts such as student reviews of professors and consumer reviews of products like books and movies. Finally, the system developed in this project will potentially enable patients looking for healthcare providers to efficiently access online physician reviews and make reliable decisions accordingly. Informed and appropriate physician selection decisions lead to

improved healthcare outcomes for patients and society as well as reduced healthcare costs for patients, providers, payers, the government, and the healthcare system.

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