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ORIGINAL PAPER

Bias in algorithmic filtering and personalization

Engin Bozdag

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Abstract Online information intermediaries such as Facebook and Google are slowly replacing traditional media channels thereby partly becoming the gatekeepers of our society. To deal with the growing amount of information on the social web and the burden it brings on the average user, these gatekeepers recently started to introduce personalization features, algorithms that filter information per individual. In this paper we show that these online services that filter information are not merely algorithms. Humans not only affect the design of the algorithms, but they also can manually influence the filtering process even when the algorithm is operational. We further analyze filtering processes in detail, show how personalization connects to other filtering techniques, and show that both human and technical biases are present in today's emergent gatekeepers. We use the existing literature on gatekeeping and search engine bias and provide a model of algorithmic gatekeeping.

Keywords Information politics · Bias · Social filtering · Algorithmic gatekeeping

Introduction

Information load is a growing problem in today's digitalized world. As the networked media environment increasingly permeates private and public life, users create their own enormous trails of data by for instance communicating, buying, sharing or searching. The rapid and extensive travelling of news, information and commentary makes it very difficult for an average user to select the relevant information. This creates serious risk to everything from personal and financial health to vital information that is needed for fundamental democratic processes. In order to deal with the increasing amounts of (social) information produced on the web, information intermediaries such as Facebook and Google started to introduce personalization features: algorithms that tailor information based on what the user needs, wants and who he knows on the social web. The consequence of such personalization is that results in a search engine differ per user and two people with the same friends in a social network might see different updates and information, based on their past interaction with the system. This might create a monoculture, in which users get trapped in their "filter bubble" or "echo chambers" (Sunstein 2002, 2006; Pariser 2011b). Social media platforms, search and recommendation engines affect what a daily user sees and does not see. As knowledge, commerce, politics and communication move online, these information intermediaries are becoming emergent gatekeepers of our society, a role which once was limited to the journalists of the traditional media.

The gatekeeping process is studied extensively by multiple disciplines, including media studies, sociology and management. Gatekeeping theory addresses traditional media bias: how certain events are being treated more newsworthy than others and how institutions or influential individuals determine which information passes to the receivers (Smith et al. 2001). Gatekeeping theory does address the rising power of online information intermediaries, but it focuses on two things: (a) the increasing role of the audience in which users can determine what is newsworthy through social networks (b) the changing role of the journalist, from a gatekeeper to a gatewatcher (Bruns 2008;

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Shoemaker and Vos 2009). The existing theory often considers the online information intermediaries themselves as neutral or treats a web service only as an algorithm, operating without human bias (Hermida 2012; Lasorsa et al. 2012; Bruns 2011). Because these information intermediaries automate their core operations, often, mistakenly, they are treated as objective and credible.

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Even though the amount of generated data on the social web has increased exponentially, our capabilities for absorbing of this information have not increased. Because the mind's information processing capacity is biologically limited (for example, we possess neither infinite nor photographic memory), we get the feeling of being overwhelmed by the number of choices and end up with ''bounded rationality'' (Hilbert 2012). Researchers across various disciplines have found that the performance (i.e., the quality of decisions or reasoning in general) of an individual correlates positively with the amount of information he or she receives, up to a certain point. If further information is provided beyond this point, the performance of the individual will rapidly decline (Eppler and Mengis 2004).

One means of managing information overload is through accessing value-added information—information that has been collected, processed, filtered, and personalized for each individual user in some way (Lu 2007). Lu argues that people rely on social networks for a sense of belonging and interpersonal sources are recognized as more credible and reliable, more applicable, and can add value through intermediate processing and evaluation to reduce information overload. The general public prefers personal contacts for information acquisition (Lu 2007). As most of

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