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Patients' written reviews as a resource for public healthcare management in England

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Abstract

Measurement of satisfaction from public health services is an important problem. Unhappy patients may lose trust in public health services and avoid using them even when they need do need help. New big data analytics tools could be used to help understand their preferences better and increase satisfaction from public health services. Unsupervised extraction of key themes from written feedback with an LDA topic model can help with better understanding of the preferences of patients and their carers. The additional insight may help improve the speed of organisational learning in public healthcare organisations and open up new avenues of research.

Keywords: public healthcare;decision support systems;patient feedback;machine learning;public management

1. Introduction

Vast amounts of patient-generated reviews of GP practices which are collected by National Health Service in England can be used in more ways than what is the current practice. They contain information on patient preferences. Machine learning algorithms such as topic modelling[1] can help make this insight accessible. Online reviews are a resource already used to boost companies' profits[2]. Commercial uses of the customer reviews data, however, are likely different from how public organisations such as NHS would like to make use of their patients'

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reviews. This study explores the usefulness of patient reviews processed with topic modelling, a machine learning algorithm, for public organisation management. It is argued that anonymous online reviews could be used as a resource for boosting organisational learning in the public sector. The study includes suggestions for how to use the data in management of GP practices and how to overcome opinion biases inherent in anonymous reviews.

2. Literature review

Unfortunately, present NHS standards for handling customer feedback appear relatively low[3]. Online feedback on NHS GP services in England informs only individuals directly involved with commented-on NHS GP services[4] and is not used to infer patterns on national scale[3]. Text reviews can also be used to inform about differences between health service providers that in conventional measures of performance score very similarly[5,6]. Furthermore, patients also have an interest in making sure the whole NHS works effectively[7]. As far as they understand healthcare, in reviews they commend high quality services and share about any problems[8]. It appears that the interests of the public expressed through written feedback are highly relevant to achieving a successful public health service.

In absence of good practices of customer review analysis done by public organisations[2], a study involving customer feedback about NHS services can take inspiration from private sector[2]. At the same time, public organisations can have "forced customers" as opposed to clients that have some choice[9] and their objectives may be unrelated to service demand or profitability[10]. For example, a manager in a private GP surgery can reasonably assume that simply making patients happy stands for a high quality service[5]. In the case of public healthcare, questions may be asked about whether the services which made the customer happy were all really necessary, and whether the treatment method ensured the most cost-effective care available equally to all. Hence, the demand for insight among public organisations may differ from the private sector. The question how to analyse customer feedback for public organisations, also in case of public healthcare, constitutes a gap in literature that needs to be addressed.

The choice of the best technique to extract information from written customer feedback depends to a large degree on how many reviews there are[2]. Smallest review datasets can be read manually in a systematic manner[8]. If the review numbers are greater and new reviews require continuous analysis, information extraction tends to be carried out automatically according to a manually encoded set of rules[2,11]. Those automation methods can produce highly interpretable, concise summaries and offer easily understandable methodologies[2]. On the other hand, they require significant customising and maintaining effort for each model, especially when model biases in very large datasets are hard to identify[2,12]. Therefore, a viable alternative for the largest datasets is to use machine learning models such as topic modelling. Topic models are able to extract key features from text documents without explicit, manually set rules for information extraction[13]. They can also adapt to changes in how customers write their feedback[14,15] and can use whole datasets to train the model for feature extraction. On the other side, machine learning makes model outcomes may not be easily interpretable[2], and may not always be effective at extraction of the desired information from customer feedback[16]. Nonetheless, a topic model such as an Latent Dirichlet Allocation (LDA) can be highly useful for extracting key features of public services identified by customers[13,17].

3. Methods

Customer feedback processed with machine learning models has a potential for supporting decision-making in NHS to generate more value for patients. Therefore, this study investigates the use of LDA topic model to analyse a large body reviews of NHS-funded GP services in England. The data constitute of over 145 000 fully filled out reviews of GP practices posted from July 2013 to January 2017 about almost 7700 GP practices (89% of all reviews). Anonymous reviewers can post a written comment and answer six 5-point Likert-scale statements on their service experience in NHS-funded GP practices. The statements reviewers respond to are: 1) "Are you able to get through to the surgery by telephone?", 2) "Are you able to get an appointment when you want one?", 3) "Do the