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APPLICATION OF SOCIAL MATCHING RECOMMENDER SYSTEMS IN HEALTHCARE

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ABSTRACT

Recommender systems are software tools and techniques that give suggestions for items to be of interest to a user. The suggestions provided are aimed at supporting decision-making processes. The application of recommender systems in healthcare is expansive, ranging improving doctors’ appointments (Zini and Ricci 2011), providing personalized recommendations (Wiesner and Pfeifer 2010), and diagnosing diseases (Hussein et al. 2012). Mostly, these systems are based on conventional algorithms such as collaborative filtering and content-based recommendations. Although such tools and technologies have made a difference, they do not address the healthcare patient-physician matching issue at its core. As an issue that requires people-to-people interactions, the concept of social matching is more suitable. The concept posits that both users and items are as dynamic as they ought to be. This view denotes a shift in perspectives, leading to changes in strategic and implementation approaches to solve the patient-physician matching issue.

Such a new system starts when a patient signs up with the insurer. The patient provides personal, geographical, and demographic data in the system. To collect more information, an optional questionnaire is often provided. This questionnaire voluntarily extracts additional information such as patients’ care preferences and health issues. Specifically, attributes such as preexisting conditions, current medications, age, gender, and language(s) spoken would shed light on patients’ current needs. Correspondingly, the system extracts all physicians’ relevant information from the data warehouse. The questionnaire also asks the patient’s preferences in several predefined categories, namely physician’s availability (e.g., operating hours and dates, expertise), accessibility (e.g., location, utilization rate), and demographics (e.g., gender, language spoken). The recommender system processes the questionnaire and derives appropriate weights for each preference. Afterward, the recommender system assigns matching scores to physicians, with the highest match on the top. The matching score is hidden from the patient to prevent misinterpretation. However, confirming phrases such as “Doctor X could speak your preferred language” and/or “Doctor X is specialized in caring for your needs” indicate in an understandable format why the system suggests a physician to the patient. The system can incorporate human-in-the-loop practices allowing users to express their own preferences at the time of matching. After the patient selects the physician, the system will set up the first appointment so the patient and the physician can meet to establish a formal relationship. After the appointment is concluded, additional data will be reviewed to assess the efficacy of the match, thereby creating a feedback loop to improve the matching algorithm.

We are currently developing a system prototype that can meet these goals with a primary focus on fostering a positive, long-lasting relationship between patients and providers based on the social matching concept. Moreover, the system seeks to strike a balance of overall provider utilization in the network. The more patients a physician manages, the less effective the care becomes. On the other hand, having too few patients per physician breeds inefficiency, thereby escalating healthcare costs. As a result, while patient care and patient satisfaction are the primary concern, the recommender system has to maximize the collective physicians’ utilization rate to improve the effectiveness of the network, leading to overall cost reduction. This is a first step in using recommender systems for improving healthcare outcomes and has the potential to revolutionize the field. Any new implementations will also have to demonstrate highest standards of protecting patient information and ensuring user privacy.

Keywords

Recommender systems, healthcare, social matching

REFERENCES

