Text Classification to Weave Medical Advice with Patient Experiences

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Abstract
Unlike face-to-face patient support groups, clinicians providing medical advice to peer-patient conversations is challenging in online patient communities due to its large scale. We are developing a system that weaves medical advice into online patient conversations. As an initial step, we are exploring text classification of answers contributed by health professionals and patients. Using unigrams, we were able to predict with 91.9% accuracy whether an answer was written by a health professional or a patient.

Introduction
Unlike face-to-face support groups, it is challenging for health professionals to provide medical advice in the context of online peer-patient conversations because of time and resource limitations. To address this gap, we are developing a system that weaves health professionals’ medical advice available on the Web into peer-patient conversations in online communities. Health professionals’ blogs or answers posted in online community forums often lack meta-data about the authorship of the information. To explore automatically identifying health professionals’ answers from the Web, we looked at classifying health professionals’ answers versus patients’ answers. Previous studies looked at various ways—semantic, syntactic, and statistical features—to classify medical questions, but no studies have classified authorship of answers in online patient community settings.

Methods
DLife.com, an online diabetes patient community, provides a forum where both health professionals and patients can answer patients’ questions. We analyzed all 9,309 publicly available answers (6554 from patients and 2755 from health professionals) from DLife. We represented the content of answers using unigrams and excluding stop words while keeping pronouns. For feature selection, we applied Correlation Feature Selection, which selected a set of 759 features from 23,954 original features. We trained a Naïve Bayes Classifier to predict whether a given post is written by a health professional or a patient. To evaluate the performance, we applied 10-fold cross validation.

Results and Conclusion
The findings show that the classifier can predict whether an answer is written by a health professional or a patient with 91.9% accuracy—21.9% higher than a random prediction. The precision rate for each class—health professionals’ answers and patients’ answers—is 0.922 and 0.911, and recall rate is 0.967 and 0.805, respectively. The top three features included “my,” “your,” and “I.” “My” is the only word among the three that occurs more frequently in patients’ answers. We examined the content of the data in which the word “my” occurred. In patients’ answers, “my” is used in the context of one’s health such as “my cholesterol level.” For health professionals, “my” is used as a reference to information such as “my rule is to take.” In conclusion, our results inform possibilities to automatically extract health professionals’ posts on the Web for weaving into peer-patient conversations. For future work, we explore adding semantic features such as UMLS and statistical features to improve explanatory power. We continue to work on applying our results to other online communities and social media such as blogs and personal websites. Text classification shows promise in leveraging health professionals’ valuable contributions online.

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References