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A study on Suggesting Medicines by Analysing Reviews

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Abstract

The research aims at Recommending Appropriate Medicine by analysing review of it and mapping it with patient's condition. After consuming any medicine patients experience certain effects which are both positive and negative. These effects when put forward as reviews about the medicine are helpful in recommending the correct medicine for a particular condition. The review contains the side effects, positive effects and details about how impactful the medicine was to the patient. Usually, for not so serious conditions medicines are recommended according to the previous experience of a person in family or domain knowledge of the pharmacist or few generic conditions, medicines are suggested as per knowledge of the patient. One such example is Crocin, Combiflam for viral. But these medicines are not highly impactful for specific conditions. So in this research we will be using the patient's reviews to correctly map any medicine with the patient's condition and using this further recommend an appropriate medicine to the patient. This will also work as an assistant to emerging doctors, pharmacist. In order to do so techniques like text analytics will be used. For accurate recommendation, every word in the review will be analysed to find accurate sentiment of the word.

Introduction

Healthcare is one of the most sought after field for analytics as it is growing daily. Recommendations have become part of the field as they assist doctors, nurses as well as pharmacist. Medicine recommendation is a field where Recommendations can help as an aid to human domain knowledge.

Today while recommending medicines, advise from doctors matters the most. But usually this advice is also given by pharmacist or domain expert or any family member. We normally tend to use those medicines which are recommended by the people we know on the knowledge of their prior experience. We even never think of the alternatives which can be a better substitute to the medicine we are consuming. One of the major things that is ignored in this process is using the reviews of the medicines given by the users. Every user has different opinions on medicine he she uses.So here, understanding multiple reviews between substitute medicines and then recommending the best suitable medicine can be an optimum option. Even Doctors can take into consideration many multiple reviews about a drug and then recommend the appropriate. Also Pharma companies can know how their drugs are ranked by users when compared to their substitutes. There is a tremendous amount of reviews in social media. In decades past, enterprises paid research companies to poll end users to get the kind of information that consumers now willingly post to public social media platforms. It gave Pharma company's businesses an unprecedented opportunity for connecting with customers. Meanwhile, it can also help doctors and practitioners to find the right or most accurate drug among its substitutes and that advice can be well trusted as the data has been collected by those who have actually used the specific drug and know how it affected the body. This will allow doctors to extract information about how the patient perceives a certain drug, what kind of effects patients had generally and how well a particular drug is impacting mankind. Research objective is to find the best suitable drug for a condition by analysing and validating the reviews given by the patients. Moreover, this is done in order to assist Doctors, Nurses, Pharmacist to help recommending any drug for a particular condition.

Research Design

The dataset gives persistent audits on explicit medications alongside related conditions and a patient rating reflecting by and large patient fulfilment. The information was gotten by slithering on the web pharmaceutical audit destinations and is accessible at UCL Data Repository.

Information is principally utilized for following things:

(1) Sentiment analysis of how a drug is performing based on reviews.

Attribute Information:

1. Drug Name: Type: Categorical Data
2. Condition: Type: Categorical Data
3. Review: Type: Text
4. Rating: Type: Numerical
5. Date: Type: Date
6. Useful Count: Type: Numerical

The cycle starts in the order of Data understanding flowed by data exploration and data pre-processing. Then text analytics is performed to calculate sentiment score and results are analysed to build a conclusion. In the data exploration part, visualization techniques and statistical techniques are used. Pre-processing is done to remove any not value adding entities and also feature engineering is used to find more appropriate variables. Further text blob library is used to calculate sentiment score on the cleaned data. After getting the score aggregation of medicine scores is used.

Methodology

In Data understanding all attributes are analysed to check how they are impactful. Moreover, is the data Bias or not, are any extra variables required are looked upon. Also Primary key which is UniqueId in this case is used to find whether multiple reviews are written by same patient. On finding it there weren't any such discrepancies. After understanding the Data and the variables, data exploration is performed. Few variables like Drug Name and Condition are analysed together as they are very dependent on each other. On checking this it was found that there were few conditions which have only 1 drug. Such conditions were removed.

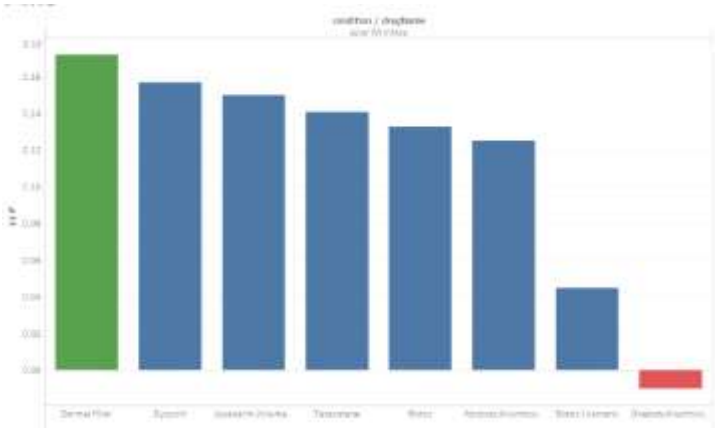
Data Exploration gave different dimensions about the data with respect to reviews, year of reviews, useful count.

Then in Data Pre-processing the missing values were removed followed by the entities where only 1 drug was used and no other substitute was available. Also reviews were cleaned especially the non ascii characters.

Then feature engineering was done to add many more meaningful features to the existing variables. Sentiment score was added for more accurate results. Further the sentiment score for all Drugs covering a particular symptom was calculated.

Results

After doing the feature engineering final predicted score was calculated using information received from all the variables and best Drugname was suggested for a particular condition.



Here, for the condition Acid Wrinkles, Dermal filler is the best drug according to the reviews while Onabotulinum Toxin A has the worst reviews. Similarly, for every condition available, the best suggested medicine and the not so better ones are available.Meanwhile this score can also be used for comparison of two or more substituted Drugs with each other with respect to the review provided by the patient. Few conditions have many types of Drugs. Here the confusion is quite high but our results clearly separate and substitute drugs based on the reviews we got. It successfully recommended the best suitable Drug as per review.

Implications- Theoretical and Managerial

This can add as an assistance to doctors, nurses and pharmacist. Depending on the symptom of a patient an accurate Drug can be recommended which not only depends on the doctor expertise but also on the patient feedback. Furthermore, this will also help Pharma companies to compare their product with substitute Drugs available in the market. This comparison is also validated as the patient himself is an important factor guiding the comparison.

Future research

- Sample size is an important factor here. Every drug should have sufficient sample size for its validation.
- The source of review must be well validated.
- Emotional analysis can further be improved by altering the dictionary and modifications in future.

- Can be added as part of every Information system use at healthcare institutions like clinics, shops, hospitals etc.

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