CS598 Data Mining Capstone Task 1

Exploration of the Dataset

dipakp2@illinois.edu

Overview:

The goal of this task is to explore the Yelp data set to get a sense about what the data looks like and their characteristics. In this document, I am going to analyze part of Yelp's academic dataset and mine this data to discover interesting and useful knowledge.

Task 1.1

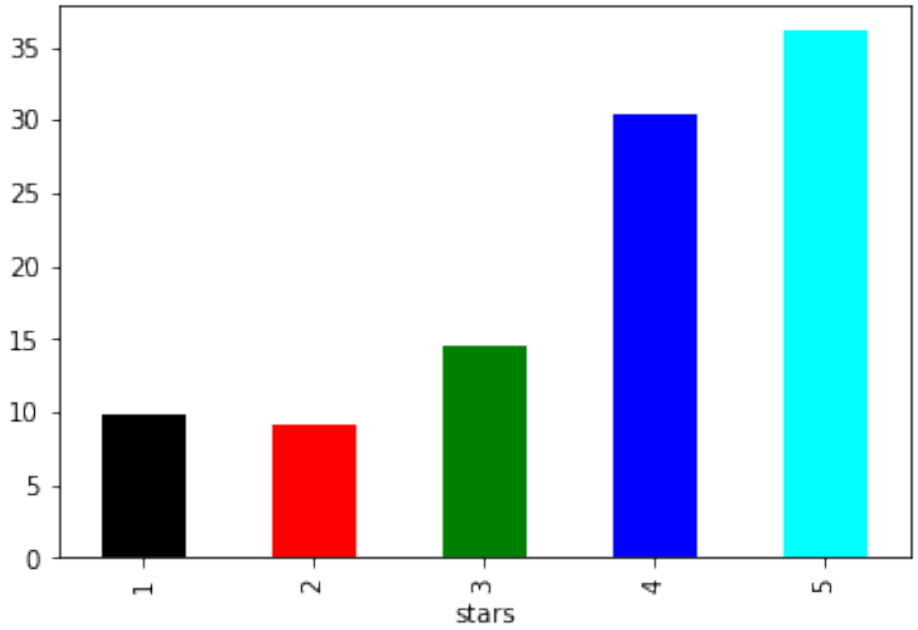
LDA (Latent Dirichlet Allication) – The main idea of this model is to assume that each document is a (different) mixture of topics. The topic is represented as a multinomial probability distribution over words. For yelp dataset, we will use LDA to extract topics from all the review text (positive and negative reviews) and visualize to better understand what everyone have talked about in these reviews.

Step 1. Preprocessing

In order to perform exploratory analysis we first read following Yelp's dataset –

- yelp_academic_dataset_business.json
- yelp_academic_dataset_checkin.json
- yelp_academic_dataset_review.json
- yelp_academic_dataset_tip.json
- yelp_academic_dataset_user.json

Step 2. Distribution Plot



Here we are creating distribution plot of ratings to answer one of the high level goals of our exploratory data analysis. We can see that vast majority of the reviews are positive (rating 5 light blue bar) based on Yelp's rating system on a scale between 1-5.

Step 3. Topic Mining of restaurant reviews

In order to perform topic mining let us take a large random sample of overall dataset and then we perform following preprocessing steps:

- stop word removal
- remove new lines
- remove single quotes
- forming unigram and bigram
- applying spacy's lemmatization
- display wordcloud

At the end, we create a dictionary and corpus for our topic modeling.

Step 4. Topic Model LDA

For this topic model, we are using Gensim's fast and efficient LDA implementation to train a model on the corpus we just created from Yelp dataset and extract topics. For easiness, we decided to use 10 documents per training chunk, and limit the maximum

number of iterations to 100 when inferring the topic distribution. Further, in order to visualize the weight of words we have decided to use word cloud that shows us the exact importance of each topic.

Step 5. LDA Positive Subset

In order to alleviate positive reviews from other reviews we will filter out results that has star ratings of 5 and resulting word cloud is shown below –

Step 6. LDA Negative Subset

In order to alleviate negative reviews from other reviews we will filter out results that has star ratings less than 3 and resulting word cloud is shown below –

Discussion

Overall after looking at the results that are displayed in word cloud visualization we can say that LDA topic have provided us very good results. Taking glance at positive topics we can say that we were able to compile the results based on positive feelings with keywords such as “love”, “wonderful”, “caring”, “great”. Whereas negative topics reveals mix of negative and mix expression with keywords such as “wait”, “old”, “brutal”, “impersonal” etc... These prominent words within the topics make intuitive sense, but some of the topics themselves are reasonable. For instance, positive reviews could include: Five Guys Burgers & Fries are so delicious. The negative reviews could be something like: We had to wait in line for long time had to leave due to slow service of restaurant.

Moreover we can also say that LDA topic has done excellent job in creating word topic cluster for positive and negative reviews. If we look at word cloud topic we can say that topics 0, 1, 3, 4, 5, 7, 8, 9 are based of positive reviews and topics 2 and 6 are based on negative reviews.

References

- https://radimrehurek.com/gensim/similarities/docsim.html
- https://www.datacamp.com/community/tutorials/wordcloud-python
- https://www.machinelearningplus.com/nlp/topic-modeling-gensim-python/#4whatdoesldado