TSNE_Avg_W2V

July 7, 2018

1 TSNE Visualization of Average Word to Vector For Amazon Fine Food Reviews

This Dataset conists of reviews of fine foods from amazon. which includes: - Reviews from Oct 1999 - Oct 2012 - Total of 568,454 reviews - Given by 256,059 users - For 74,258 products

2 Data Cleaning and Loading

The same data is cleaned, by removing the duplicates and the reviews for which HelpfulnessNumerator is greater than HelpfulnessDenominator. So it is reduced to 364171 reviews with same 10 columns. This data with 364171 reviews is stored in a SQLite Database named 'final_sqlite' and the table for these reviews is 'Reviews'.

We load the data using SQLite in to pandas dataframe

```
In [1]: import sqlite3
        import pandas as pd
        import numpy as np

        conn = sqlite3.connect('final_sqlite')
        data = pd.read_sql_query('''select * from Reviews''', conn)
        print(data.shape)
        print(data.columns)
```

```
(364171, 12)
Index(['index', 'Id', 'ProductId', 'UserId', 'ProfileName',
       'HelpfulnessNumerator', 'HelpfulnessDenominator', 'Score', 'Time',
       'Summary', 'Text', 'ClearedText'],
      dtype='object')
```

```
In [2]: def convert(x):
            '''To convert the reviews to positive or negative'''
            return 'Negative' if x<3 else 'Positive'
        score = data['Score'].map(convert)
        print(score.shape)
```

```
(364171,)
```

Here we determine a review as Positive or Negative by using the score. If score is more than 3 then it is considered as a positive and negative if it is less than 3 and will ignore if score is 3, as we can't decide whether it will fall into positive or negative category. The data which is in the Reviews table is queried/ saved without the reviews with score 3.

```
In [3]: import re
        def cleanhtml(sentence):
            '''To clean html-tags in the sentense'''
            cleanr = re.compile('<.*?>')
            cleantext = re.sub(cleanr, ' ', sentence)
            return cleantext
        def cleanpunc(sentence):
            '''To clean punctuation or special characters in the sentense'''
            cleaned = re.sub(r'[?|!|\'|"|#]',r'',sentence)
            cleaned = re.sub(r'[.|,|)|(|\|/]',r' ',cleaned)
            return  cleaned
```

```
In [5]: list_of_sent=[]
        for sent in data['Text'].values:
            filtered_sentence=[]
            sent=cleanhtml(sent)
            for w in sent.split():
                for cleaned_words in cleanpunc(w).split():
                    if(cleaned_words.isalpha()):
                        filtered_sentence.append(cleaned_words.lower())
                    else:
                        continue
            list_of_sent.append(filtered_sentence)
```

```
In [6]: print(data['Text'].values[6])
        print("**********************************************************************")
        print(list_of_sent[6])
```

```
I set aside at least an hour each day to read to my son (3 y/o). At this point, I consider myse
**********************************************************************
['i', 'set', 'aside', 'at', 'least', 'an', 'hour', 'each', 'day', 'to', 'read', 'to', 'my', 'so
```

3 Average Word to Vector

```
In [7]: import gensim
        w2v_model=gensim.models.Word2Vec(list_of_sent,min_count=5,size=50, workers=4)
```

```
D:\Users\KiranPS\Anaconda\lib\site-packages\gensim\utils.py:1197: UserWarning: detected Windows
  warnings.warn("detected Windows; aliasing chunkize to chunkize_serial")
```

```
In [8]: words = list(w2v_model.wv.vocab)
        print(len(words))
```

```
33783
```

```
In [9]: # average Word2Vec
        # compute average word2vec for each review.
        sent_vectors = []; # the avg-w2v for each sentence/review is stored in this list
        for sent in list_of_sent: # for each review/sentence
            sent_vec = np.zeros(50) # as word vectors are of zero length
            cnt_words =0; # num of words with a valid vector in the sentence/review
            for word in sent: # for each word in a review/sentence
                try:
                    vec = w2v_model.wv[word]
                    sent_vec += vec
                    cnt_words += 1
                except:
                    pass
            sent_vec /= cnt_words
            sent_vectors.append(sent_vec)
        print(len(sent_vectors))
        print(len(sent_vectors[0]))
```

```
D:\Users\KiranPS\Anaconda\lib\site-packages\ipykernel_launcher.py:14: RuntimeWarning: invalid v
```

```
364171
50
```

```
In [12]: df= pd.DataFrame(sent_vectors)
         df.fillna(-99999, inplace = True)
```

```
In [15]: from sklearn.preprocessing import StandardScaler
         df = StandardScaler(with_mean=False).fit_transform(df)
         print(df.shape)
```

```
(364171, 50)
```

```
In [16]: f_1k = df[0:1000]
         s_1k = score[0:1000]
         print(f_1k.shape)
         print(s_1k.shape)
```

```
(1000, 50)
(1000,)
```

4 TSNE Visualization of Avg W2V

```
In [17]: from sklearn.manifold import TSNE
         model = TSNE(n_components =2, random_state = 0)
         tsne_data = model.fit_transform(f_1k)
         print(tsne_data.shape)
```

```
(1000, 2)
```

We choose 1000 records to visualize data using TSNE

```
In [18]: import numpy as np
         c_data = np.vstack((tsne_data.T, s_1k)).T
         frame = pd.DataFrame(c_data, columns =( 'vector1', 'vector2', 'label'))
         print(frame.shape)
```

```
(1000, 3)
```

```
In [20]: import seaborn as sns
         import matplotlib.pyplot as plt
         sns.set_style('darkgrid')
         sns.FacetGrid(frame, hue = 'label', size =8).map(plt.scatter,'vector1', 'vector2').ad
         plt.show()
```


```
In [21]: f_2k = df[0:2000]
         s_2k = score[0:2000]
         print(f_2k.shape)
         print(s_2k.shape)
```

```
(2000, 50)
(2000,)
```

We choose 2000 records to visualize data using TSNE

```
In [22]: model = TSNE(n_components =2, random_state = 0)
         tsne_data = model.fit_transform(f_2k)
         print(tsne_data.shape)
```

```
(2000, 2)
```

```
In [23]: c_data = np.vstack((tsne_data.T, s_2k)).T
         frame = pd.DataFrame(c_data, columns =( 'vector1', 'vector2', 'label'))
         print(frame.shape)
```

```
(2000, 3)
```

```
In [24]: sns.set_style('darkgrid')
         sns.FacetGrid(frame, hue = 'label', size =8).map(plt.scatter,'vector1', 'vector2').ad
         plt.show()
```

We choose 10000 records to visualize data using TSNE

```
In [27]: f_10k = df[0:10000]
         s_10k = score[0:10000]
         print(f_10k.shape)
         print(s_10k.shape)
```

```
(10000, 50)
(10000,)
```

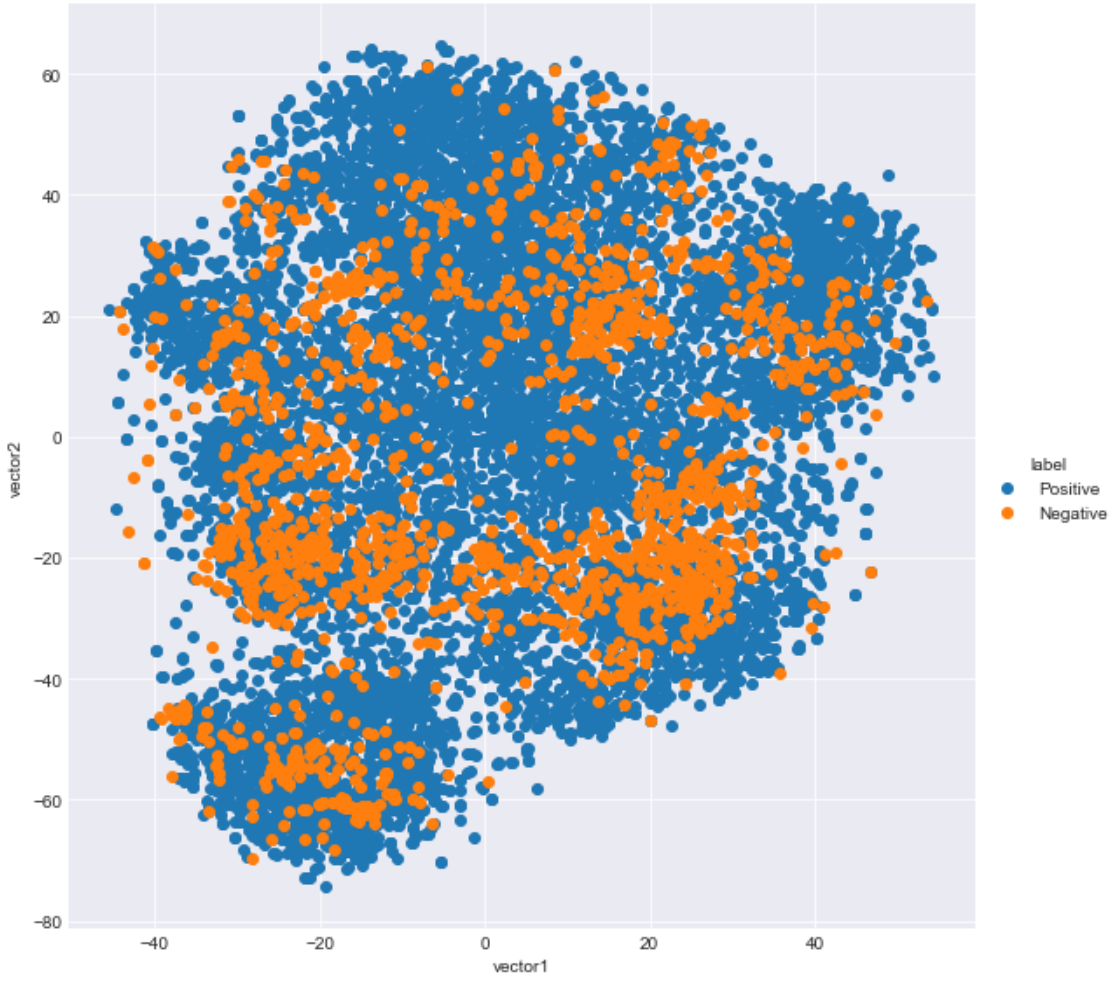
```
In [28]: model = TSNE(n_components =2, random_state = 0)
         tsne_data = model.fit_transform(f_10k)
         print(tsne_data.shape)
```

```
(10000, 2)
```

```
In [29]: c_data = np.vstack((tsne_data.T, s_10k)).T
         frame = pd.DataFrame(c_data, columns =( 'vector1', 'vector2', 'label'))
         print(frame.shape)
```

```
(10000, 3)
```

```
In [30]: sns.set_style('darkgrid')
         sns.FacetGrid(frame, hue = 'label', size =8).map(plt.scatter,'vector1', 'vector2').ad
         plt.show()
```



We choose whole of 364171 records to visualize data using TSNE

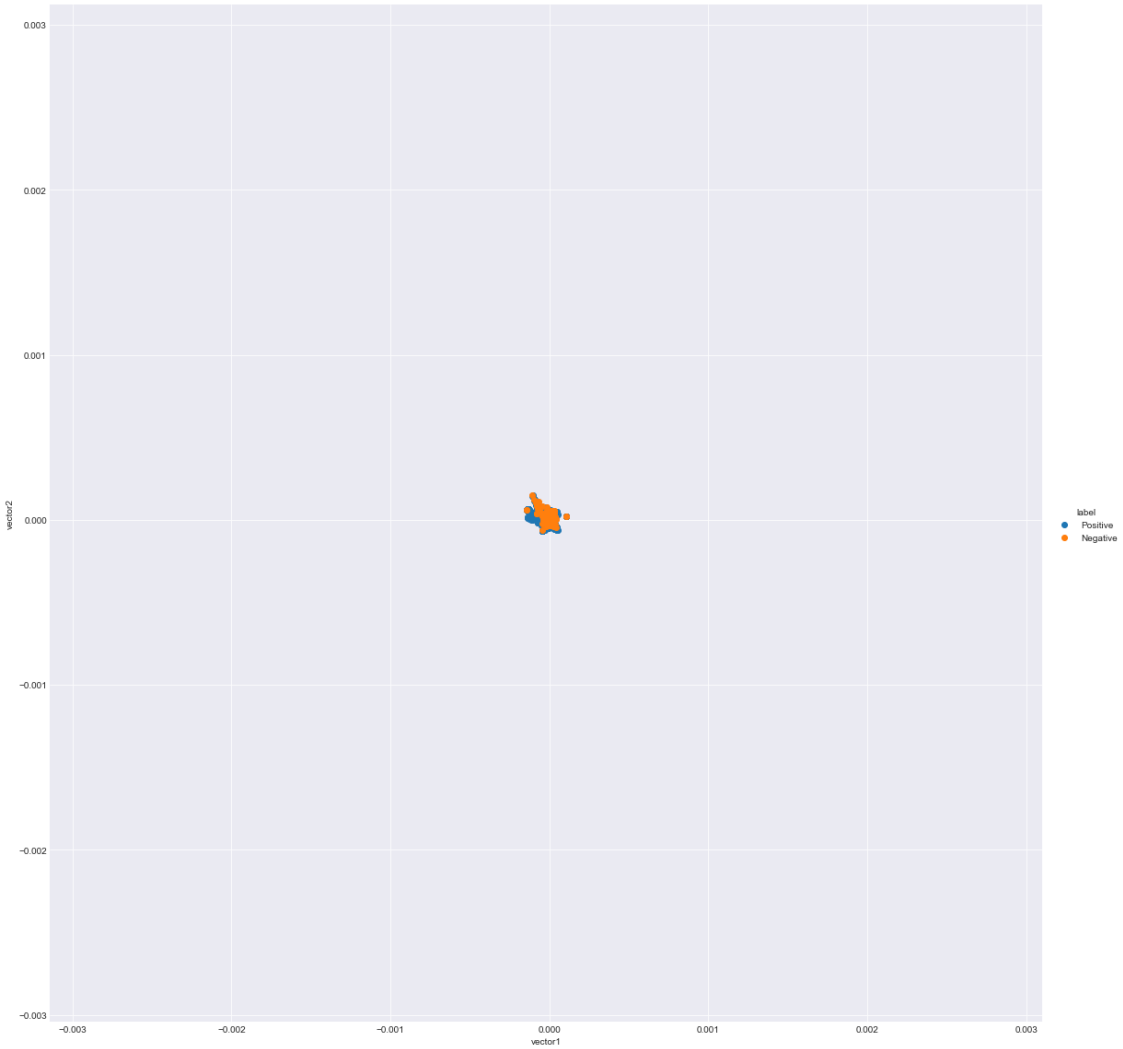
```
In [31]:  model = TSNE(n_components =2, random_state = 0)
          tsne_data = model.fit_transform(df)
          print(tsne_data.shape)
```

```
(364171, 2)
```

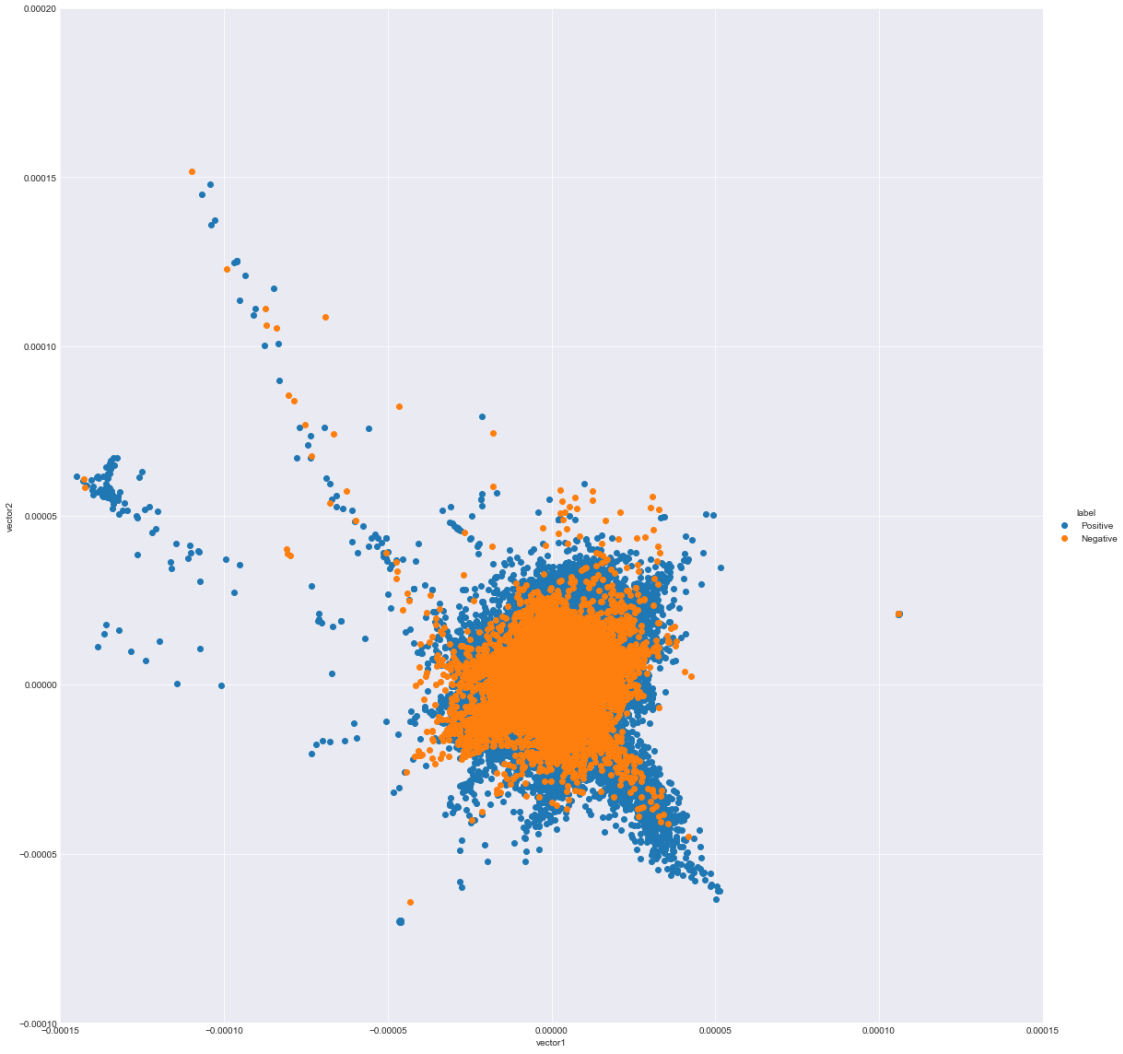
```
In [32]: c_data = np.vstack((tsne_data.T, score)).T
         frame = pd.DataFrame(c_data, columns =( 'vector1', 'vector2', 'label'))
         print(frame.shape)
```

```
(364171, 3)
```

```
In [33]: sns.set_style('darkgrid')
         sns.FacetGrid(frame, hue = 'label', size =16).map(plt.scatter,'vector1', 'vector2').ad
         plt.show()
```



```
In [34]: sns.set_style('darkgrid')
         sns.FacetGrid(frame, hue = 'label', size =16,ylim= (-0.0001,0.0002),xlim= (-0.00015,0
         plt.show()
```



5 Observations:

Even these doesnot give much difference and we cannot bifercate or differentiate whether a review is positive or negative. Both the reviews are spread accross the graph. So we will proceed with other approach and check whether they can be bifercated.