Data_segmentation_user&business

December 19, 2019

```
In [0]: import pandas as pd
        import numpy as np
        import random
        import matplotlib.pyplot as plt
        import time
        import sklearn
        from sklearn.model_selection import train_test_split
        from random import shuffle
        import seaborn as sns
```

```
In [0]: import matplotlib.pyplot as plt
```

```
In [14]: from google.colab import drive
         drive.mount('/content/drive',force_remount=True)
```

```
Mounted at /content/drive
```

```
In [0]: !ls ./drive/My Drive
```

```
ls: cannot access './drive/MyDrive': No such file or directory
```

```
In [0]: path="/content/drive/My Drive/yelp_final_data/"
```

0.0.1 In this notebook, we segment test set in user and business dimension.

We separate user and business in three levels: unpopular, midpopuar and popular. The defination of whether a user/business is popular is defined by the frequency of a user/business. The frequency of a user means the number of ratings a users rated before. The frequency of a business means the number of times a business has been rated before. (Note: when we say a 'popular' user, it means a 'prolific' user, we use the term 'popular' for the succinctness of representing these three levels.)

First, read the dataset we prepared before.

Read the test index we prepared before.

```
In [0]: #start_time=time.time()
        review=pd.read_csv(path+'review.csv')
```

```
        del review['text_review']
        review['freq_business'] = review.groupby('business_id')['business_id'].transform('count
        review2=review.loc[review['freq_business']>2]
        review2['freq_user'] = review2.groupby('user_id')['user_id'].transform('count')
        review3=review2.loc[review2['freq_user']>=5]
        review3=review3.reset_index()
        test_idx=pd.read_csv(path+'all_test_idx_df2.csv')
        test_idx=test_idx.rename({'0':'index'},axis=1)
```

```
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:5: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: http://pandas.pydata.org/pandas-docs/stable/user_guide/i
  """
```

Using the test row index we saved before to get train and test set.

```
In [0]: test=review3.loc[review3['index'].isin(test_idx['index'])]
        train=review3.loc[~review3['index'].isin(test_idx['index'])]
```

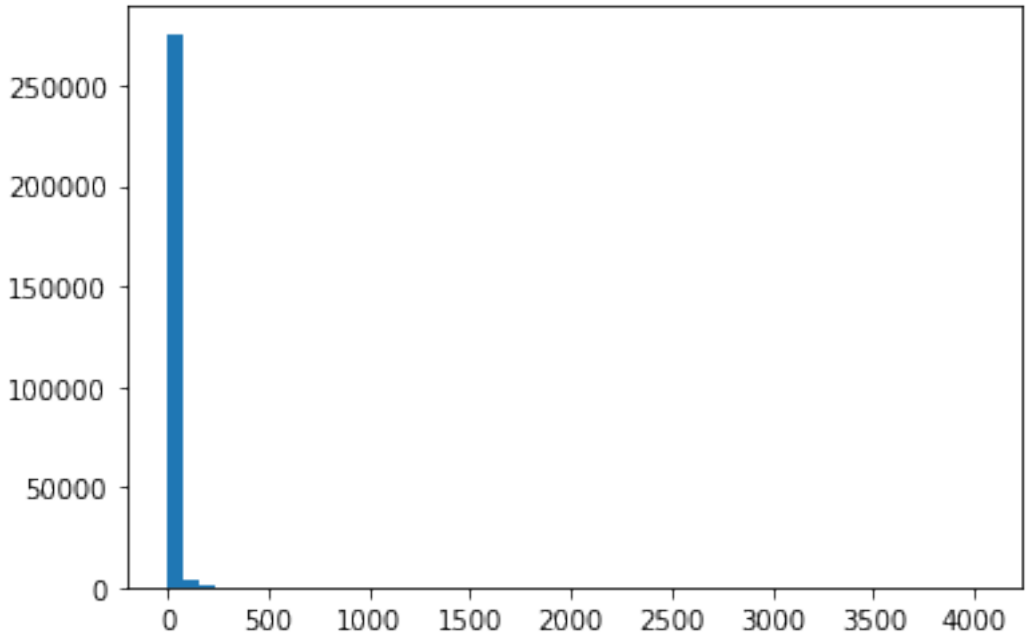
```
In [0]: train.head(3)
```

```
Out[0]:    index                 user_id  ... freq_business  freq_user
        0      0  hG7b0MtEbXx5QzbzE6C_VA  ...            183         10
        1      1  n6-Gk65cPZL6Uz8qRm3NYw  ...             20          9
        2      2  jlu4CztcSxrKx56ba1a5AQ  ...            108        336

        [3 rows x 10 columns]
```

User dimension segmentation

```
In [0]: user_freq=train['user_id'].value_counts()
        df = pd.DataFrame(user_freq).reset_index()
        df.columns = ['userId', 'count']
        plt.hist(df['count'],bins=50)
        plt.show()
```




```
In [0]: df
```

```
Out[0]:                        userId  count
        0       CxDOIDnH8gp9KXzpBHJYXw   4031
        1       bLbSNkLggFnqwNNzzq-Ijw   2335
        2       PKEzKWv_FktMm2mGPjwd0Q   1808
        3       ELcQDlf69kb-ihJfxZyL0A   1754
        4       DK57YibC5ShBmqQl97CKog   1715
        ...                        ...    ...
        281360  PRGMs30FB1F_Lbsk1tWRxw      2
        281361  crwcqmGOSNrftAQTqGHifg      2
        281362  EWJ3FnnEZi2bWnylCFgMrg      2
        281363  SWWfnUz0daoVCN6kJds_9w      2
        281364  4eoE04rDTK6k0UPuuM28fw      2

        [281365 rows x 2 columns]
```

Check the median and mean of the frequency of users

```
In [0]: df['count'].median()
```

```
Out[0]: 5.0
```

```
In [0]: df['count'].mean()
```

```
Out[0]: 12.85909761342029
```

The number of users who rated more than 5 times.

```
In [0]: len(df.loc[df['count']>5])
```

```
Out[0]: 138076
```

The number of users who rated less or equal to 5 times.

```
In [0]: len(df.loc[df['count']<=5])
```

```
Out[0]: 143289
```

The number of users who rated between 5 and 13 times.

```
In [0]: len(df.loc[(df['count']<=13)&(5<df['count'])])
```

```
Out[0]: 78897
```

The number of users who rated more than 13 times.

```
In [0]: len(df.loc[df['count']>13])
```

```
Out[0]: 59179
```

For users who rated less than 5 times, we see them as unpopular/unprolific users. (Note: this does not mean that the users rated less than 5 times in the overall dataset, for here, 'less than 5 times' means 'less than 5 times' in the train set. In the overall dataset, we already exclude the users who rated less than 5 times as inactive users).

```
In [0]: unpopular_user_ID=(df.loc[df['count']<=5])['userId']
```

```
In [0]: unpopular_user_ID=pd.DataFrame(unpopular_user_ID)
```

```
In [0]: unpopular_user_ID.to_csv(path+'unpopular_user_ID.csv',index=False)
```

```
In [0]: pd.read_csv(path+'unpopular_user_ID.csv')
```

```
Out[0]:                        userId
        0       1ULNqf9IbFiso1cBdcTX0A
        1       502dJKA0kyc2bKsyjCniEw
        2       GvKJKd3tBEeWmp0PWBGQ3w
        3       0_KCK9S9j5FhlY0Duf6Lrw
        4       _CMcr0_ylU9fZ6BMCmw0iQ
        ...                        ...
        143284  PRGMs30FB1F_Lbsk1tWRxw
        143285  crwcqmGOSNrftAQTqGHifg
        143286  EWJ3FnnEZi2bWnylCFgMrg
        143287  SWWfnUz0daoVCN6kJds_9w
        143288  4eoE04rDTK6k0UPuuM28fw

        [143289 rows x 1 columns]
```

For users who rated between 5 and 13 times, we see them as midpopular users. 5 and 13 are decided by the median and mean of the frequency.

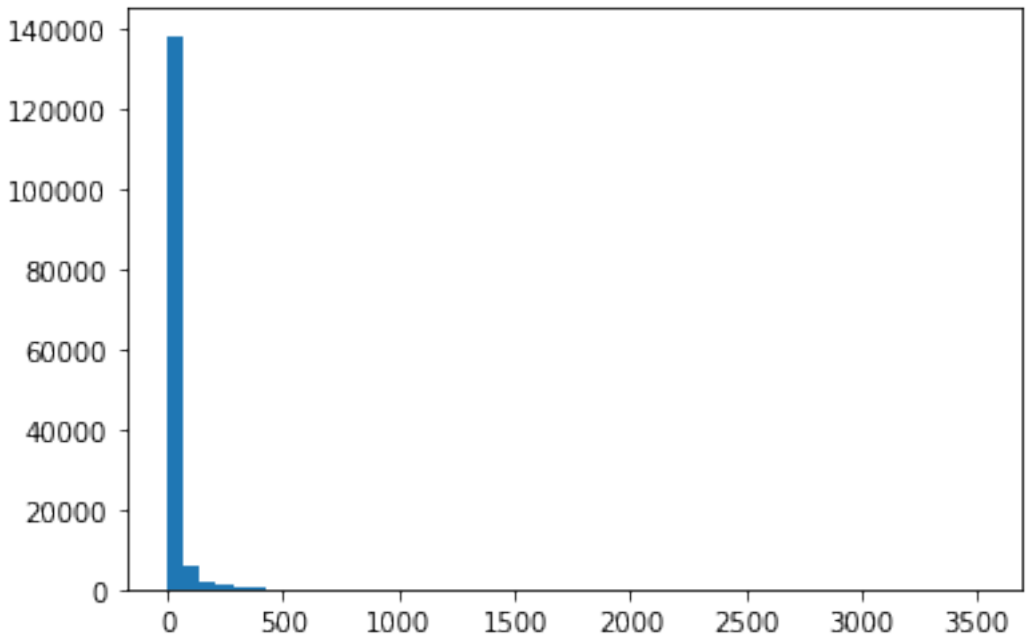
```
In [0]: midpopular_user_ID=(df.loc[(df['count']<=13)&(5<df['count'])])['userId']
        midpopular_user_ID=pd.DataFrame(midpopular_user_ID)
        midpopular_user_ID.to_csv(path+'midpopular_user_ID.csv',index=False)
```

For users who rated between more than 13 times, we see them as popular/prolific users.

```
In [0]: popular_user_ID=(df.loc[df['count']>13])['userId']
        popular_user_ID=pd.DataFrame(popular_user_ID)
        popular_user_ID.to_csv(path+'popular_user_ID.csv',index=False)
```

Business dimension segmentation Same logic applies here.

```
In [0]: business_freq=train['business_id'].value_counts()
        df = pd.DataFrame(business_freq).reset_index()
        df.columns = ['businessId', 'count']
        plt.hist(df['count'],bins=50)
        plt.show()
```




```
In [0]: df['count']

Out[0]: 0         3514
        1         3323
        2         2901
```

```
3          2636
4          2342
           ...
148838        1
148839        1
148840        1
148841        1
148842        1
Name: count, Length: 148843, dtype: int64
```

Check the median and the mean of the frequency.

```
In [0]: df['count'].median()
```

```
Out[0]: 7.0
```

```
In [0]: df['count'].mean()
```

```
Out[0]: 24.308163635508556
```

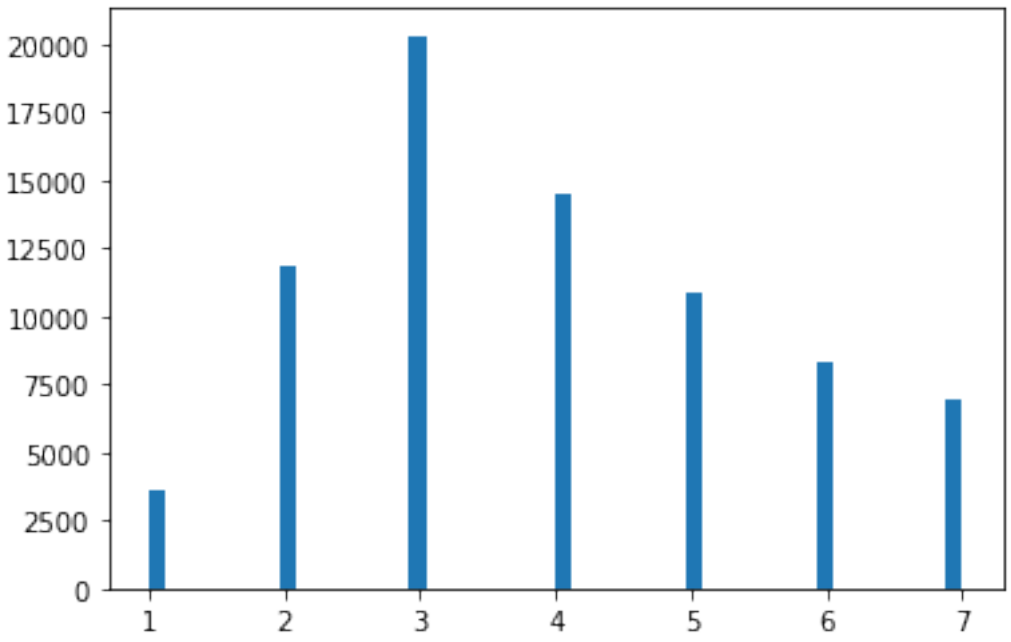
The number business that has been rated less or equal to 7 times.

```
In [0]: len(df.loc[df['count']<=7])
```

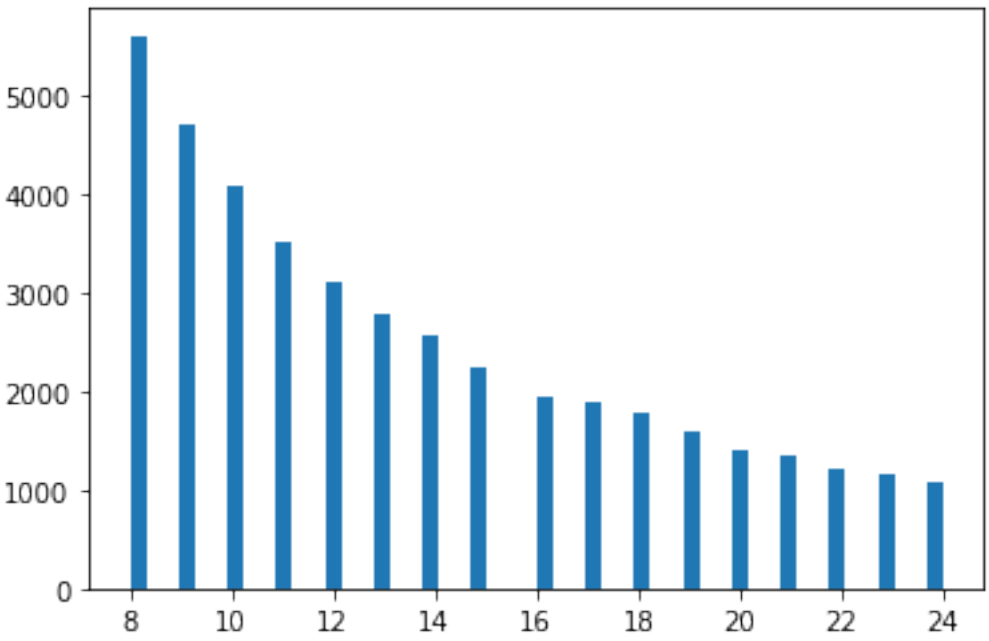
```
Out[0]: 76229
```

```
In [0]: A=df.loc[df['count']<=7]
```

```
In [0]: plt.hist(A['count'],bins=50)
        plt.show()
```



```
In [0]: plt.hist((df.loc[(df['count']>7)&(df['count']<=24)])['count'],bins=50)
        plt.show()
```



The number business that has been rated between 7 and 24 times.

```
In [0]: len(df.loc[(df['count']>7)&(df['count']<=24)])
```

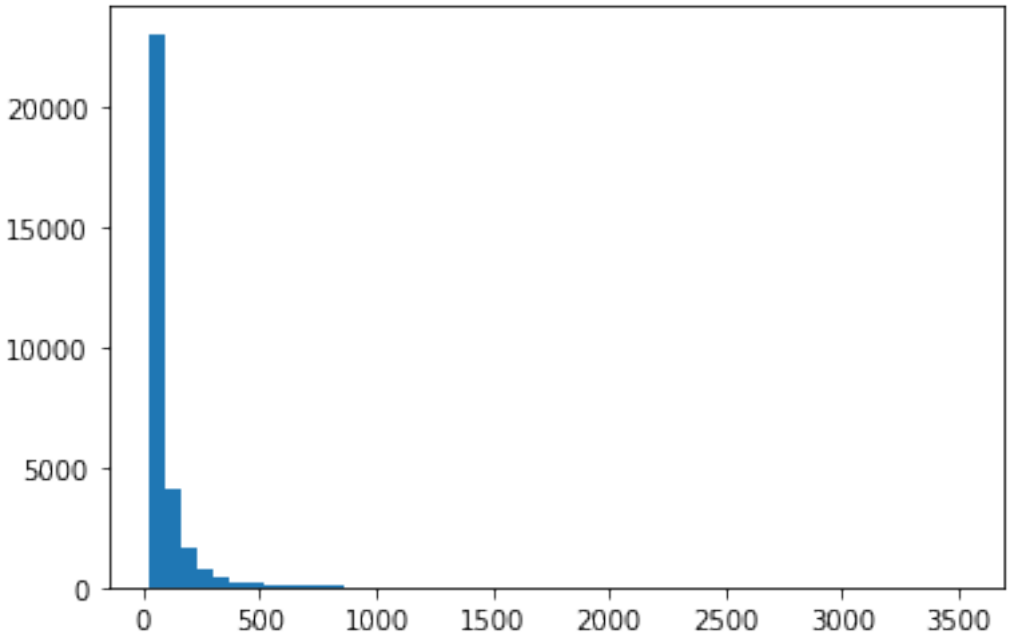
```
Out[0]: 41929
```

The number business that has been rated more than 24 times.

```
In [0]: len(df.loc[df['count']>24])
```

```
Out[0]: 30685
```

```
In [0]: plt.hist((df.loc[df['count']>24])['count'],bins=50)
        plt.show()
```



1. For business that has been rated less or equal to 7 times, we see them as unpopular businesses.
2. For business that has been rated between 7 and 24 times, we see them as midpopular businesses.
3. For business that has been rated more than 24 times, we see them as popular businesses.

Note:7 and 24 are decided by the median and mean of the frequency.

```
In [0]: unpopular_business_ID=(df.loc[df['count']<=7])['businessId']
        unpopular_business_ID=pd.DataFrame(unpopular_business_ID)
        unpopular_business_ID.to_csv(path+'unpopular_business_ID.csv',index=False)

In [0]: midpopular_business_ID=(df.loc[(df['count']>7)&(df['count']<=24)])['businessId']
        midpopular_business_ID=pd.DataFrame(midpopular_business_ID)
        midpopular_business_ID.to_csv(path+'midpopular_business_ID.csv',index=False)

In [0]: popular_business_ID=(df.loc[df['count']>24])['businessId']
        popular_business_ID=pd.DataFrame(popular_business_ID)
        popular_business_ID.to_csv(path+'popular_business_ID.csv',index=False)
```