ket-ecommerce-recommendaion-system

February 11, 2024

PREPROCESSING:

[ ]:

```
import pandas as pd
import numpy as np

import datetime
import time

%matplotlib inline
import matplotlib.pyplot as plt
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn import metrics
```

IMPORTING DATASETS:

[ ]:

```
events_df = pd.read_csv('/content/drive/MyDrive/ecommerce dataset/events.csv')
category_tree_df = pd.read_csv('/content/drive/MyDrive/ecommerce dataset/
 ↪category_tree.csv')
item_properties_1_df = pd.read_csv('/content/drive/MyDrive/ecommerce dataset/
 ↪item_properties_part1.csv')
item_properties_2_df = pd.read_csv('/content/drive/MyDrive/ecommerce dataset/
 ↪item_properties_part2.csv')
```

[ ]:

```
events_df.head()
```

[ ]:

```
       timestamp  visitorid event  itemid  transactionid
0  1433221332117     257597  view  355908            NaN
1  1433224214164     992329  view  248676            NaN
2  1433221999827     111016  view  318965            NaN
3  1433221955914     483717  view  253185            NaN
4  1433221337106     951259  view  367447            NaN
```

[ ]:

```
events_df[events_df.transactionid.notnull()].event.unique()
```

[ ]:

```
array(['transaction'], dtype=object)
```

```
[ ]: events_df[events_df.transactionid.isnull()].event.unique()
```

```
[ ]: array(['view', 'addtocart'], dtype=object)
```

```
[ ]: item_properties_1_df.head()
```

```
[ ]:        timestamp  itemid    property                           value
     0  1435460400000  460429  categoryid                            1338
     1  1441508400000  206783         888         1116713 960601 n277.200
     2  1439089200000  395014         400  n552.000 639502 n720.000 424566
     3  1431226800000   59481         790                       n15360.000
     4  1431831600000  156781         917                          828513
```

```
[ ]: category_tree_df.head()
```

```
[ ]:    categoryid  parentid
     0        1016     213.0
     1         809     169.0
     2         570       9.0
     3        1691     885.0
     4         536    1691.0
```

```
[ ]: item_properties_1_df.loc[(item_properties_1_df.property == 'categoryid') &␣
      ↪(item_properties_1_df.value == '1016')].sort_values('timestamp').head()
```

```
[ ]:                timestamp  itemid    property value
     6363096   1431226800000  339403  categoryid  1016
     8597591   1431226800000  161686  categoryid  1016
     7942027   1431226800000  418837  categoryid  1016
     10230975  1431226800000   85538  categoryid  1016
     7280176   1431226800000  278463  categoryid  1016
```

```
[ ]: customer_purchased = events_df[events_df.transactionid.notnull()].visitorid.
      ↪unique()
     customer_purchased.size
```

```
[ ]: 11719
```

```
[ ]: all_customers = events_df.visitorid.unique()
     all_customers.size
```

```
[ ]: 1407580
```

```
[ ]: customer_browsed = [x for x in all_customers if x not in customer_purchased]
```

```
[ ]: len(customer_browsed)
[ ]: 1395861
```

```
[ ]: temp_array = np.isin(customer_browsed, customer_purchased)
     temp_array[temp_array == False].size
```

```
[ ]: 1395861
```

```
[ ]: customer_purchased[:10]
```

```
[ ]: array([ 599528,  121688,  552148,  102019,  189384,  350566,  404403,
             505565,  945184, 1406787])
```

```
[ ]: events_df[events_df.visitorid == 102019].sort_values('timestamp')
```

```
[ ]:            timestamp  visitorid        event  itemid  transactionid
     19690  1433175714335     102019         view   49521            NaN
     19501  1433175801314     102019    addtocart   49521            NaN
     14842  1433175812596     102019         view  150318            NaN
     19573  1433175871497     102019         view   49521            NaN
     8701   1433175894837     102019         view   49521            NaN
     19708  1433175945872     102019         view  150318            NaN
     8740   1433176042269     102019         view   49521            NaN
     814    1433176736375     102019  transaction  150318        13556.0
     19724  1433176736422     102019  transaction   49521        13556.0
```

```
[ ]: tz = int('1433221332')
     new_time = datetime.datetime.fromtimestamp(tz)
     new_time.strftime('%Y-%m-%d %H:%M:%S')
```

```
[ ]: '2015-06-02 05:02:12'
```

```
[ ]: tz = int('1438400163')
     new_time = datetime.datetime.fromtimestamp(tz)
     new_time.strftime('%Y-%m-%d %H:%M:%S')
```

```
[ ]: '2015-08-01 03:36:03'
```

```
[ ]: # Firstly let's create an array that lists visitors who made a purchase
     customer_purchased = events_df[events_df.transactionid.notnull()].visitorid.
       ↪unique()

     purchased_items = []

     # Create another list that contains all their purchases
     for customer in customer_purchased:
```

```
    #Generate a Pandas series type object containing all the visitor's␣
  ↪purchases and put them in the list
    purchased_items.append(list(events_df.loc[(events_df.visitorid == customer)␣
  ↪& (events_df.transactionid.notnull())].itemid.values))
```

```
[ ]: purchased_items[:5]
```

```
[ ]: [[356475],
      [15335,
       380775,
       237753,
       317178,
       12836,
       400969,
       105792,
       25353,
       200793,
       80582,
       302422],
      [81345],
      [150318, 49521],
      [310791, 299044]]
```

```
[ ]: # Write a function that would show items that were bought together (same of␣
      ↪different dates) by the same customer
     def recommender_bought_bought(item_id, purchased_items):

         # Perhaps implement a binary search for that item id in the list of arrays
         # Then put the arrays containing that item id in a new list
         # Then merge all items in that list and get rid of duplicates
         recommender_list = []
         for x in purchased_items:
             if item_id in x:
                 recommender_list += x

         #Then merge recommender list and remove the item id
         recommender_list = list(set(recommender_list) - set([item_id]))

         return recommender_list
```

```
[ ]: recommender_bought_bought(302422, purchased_items)
```

```
[ ]: [105792, 200793, 12836, 80582, 380775, 15335, 400969, 25353, 237753, 317178]
```

```
[ ]: all_visitors = events_df.visitorid.sort_values().unique()
     all_visitors.size
```

[ ]: 1407580

[ ]:
```
buying_visitors = events_df[events_df.event == 'transaction'].visitorid.
 ↪sort_values().unique()
buying_visitors.size
```

[ ]: 11719

[ ]:
```
viewing_visitors_list = list(set(all_visitors) - set(buying_visitors))
```

[ ]:
```
def create_dataframe(visitor_list):

    array_for_df = []
    for index in visitor_list:

        #Create that visitor's dataframe once
        v_df = events_df[events_df.visitorid == index]

        temp = []
        #Add the visitor id
        temp.append(index)

        #Add the total number of unique products viewed
        temp.append(v_df[v_df.event == 'view'].itemid.unique().size)

        #Add the total number of views regardless of product type
        temp.append(v_df[v_df.event == 'view'].event.count())

        #Add the total number of purchases
        number_of_items_bought = v_df[v_df.event == 'transaction'].event.count()
        temp.append(number_of_items_bought)

        #Then put either a zero or one if they made a purchase
        if(number_of_items_bought == 0):
            temp.append(0)
        else:
            temp.append(1)

        array_for_df.append(temp)

    return pd.DataFrame(array_for_df, columns=['visitorid', 'num_items_viewed',␣
 ↪'view_count', 'bought_count', 'purchased'])
```

[ ]:
```
buying_visitors_df = create_dataframe(buying_visitors)
```

[ ]:
```
buying_visitors_df.shape
```

```
[ ]: (11719, 5)
```

```
[ ]: import random
     random.shuffle(viewing_visitors_list)
```

```
[ ]: viewing_visitors_df = create_dataframe(viewing_visitors_list[0:27820])
```

```
[ ]: viewing_visitors_df.shape
```

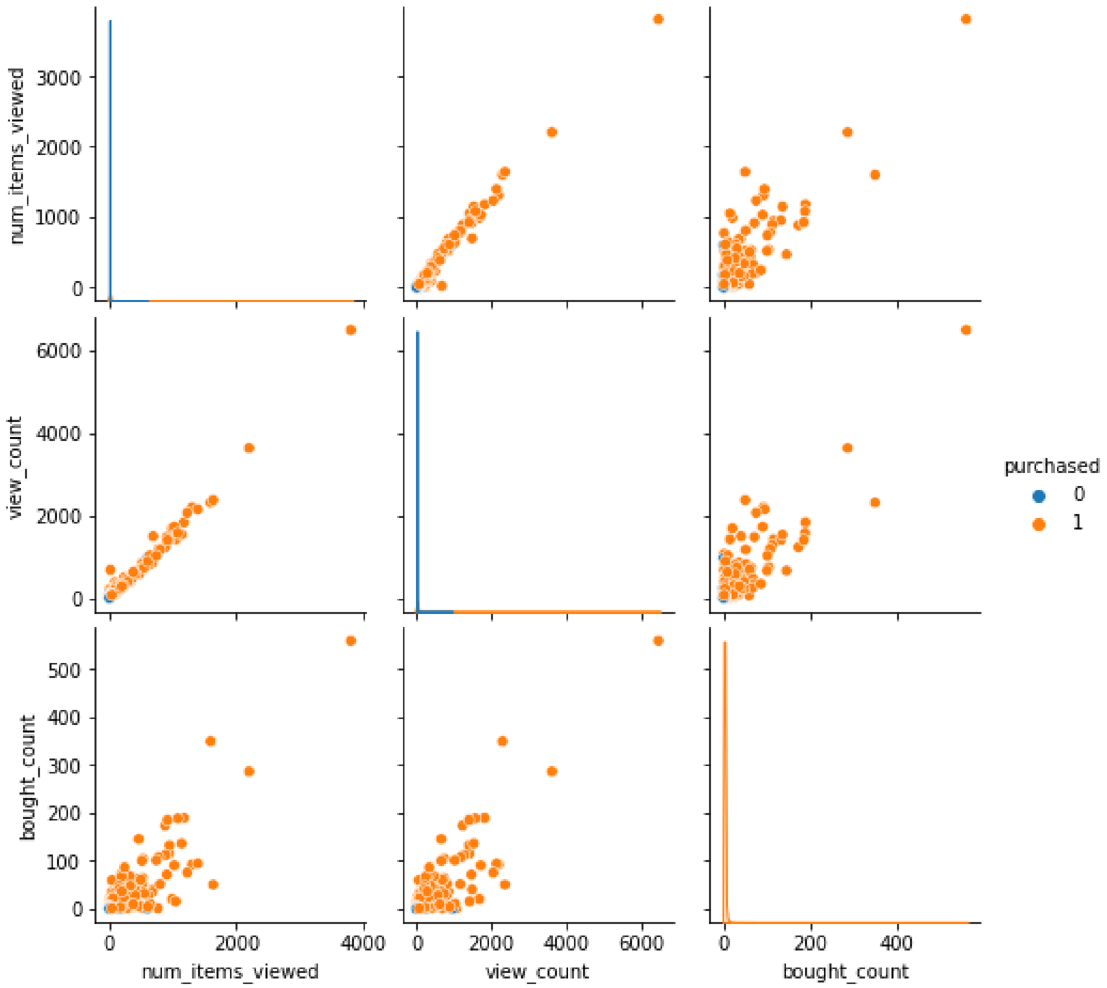
```
[ ]: (27820, 5)
```

```
[ ]: main_df = pd.concat([buying_visitors_df, viewing_visitors_df],␣
       ↪ignore_index=True)
```

```
[ ]: main_df = main_df.sample(frac=1)
```

```
[ ]: sns.pairplot(main_df, x_vars = ['num_items_viewed', 'view_count',␣
       ↪'bought_count'],
                  y_vars = ['num_items_viewed', 'view_count', 'bought_count'],  hue␣
       ↪= 'purchased')
```

```
[ ]: <seaborn.axisgrid.PairGrid at 0x7f7b91dc3850>
```



[ ]:
```
X = main_df.drop(['purchased', 'visitorid', 'bought_count'], axis = 'columns')
y = main_df.purchased
```

[ ]:
```
X_train, X_test, y_train, y_test = train_test_split(X, y, random_state = 42,␣
 ↪train_size = 0.7)
```

[ ]:
```
logreg = LogisticRegression()
```

[ ]:
```
logreg.fit(X_train, y_train)
```

[ ]:
```
LogisticRegression()
```

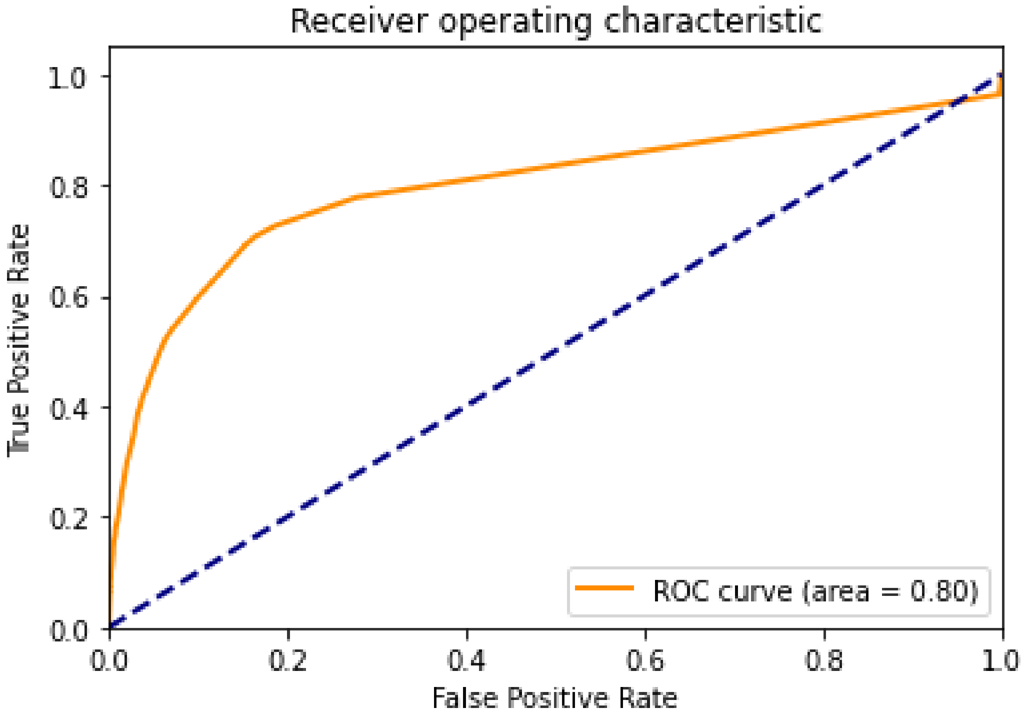
[ ]:
```
y_pred_class = logreg.predict(X_test)
```

[ ]:
```
preds = logreg.predict_proba(X_test)[:,1]
```

```
# Store the false positive rate(fpr), true positive rate (tpr) in vectors for␣
  ↪use in the graph
fpr, tpr, _ = metrics.roc_curve(y_test, preds)

# Store the Area Under the Curve (AUC) so we can annotate our graph with theis␣
  ↪metric
roc_auc = metrics.auc(fpr, tpr)

# Plot the ROC Curve
plt.figure()
lw = 2
plt.plot(fpr, tpr, color='darkorange', lw = lw, label = 'ROC curve (area = %0.
  ↪2f)' % roc_auc)
plt.plot([0, 1], [0, 1], color = 'navy', lw = lw, linestyle = '--')
plt.xlim([0.0, 1.0])
plt.ylim([0.0, 1.05])
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive Rate')
plt.title('Receiver operating characteristic')
plt.legend(loc = "lower right")
plt.show()
```



PERFORMACE METRICS:

```
[ ]: print('accuracy = {:7.4f}'.format(metrics.accuracy_score(y_test, y_pred_class)))
```

```
accuracy =  0.7921
```