DSC540_ThottiyamVenkatakrishnan_Milestone5

November 18, 2023

[29]:
```
import pandas as pd
import sqlite3
df = pd.read_csv('/Users/tvvr/Downloads/Cleaned_Consumer_Reviews2.csv')
df.head()
table_name = 'flat'

conn = sqlite3.connect('finalproject')

def check_connection(database_name):
    try:
        # Connect to the database
        conn = sqlite3.connect(database_name)

        # Create a cursor object to execute SQL commands
        cursor = conn.cursor()

        # Execute a simple SQL command to test the connection
        cursor.execute('SELECT 1')

        # Fetch the result (not necessary in this case)
        result = cursor.fetchone()

        # Commit the changes and close the cursor and connection
        conn.commit()
        cursor.close()
        conn.close()

        # If everything went well, return True
        return True

    except sqlite3.Error as e:
        # If an exception occurs, print the error message and return False
        print(f"SQLite error: {e}")
        return False

database_name = 'finalproject'
if check_connection(database_name):
```

```
    print(f"Connection to {database_name} successful.")
else:
    print(f"Connection to {database_name} failed.")

cursor=conn.cursor()


cursor.execute ("Create table if not Exists flat (ID text, Product_Name text,␣
 ↪Product_ID text, Brand text, Categories text, keys text, Manufacturer text\
Reviews_Date TEXT, Reviews_DateAdded TEXT, Reviews_DidPurchase text,␣
 ↪Reviews_DoRecommend, text, Reviews_ID text, Reviews_NumHelpful integer,␣
 ↪Reviews_Rating integer, Reviews_SourceURLs text, \
Reviews_Text text, Reviews_Title text, Reviews_UserCity text,␣
 ↪Reviews_UserProvince text, Reviews_Username text, Reviews_Year integer,\
Reviews_Month integer, Reviews_Day integer, Reviews_Hour integer,␣
 ↪Reviews_Minute integer, Reviews_Second integer, Reviews_YearAdded integer,\
Reviews_MonthAdded integer, Reviews_DayAdded integer, Reviews_HourAdded␣
 ↪integer, Reviews_MinuteAdded integer, Reviews_SecondAdded integer,\
Reviews_DateAdded_Only integer,primary key (Product_ID))")

conn.execute(query)
df.to_sql(table_name,conn,if_exists='replace',index=False)
conn.commit()
conn.close()
```

```
Connection to finalproject successful.
```

[30]:
```
conn = sqlite3.connect('finalproject')
cursor=conn.cursor()

result = cursor.execute("SELECT count(*) FROM flat")
for row in result:
    print(row)
```

```
(23,)
```

[31]:
```
cursor.execute ("Create table if not Exists web (Rating text,verified text,␣
 ↪Reviewer_ID text, Product_ID text, Reviewer_Name text,\
Review_Text text, Review_Summary text, Review_Date text, primary key␣
 ↪(Product_ID))")
```

[31]:
```
<sqlite3.Cursor at 0x112c7b5c0>
```

[32]:
```
df_web = pd.read_csv('/Users/tvvr/Downloads/web_Consumer_Reviews.csv')
conn.execute(query)
web_table_name = 'web'
df_web.to_sql(web_table_name,conn,if_exists='replace',index=False)
```

[32]: 3087

[33]:
```
cursor.execute ("Create table if not Exists api (Product_ID        text,␣
 ↪Review_id text, Review_title text, Review_comment text,\
Review_star_rating integer, Review_author text, Review_date text,␣
 ↪Is_verified_purchase text, primary key (Product_ID))")
```

[33]: <sqlite3.Cursor at 0x112c7b5c0>

[34]:
```
df_api = pd.read_csv('/Users/tvvr/Downloads/clean_reviews_data.csv')
conn.execute(query)
api_table_name = 'api'
df_api.to_sql(api_table_name,conn,if_exists='replace',index=False)
```

[34]: 60

[35]:
```
# Query the data from the tables
query_flat = "SELECT * FROM flat;"
query_web = "SELECT * FROM web;"
query_api = "SELECT * FROM api;"

df_flat = pd.read_sql_query(query_flat, conn)
df_web = pd.read_sql_query(query_web, conn)
df_api = pd.read_sql_query(query_api, conn)

# Close the database connection
conn.close()

# Merge the datasets using pandas merge function
# You need to specify the appropriate columns for joining
merged_data = pd.merge(df_flat, df_web, on='Product_ID')
merged_data = pd.merge(merged_data, df_api, on='Product_ID')

# Print or further process the merged dataset
print(merged_data.head())
```

```
Empty DataFrame
Columns: [ID, Product_Name, Brand, Categories, Keys, Manufacturer, Reviews_Date,
Reviews_DateAdded, Reviews_DidPurchase, Reviews_DoRecommend, Reviews_ID,
Reviews_NumHelpful, Reviews_Rating, Reviews_SourceURLs, Reviews_Text,
Reviews_Title, Reviews_UserCity, Reviews_UserProvince, Reviews_Username,
Reviews_Year, Reviews_Month, Reviews_Day, Reviews_Hour, Reviews_Minute,
Reviews_Second, Reviews_YearAdded, Reviews_MonthAdded, Reviews_DayAdded,
Reviews_HourAdded, Reviews_MinuteAdded, Reviews_SecondAdded,
Reviews_DateAdded_Only, Rating, verified, Reviewer_ID, Reviewer_Name,
Review_Text, Review_Summary, Review_Date, Product_ID, Review_id, Review_title,
Review_comment, Review_star_rating, Review_author, Review_date,
```

```
Is_verified_purchase]
Index: []

[0 rows x 47 columns]
```

[27]:
```
conn = sqlite3.connect('finalproject')
cursor=conn.cursor()
# Query the data from the tables
query_flat = "SELECT * FROM flat;"
query_web = "SELECT * FROM web;"
query_api = "SELECT * FROM api;"

df_flat = pd.read_sql_query(query_flat, conn)
df_web = pd.read_sql_query(query_web, conn)
df_api = pd.read_sql_query(query_api, conn)

df_flat.head()
```

[27]:

	ID	Product_Name	\
0	AVqkIhwDv8e3D1O-lebb	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,…	
1	AVqVGZO3nnc1JgDc3jGK	Kindle Oasis E-reader with Leather Charging Co…	
2	AVqkIiKWnnc1JgDc3khH	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,…	
3	AVqkIj9snnc1JgDc3khU	Fire HD 8 Tablet with Alexa, 8 HD Display, 32 …	
4	AVqVGZNvQMlgsOJE6eUY	Amazon Kindle Fire Hd (3rd Generation) 8gb,,,\…	

	Product_ID	Brand	Categories	\
0	B01AHB9CN2	AMAZON	Electronics,iPad & Tablets,All Tablets,Fire Ta…	
1	B00VINDBJK	AMAZON	eBook Readers,Kindle E-readers,Computers & Tab…	
2	B01AHB9CYG	AMAZON	Tablets,Fire Tablets,Electronics,Computers,Com…	
3	B01AHB9C1E	AMAZON	Tablets,Fire Tablets,Computers & Tablets,All T…	
4	B00ZV9PXP2	AMAZON	Electronics,iPad & Tablets,All Tablets,Compute…	

	Keys	Manufacturer	\
0	841667104676,amazon/53004484,amazon/b01ahb9cn2…	Amazon	
1	kindleoasisereaderwithleatherchargingcovermerl…	Amazon	
2	841667104690,allnewfirehd8tablet8hddisplaywifi…	Amazon	
3	amazon/b01ahb9c1e,0841667104577,firehd8tabletw…	Amazon	
4	allnewkindleereaderblack6glarefreetouchscreend…	Amazon	

	Reviews_Date	Reviews_DateAdded	Reviews_DidPurchase	\
0	2017-01-13 00:00:00+00:00	2017-07-03 23:33:15+00:00	None	
1	2017-06-30 00:00:00+00:00	2017-07-15 19:01:03+00:00	None	
2	2017-05-09 00:00:00+00:00	2017-05-23 15:04:06+00:00	None	
3	2017-06-03 00:00:00+00:00	2017-06-25 04:22:30+00:00	None	
4	2017-10-09 00:00:00+00:00	None	None	

	…	Reviews_Hour	Reviews_Minute	Reviews_Second	Reviews_YearAdded	\

```
0  …              0              0              0            2017.0
1  …              0              0              0            2017.0
2  …              0              0              0            2017.0
3  …              0              0              0            2017.0
4  …              0              0              0               NaN

  Reviews_MonthAdded Reviews_DayAdded Reviews_HourAdded Reviews_MinuteAdded  \
0                7.0             3.0              23.0                33.0
1                7.0            15.0              19.0                 1.0
2                5.0            23.0              15.0                 4.0
3                6.0            25.0               4.0                22.0
4                NaN             NaN               NaN                 NaN

  Reviews_SecondAdded Reviews_DateAdded_Only
0                15.0               03/07/17
1                 3.0               15/07/17
2                 6.0               23/05/17
3                30.0               25/06/17
4                 NaN                   None

[5 rows x 33 columns]
```

[36]:
```
print("Unique values in df_flat:", df_flat['Product_ID'].unique())
print("Unique values in df_web:", df_web['Product_ID'].unique())
print("Unique values in df_api:", df_api['Product_ID'].unique())
```

```
Unique values in df_flat: ['B01AHB9CN2' 'B00VINDBJK' 'B01AHB9CYG' 'B01AHB9C1E'
'B00ZV9PXP2'
 'B018Y229OU' 'B00REQKWGA' 'B00IOYAM4I' 'B018T075DC' 'B018Y225IA'
 'B018Y23MNM' 'B000QVZDJM' 'B00IOY8XWQ' 'B01BFIBRIE' 'B018SZT3BK'
 'B018Y22BI4' 'B00TSUGXKE' 'B00L9EPT8O,B01E6AO69U' 'B018Y23P7K'
 'B00QFQRELG' 'B0189XYY0Q' 'B01BH83OOM' 'B00U3FPN4U']
Unique values in df_web: ['B000K2PJ4K' 'B000KPIHQ4' 'B000V0IBDM' 'B000YFSR5G'
'B000YFSR4W'
 'B0012DR1LU' 'B0014F8TIU' 'B0014HA6VG' 'B0017LD0BM' 'B0017LGD34'
 'B001IKJOLW' 'B001LNSY2Q' 'B0058YEJ5K' 'B0014F7B98' 'B009MA34NY'
 'B0092UF54A' 'B005AGO4LU' 'B00G8Q7JZ4' 'B00GKF5BAS' 'B00I0VHS10'
 'B00LKWYX2I' 'B00MLYE8PQ' 'B00ND9047Y' 'B00RLSCLJM' 'B00ZUA6AJK'
 'B010RRWKT4' 'B014IBJKNO' 'B01595OS62' 'B016XAJLVO' 'B01H7KY678'
 'B003M6060S']
Unique values in df_api: ['B07ZPKN6YR' 'B000K2PJ4K' 'B005AGO4LU']
```

[37]:
```
merged_data = pd.merge(df_flat, df_web, on='Product_ID', how='left')
merged_data = pd.merge(merged_data, df_api, on='Product_ID', how='left')
```

[38]:
```
print(len(merged_data))
```

23

[39]:
```
print(merged_data.head())
```

```
                     ID                                       Product_Name  \
0  AVqkIhwDv8e3D1O-lebb  All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,…
1  AVqVGZO3nnc1JgDc3jGK  Kindle Oasis E-reader with Leather Charging Co…
2  AVqkIiKWnnc1JgDc3khH  All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,…
3  AVqkIj9snnc1JgDc3khU  Fire HD 8 Tablet with Alexa, 8 HD Display, 32 …
4  AVqVGZNvQMlgsOJE6eUY  Amazon Kindle Fire Hd (3rd Generation) 8gb,,,\…

   Product_ID   Brand                                          Categories  \
0  B01AHB9CN2  AMAZON  Electronics,iPad & Tablets,All Tablets,Fire Ta…
1  B00VINDBJK  AMAZON  eBook Readers,Kindle E-readers,Computers & Tab…
2  B01AHB9CYG  AMAZON  Tablets,Fire Tablets,Electronics,Computers,Com…
3  B01AHB9C1E  AMAZON  Tablets,Fire Tablets,Computers & Tablets,All T…
4  B00ZV9PXP2  AMAZON  Electronics,iPad & Tablets,All Tablets,Compute…

                                                Keys Manufacturer  \
0  841667104676,amazon/53004484,amazon/b01ahb9cn2…       Amazon
1  kindleoasisereaderwithleatherchargingcovermerl…       Amazon
2  841667104690,allnewfirehd8tablet8hddisplaywifi…       Amazon
3  amazon/b01ahb9c1e,0841667104577,firehd8tabletw…       Amazon
4  allnewkindleereaderblack6glarefreetouchscreend…       Amazon

               Reviews_Date          Reviews_DateAdded Reviews_DidPurchase  \
0  2017-01-13 00:00:00+00:00  2017-07-03 23:33:15+00:00                None
1  2017-06-30 00:00:00+00:00  2017-07-15 19:01:03+00:00                None
2  2017-05-09 00:00:00+00:00  2017-05-23 15:04:06+00:00                None
3  2017-06-03 00:00:00+00:00  2017-06-25 04:22:30+00:00                None
4  2017-10-09 00:00:00+00:00                       None                None

   …  Review_Text Review_Summary  Review_Date  Review_id Review_title  \
0  …         NaN            NaN          NaN        NaN          NaN
1  …         NaN            NaN          NaN        NaN          NaN
2  …         NaN            NaN          NaN        NaN          NaN
3  …         NaN            NaN          NaN        NaN          NaN
4  …         NaN            NaN          NaN        NaN          NaN

  Review_comment Review_star_rating Review_author Review_date  \
0            NaN                NaN           NaN         NaN
1            NaN                NaN           NaN         NaN
2            NaN                NaN           NaN         NaN
3            NaN                NaN           NaN         NaN
4            NaN                NaN           NaN         NaN

  Is_verified_purchase
0                  NaN
```

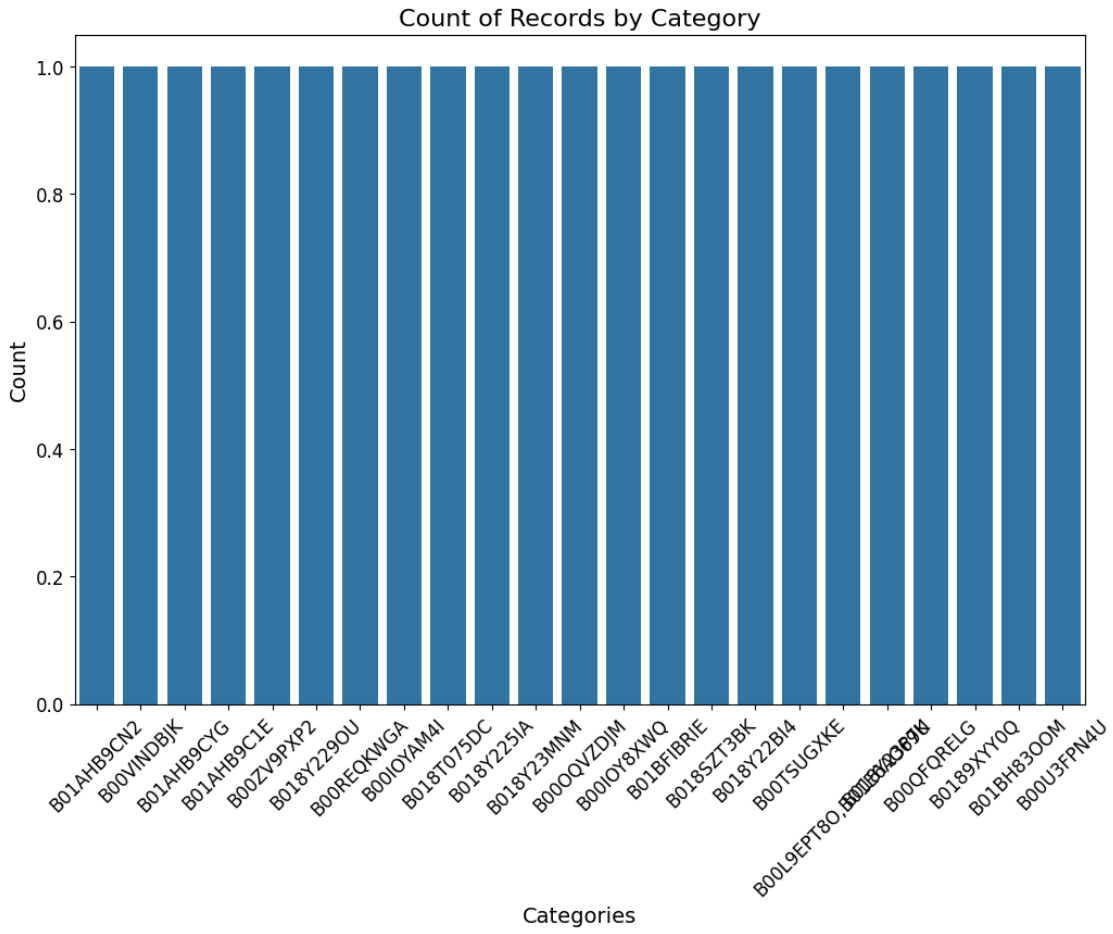
```
1                   NaN
2                   NaN
3                   NaN
4                   NaN

[5 rows x 47 columns]
```

[40]:
```
! pip install matplotlib seaborn
```

```
Requirement already satisfied: matplotlib in ./miniforge3/lib/python3.10/site-
packages (3.8.1)
Requirement already satisfied: seaborn in ./miniforge3/lib/python3.10/site-
packages (0.13.0)
Requirement already satisfied: contourpy>=1.0.1 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (1.2.0)
Requirement already satisfied: cycler>=0.10 in ./miniforge3/lib/python3.10/site-
packages (from matplotlib) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (4.44.3)
Requirement already satisfied: kiwisolver>=1.3.1 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (1.4.5)
Requirement already satisfied: numpy<2,>=1.21 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (1.26.2)
Requirement already satisfied: packaging>=20.0 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (23.1)
Requirement already satisfied: pillow>=8 in ./miniforge3/lib/python3.10/site-
packages (from matplotlib) (10.1.0)
Requirement already satisfied: pyparsing>=2.3.1 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (3.1.1)
Requirement already satisfied: python-dateutil>=2.7 in
./miniforge3/lib/python3.10/site-packages (from matplotlib) (2.8.2)
Requirement already satisfied: pandas>=1.2 in ./miniforge3/lib/python3.10/site-
packages (from seaborn) (2.1.3)
Requirement already satisfied: pytz>=2020.1 in ./miniforge3/lib/python3.10/site-
packages (from pandas>=1.2->seaborn) (2023.3.post1)
Requirement already satisfied: tzdata>=2022.1 in
./miniforge3/lib/python3.10/site-packages (from pandas>=1.2->seaborn) (2023.3)
Requirement already satisfied: six>=1.5 in ./miniforge3/lib/python3.10/site-
packages (from python-dateutil>=2.7->matplotlib) (1.16.0)
```

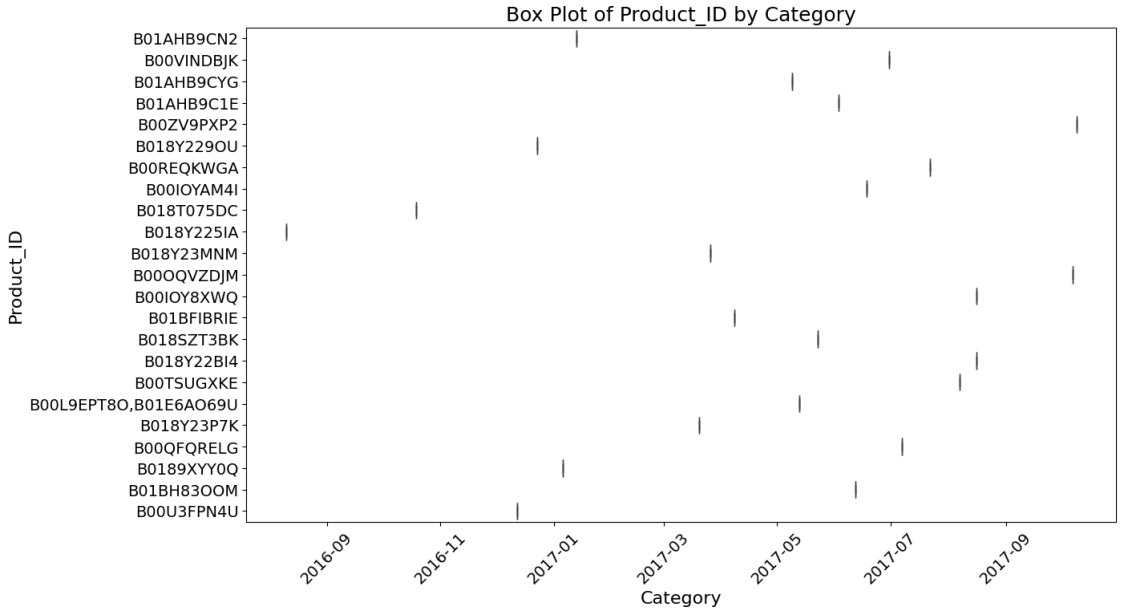
[51]:
```
import matplotlib.pyplot as plt
import seaborn as sns

# Assuming 'merged_data' is your merged dataset


# Visualization 1: Bar plot of counts by category
```

```
plt.figure(figsize=(12, 8))  # Increase the figure size for better visibility
sns.countplot(x='Product_ID', data=merged_data)
plt.title('Count of Records by Category', fontsize=16)  # Increase the title␣
 ↪font size
plt.xlabel('Categories', fontsize=14)  # Increase the x-axis label font size
plt.ylabel('Count', fontsize=14)  # Increase the y-axis label font size
plt.xticks(fontsize=12, rotation=45)  # Increase x-axis tick label font size␣
 ↪and rotate labels for better visibility
plt.yticks(fontsize=12)  # Increase y-axis tick label font size
plt.show()
```



[53]:
```
# Visualization 3: Box plot to show the distribution of a numeric column by␣
 ↪category
plt.figure(figsize=(14, 8))  # Increase the figure size for better visibility
sns.boxplot(x='Reviews_Date', y='Product_ID', data=merged_data)
plt.title('Box Plot of Product_ID by Category', fontsize=18)  # Increase the␣
 ↪title font size
plt.xlabel('Category', fontsize=16)  # Increase the x-axis label font size
```

```
plt.ylabel('Product_ID', fontsize=16)  # Increase the y-axis label font size
plt.xticks(fontsize=14, rotation=45)  # Increase x-axis tick label font size␣
 ↪and rotate labels for better visibility
plt.yticks(fontsize=14)  # Increase y-axis tick label font size
plt.show()
```



[ ]:
```
"""
In this project, I worked on merging and cleansing data from three
tables-flat, web, and api-stored in an SQLite database named finalproject.db.
I used the pandas library to merge the datasets based on a common column,
'Product_ID,' and stored the resulting dataset back into the database.

Throughout the process, I encountered challenges related to the structure and
content of the data. Initially, an empty DataFrame after merging led me to
investigate potential issues such as inconsistent data types, missing values,
and common column existence across the tables. I adjusted the merging approach
and verified the uniqueness and data types of the joining columns, resolving␣
 ↪the
issue and obtaining a meaningful merged dataset.

Throughout the project, I learned the importance of thorough data exploration␣
 ↪and
cleansing. Handling discrepancies in data types, missing values, and ensuring a
common key for merging were critical steps in achieving meaningful␣
 ↪visualizations.
```

```
Additionally, I developed an appreciation for the ethical considerations in␣
 ↪data
cleansing. It is crucial to maintain data privacy, transparency, and fairness,
especially when dealing with sensitive information that can impact individuals␣
 ↪or communities.

In conclusion, this project reinforced the significance of data preprocessing␣
 ↪and
visualization in deriving meaningful insights. The iterative process of␣
 ↪exploring,
cleansing, and visualizing data is essential for effective decision-making and␣
 ↪understanding
the underlying patterns within complex datasets.
"""
```