

npoh9cwtp

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#

ADT FINAL PROJECT PART 2

#

Amazon: A2Z AmazeComparator

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Authorship of the code - Kabir Chaturvedi

```
[1]: #Inserting the data
import pandas as pd

sales = pd.read_csv('./data/amazon.csv')

sales
```

```
[1]:
```

	product_id	product_name \
0	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
1	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
2	B096MSW6CT	Sounce Fast Phone Charging Cable & Data Sync U...
3	B08HJDJ86NZ	boAt Deuce USB 300 2 in 1 Type-C & Micro USB S...
4	B08CF3B7N1	Portronics Konnect L 1.2M Fast Charging 3A 8 P...
...
1460	B08L7J3T31	Noir Aqua - 5pcs PP Spun Filter + 1 Spanner ...
1461	B01M6453MB	Prestige Delight PRW0 Electric Rice Cooker (1 ...
1462	B009P2LIL4	Bajaj Majesty RX10 2000 Watts Heat Convector R...
1463	B00J5DYCCA	Havells Ventil Air DSP 230mm Exhaust Fan (Pist...
1464	B01486F4G6	Borosil Jumbo 1000-Watt Grill Sandwich Maker (...)

	category	discounted_price \
0	Computers&Accessories Accessories&Peripherals ...	399
1	Computers&Accessories Accessories&Peripherals ...	199
2	Computers&Accessories Accessories&Peripherals ...	199
3	Computers&Accessories Accessories&Peripherals ...	329

4	Computers&Accessories Accessories&Peripherals ...	154
...
1460	Home&Kitchen Kitchen&HomeAppliances WaterPurif...	379
1461	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,280
1462	Home&Kitchen Heating,Cooling&AirQuality RoomHe...	2,219
1463	Home&Kitchen Heating,Cooling&AirQuality Fans E...	1,399
1464	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863

	actual_price	discount_percentage	rating	rating_count	\
0	1,099	64%	4.2	24,269	
1	349	43%	4.0	43,994	
2	1,899	90%	3.9	7,928	
3	699	53%	4.2	94,363	
4	399	61%	4.2	16,905	
...	
1460	919	59%	4	1,090	
1461	3,045	25%	4.1	4,118	
1462	3,080	28%	3.6	468	
1463	1,890	26%	4	8,031	
1464	3,690	22%	4.3	6,987	

	about_product	\
0	High Compatibility : Compatible With iPhone 12...	
1	Compatible with all Type C enabled devices, be...	
2	Fast Charger& Data Sync -With built-in safet...	
3	The boAt Deuce USB 300 2 in 1 cable is compati...	
4	[CHARGE & SYNC FUNCTION]- This cable comes wit...	
...	...	
1460	SUPREME QUALITY 90 GRAM 3 LAYER THIK PP SPUN F...	
1461	230 Volts, 400 watts, 1 Year	
1462	International design and styling Two heat sett...	
1463	Fan sweep area: 230 MM ; Noise level: (40 - 45...	
1464	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	

	user_id	\
0	AG3D604STAQKAY2UVGEUV46KN35Q,AHMY5CWJMMK5BJRBB...	
1	AECPFYFQVRUWC3KGNLJIOREFP5LQ,AGYYVPDD7YG7FYNBX...	
2	AGU3BBQ2V2DDAMOAKGFAWDDQ6QHA,AESFLDV2PT363T2AQ...	
3	AEWAZDZZJLQUYVOVGBEUKSLXHQA,AG5HTSFRRE6NL3M5S...	
4	AE3Q6KSUK5P75D5HFYHCRAOLODSA,AFUGIFH5ZAFXRDSZH...	
...	...	
1460	AHITFY6AHALOFOHOZEOC6XBP4FEA,AFRABBODZJZQB6Z4U...	
1461	AFG5FM3NEMOL6BNFRV2NK5FNJCHQ,AGEINTRN6Z563RMLH...	
1462	AGVPWCMAHYQWJOQKMUJN4DW3KM5Q,AF4Q3E66MY4SR7YQZ...	
1463	AF2JQCLSCY3QJATWUNNHUSVUPNQQ,AFDMLUXC5LS5RXDJS...	
1464	AFGW5PT3R6ZAVQR4Y5MWVAKBZAYA,AG7QNJ2SCS5VS5VYY...	

	user_name \
0	Manav,Adarsh gupta,Sundeep,S.Sayed Ahmed,jasp...
1	ArdKn,Nirbhay kumar,Sagar Viswanathan,Asp,Plac...
2	Kunal,Himanshu,viswanath,sai niharka,saqib mal...
3	Omkar dhale,JD,HEMALATHA,Ajwadh a.,amar singh ...
4	rahuls6099,Swasat Borah,Ajay Wadke,Pranali,RVK...
...	...
1460	Prabha ds,Raghuram bk,Real Deal,Amazon Custome...
1461	Manu Bhai,Naveenpittu,Evatira Sangma,JAGANNADH...
1462	Nehal Desai,Danish Parwez,Amazon Customer,Amaz...
1463	Shubham Dubey,E.GURUBARAN,Mayank S.,eusuf khan...
1464	Rajib,Ajay B,Vikas Kahol,PARDEEP,Anindya Prama...

	review_id \
0	R3HXWTOLRPONMF,R2AJM3LFTLZHFO,R6AQJGUP6P86,R1K...
1	RGIQEG07R9HS2,R1SMWZQ86XIN8U,R2J3Y1WL29GWDE,RY...
2	R3J3EQQ9TZI5ZJ,R3E7WBGK7IDOKV,RWU79XKQ6I1QF,R2...
3	R3EEUZKKK9J36I,R3HJVYCLYOY554,REDECAZ7AMPQC,R1...
4	R1BP4L2HH9TFUP,R16PVJEXKV6QZS,R2UPDB81N66T4P,R...
...	...
1460	R3G3XFHPBFFOE8,R3COBZCD32EIGW,R2EBVBCN9QPD9R,R...
1461	R3DDL2UPKQ2CK9,R2SYYU10ATVIU5,R1VM993161IYRW,R...
1462	R1TLRJVV4STY5I,R2O455KRN493R1,R3Q5MVGGBRIAS2G,R...
1463	R39Q2Y79MM9SWK,R3O79BG1NIH6MB,R29A31ZELTZNJM,R...
1464	R2ORBRZOWEUIT9,ROKIFK9R2ISSE,R3OEEG2FNJSN5I,R2...

	review_title \
0	Satisfied,Charging is really fast,Value for mo...
1	A Good Braided Cable for Your Type C Device,Go...
2	Good speed for earlier versions,Good Product,W...
3	Good product,Good one,Nice,Really nice product...
4	As good as original,Decent,Good one for second...
...	...
1460	Received the product without spanner,Excellent...
1461	ok,everything was good couldn't return bcoz I ...
1462	very good,Work but front melt after 2 month,Go...
1463	Fan Speed is slow,Good quality,Good product,go...
1464	Works perfect,Ok good product,Nice Product. Re...

	review_content \
0	Looks durable Charging is fine tooNo complains...
1	I ordered this cable to connect my phone to An...
2	Not quite durable and sturdy,https://m.media-a...
3	Good product,long wire,Charges good,Nice,I bou...
4	Bought this instead of original apple, does th...
...	...
1460	I received product without spanner,Excellent p...

```

1461 ok,got everything as mentioned but the measuri...
1462 plastic but cool body ,u have to find sturdy s...
1463 I have installed this in my kitchen working fi...
1464 It does it job perfectly..only issue is temp c...

```

```

                                img_link \
0      https://m.media-amazon.com/images/W/WEBP_40237...
1      https://m.media-amazon.com/images/W/WEBP_40237...
2      https://m.media-amazon.com/images/W/WEBP_40237...
3      https://m.media-amazon.com/images/I/41V5FtEWPk...
4      https://m.media-amazon.com/images/W/WEBP_40237...
...
1460 https://m.media-amazon.com/images/I/41fDdRtjfx...
1461 https://m.media-amazon.com/images/I/41gzDxk4+k...
1462 https://m.media-amazon.com/images/W/WEBP_40237...
1463 https://m.media-amazon.com/images/W/WEBP_40237...
1464 https://m.media-amazon.com/images/W/WEBP_40237...

```

```

                                product_link
0      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
1      https://www.amazon.in/Ambrane-Unbreakable-Char...
2      https://www.amazon.in/Sounce-iPhone-Charging-C...
3      https://www.amazon.in/Deuce-300-Resistant-Tang...
4      https://www.amazon.in/Portronics-Konnnect-POR-1...
...
1460 https://www.amazon.in/Noir-Aqua-Spanner-Purifi...
1461 https://www.amazon.in/Prestige-Delight-PRW0-1-...
1462 https://www.amazon.in/Bajaj-RX-10-2000-Watt-Co...
1463 https://www.amazon.in/Havells-Ventilair-230mm-...
1464 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...

```

```
[1465 rows x 16 columns]
```

0.1 Data Preprocessing

```

[2]: def transform_dataset(row):

    # Splitting the columns that have data for different users
    user_ids = row['user_id'].split(',')
    user_names = row['user_name'].split(',')
    review_ids = row['review_id'].split(',')
    review_titles = row['review_title'].split(',')
    review_contents = row['review_content'].split(',')

    # Finding the minimum length among the split lists
    min_elements = min(len(user_ids), len(user_names), len(review_ids),
    ↪len(review_titles), len(review_contents))

```

```

# Creating the DataFrame for the current row using only up to the
↳ min_elements
expanded_df = pd.DataFrame({
    'product_id': [row['product_id']] * min_elements,
    'product_name': [row['product_name']] * min_elements,
    'category': [row['category']] * min_elements,
    'discounted_price': [row['discounted_price']] * min_elements,
    'actual_price': [row['actual_price']] * min_elements,
    'discount_percentage': [row['discount_percentage']] * min_elements,
    'rating': [row['rating']] * min_elements,
    'rating_count': [row['rating_count']] * min_elements,
    'about_product': [row['about_product']] * min_elements,
    'user_id': user_ids[:min_elements],
    'user_name': user_names[:min_elements],
    'review_id': review_ids[:min_elements],
    'review_title': review_titles[:min_elements],
    'review_content': review_contents[:min_elements],
    'img_link': [row['img_link']] * min_elements,
    'product_link': [row['product_link']] * min_elements
})

return expanded_df

# Applying this transformation to the entire dataset
sales_new = pd.concat([transform_dataset(row) for index, row in sales.
↳ iterrows()], ignore_index=True)

sales_new

```

```

[2]:
    product_id      product_name \
0    B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
1    B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
2    B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
3    B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
4    B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
...
11498 B01486F4G6  Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11499 B01486F4G6  Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11500 B01486F4G6  Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11501 B01486F4G6  Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11502 B01486F4G6  Borosil Jumbo 1000-Watt Grill Sandwich Maker (...

    category discounted_price \
0    Computers&Accessories|Accessories&Peripherals|...      399
1    Computers&Accessories|Accessories&Peripherals|...      399

```

2	Computers&Accessories Accessories&Peripherals ...	399
3	Computers&Accessories Accessories&Peripherals ...	399
4	Computers&Accessories Accessories&Peripherals ...	399
...
11498	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863
11499	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863
11500	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863
11501	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863
11502	Home&Kitchen Kitchen&HomeAppliances SmallKitch...	2,863

	actual_price	discount_percentage	rating	rating_count	\
0	1,099	64%	4.2	24,269	
1	1,099	64%	4.2	24,269	
2	1,099	64%	4.2	24,269	
3	1,099	64%	4.2	24,269	
4	1,099	64%	4.2	24,269	
...	
11498	3,690	22%	4.3	6,987	
11499	3,690	22%	4.3	6,987	
11500	3,690	22%	4.3	6,987	
11501	3,690	22%	4.3	6,987	
11502	3,690	22%	4.3	6,987	

	about_product	\
0	High Compatibility : Compatible With iPhone 12...	
1	High Compatibility : Compatible With iPhone 12...	
2	High Compatibility : Compatible With iPhone 12...	
3	High Compatibility : Compatible With iPhone 12...	
4	High Compatibility : Compatible With iPhone 12...	
...	...	
11498	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	
11499	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	
11500	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	
11501	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	
11502	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...	

	user_id	user_name	review_id	\
0	AG3D604STAQKAY2UVGEUV46KN35Q	Manav	R3HXWTOLRPONMF	
1	AHMY5CWJMMK5BJRBBSNLYT3ONILA	Adarsh gupta	R2AJM3LFTLZHF0	
2	AHCTC6ULH4XB6YHDY6PCH2R772LQ	Sundeep	R6AQJGUP6P86	
3	AGYHHIERNXKA6P5T7CZLXKVPT7IQ	S.Sayeed Ahmed	R1KD19VHEDVOOR	
4	AG40GOFWXJZTQ2HKYIOCOY3KXF2Q	jaspreet singh	R3C02RMYQMK6FC	
...	
11498	AHXCDNSXAESERITAFELQABFVNLCA	PARDEEP	R2ZC03S4QXOW4Y	
11499	AGRZD6CHLCUNOLMMIMIHUCG7PIFA	Anindya Pramanik	R186H8YW34BQD5	
11500	AFQZVGSOS0JHKFQQMCEI4725QEKQ	Vikas Singh	R10NC3D321N59G	
11501	AEALVGXXIP460ZVXKRUXSDWZJMEA	Harshada Pimple	REKF75G4SOAOX	

11502 AGEFL3AY7YXEFZA4ZJU3LP7K7OJQ Saw a. R2G0ZT4JQX322I

```

                                review_title \
0                                Satisfied
1                                Charging is really fast
2                                Value for money
3                                Product review
4                                Good quality
...
11498                            Excellent product
11499                            A good product for household use
11500
11501                            Best product
11502                            Good
```

```

                                review_content \
0                                Looks durable Charging is fine tooNo complains
1                                Charging is really fast
2                                good product.
3                                Till now satisfied with the quality.
4                                This is a good product . The charging speed is...
...
11498                            It is a nice product
11499                            easy to use. The grilling function is also wo...
11500                            Very good product
11501                            This is a pretty powerful sandwich maker
11502                            for home use. The product looks good
```

```

                                img_link \
0                                https://m.media-amazon.com/images/W/WEBP_40237...
1                                https://m.media-amazon.com/images/W/WEBP_40237...
2                                https://m.media-amazon.com/images/W/WEBP_40237...
3                                https://m.media-amazon.com/images/W/WEBP_40237...
4                                https://m.media-amazon.com/images/W/WEBP_40237...
...
11498                            https://m.media-amazon.com/images/W/WEBP_40237...
11499                            https://m.media-amazon.com/images/W/WEBP_40237...
11500                            https://m.media-amazon.com/images/W/WEBP_40237...
11501                            https://m.media-amazon.com/images/W/WEBP_40237...
11502                            https://m.media-amazon.com/images/W/WEBP_40237...
```

```

                                product_link
0                                https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
1                                https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
2                                https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
3                                https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
4                                https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
```

```
...
11498 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...
11499 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...
11500 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...
11501 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...
11502 https://www.amazon.in/Borosil-Jumbo-1000-Watt-...
```

[11503 rows x 16 columns]

```
[3]: #Dropping the duplicate entries
sales_new = sales_new.drop_duplicates()

sales_new.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 11503 entries, 0 to 11502
Data columns (total 16 columns):
#   Column                Non-Null Count  Dtype
---  -
0   product_id            11503 non-null  object
1   product_name          11503 non-null  object
2   category              11503 non-null  object
3   discounted_price      11503 non-null  object
4   actual_price          11503 non-null  object
5   discount_percentage   11503 non-null  object
6   rating                11503 non-null  object
7   rating_count          11501 non-null  object
8   about_product         11503 non-null  object
9   user_id               11503 non-null  object
10  user_name             11503 non-null  object
11  review_id             11503 non-null  object
12  review_title          11503 non-null  object
13  review_content        11503 non-null  object
14  img_link              11503 non-null  object
15  product_link          11503 non-null  object
dtypes: object(16)
memory usage: 1.4+ MB
```

```
[4]: sales_new.isnull().sum()
```

```
[4]: product_id            0
     product_name         0
     category             0
     discounted_price      0
     actual_price          0
     discount_percentage   0
     rating               0
```



```

rating_count      2
about_product     0
user_id           0
user_name         0
review_id         0
review_title      0
review_content    0
img_link          0
product_link      0
dtype: int64

```

```

[5]: sales = sales_new.dropna()

print(sales.isnull().sum())

```

```

product_id        0
product_name      0
category          0
discounted_price  0
actual_price      0
discount_percentage 0
rating            0
rating_count      0
about_product     0
user_id           0
user_name         0
review_id         0
review_title      0
review_content    0
img_link          0
product_link      0
dtype: int64

```

Authorship of the code - Vedika Halwasiya

```

[6]: import warnings
warnings.filterwarnings("ignore")

# Converting 'product_id', 'user_id', and 'review_id' to strings since they are
↳ identifiers
sales['product_id'] = sales['product_id'].astype(str)
sales['user_id'] = sales['user_id'].astype(str)
sales['review_id'] = sales['review_id'].astype(str)

# Converting price related columns to float
sales['discounted_price'] = sales['discounted_price'].str.replace(' ', '').str.
↳ replace(',', '.').astype(float)

```

```

sales['actual_price'] = sales['actual_price'].str.replace(' ', '').str.
    ↪replace(',', '').astype(float)

# Converting 'rating' to float
sales['rating'] = pd.to_numeric(sales['rating'], errors='coerce')
sales['rating'] = sales['rating'].astype(float)

# If 'discount_percentage' is stored as a string with a percentage sign, remove
    ↪it and convert
sales['discount_percentage'] = sales['discount_percentage'].str.replace('%',
    ↪').astype(float)

# Converting 'rating_count' to integer. Assuming 'rating_count' might have
    ↪commas as thousands separators which should be removed
sales['rating_count'] = sales['rating_count'].str.replace(',', '').astype(int)

sales.dtypes

```

```

[6]: product_id      object
     product_name    object
     category        object
     discounted_price float64
     actual_price     float64
     discount_percentage float64
     rating           float64
     rating_count      int32
     about_product    object
     user_id          object
     user_name        object
     review_id        object
     review_title     object
     review_content   object
     img_link         object
     product_link     object
     dtype: object

```

```

[7]: sales.reset_index(drop=True, inplace=True)
     sales.head()

```

```

[7]:   product_id      product_name \
0  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
1  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
2  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
3  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
4  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...

```

	category	discounted_price \
0	Computers&Accessories Accessories&Peripherals ...	399.0
1	Computers&Accessories Accessories&Peripherals ...	399.0
2	Computers&Accessories Accessories&Peripherals ...	399.0
3	Computers&Accessories Accessories&Peripherals ...	399.0
4	Computers&Accessories Accessories&Peripherals ...	399.0

	actual_price	discount_percentage	rating	rating_count \
0	1099.0	64.0	4.2	24269
1	1099.0	64.0	4.2	24269
2	1099.0	64.0	4.2	24269
3	1099.0	64.0	4.2	24269
4	1099.0	64.0	4.2	24269

	about_product \
0	High Compatibility : Compatible With iPhone 12...
1	High Compatibility : Compatible With iPhone 12...
2	High Compatibility : Compatible With iPhone 12...
3	High Compatibility : Compatible With iPhone 12...
4	High Compatibility : Compatible With iPhone 12...

	user_id	user_name	review_id \
0	AG3D604STAQKAY2UVGEUV46KN35Q	Manav	R3HXWTOLRPONMF
1	AHMY5CWJMMK5BJRBBSNLYT30NILA	Adarsh gupta	R2AJM3LFTLZHF0
2	AHCTC6ULH4XB6YHDY6PCH2R772LQ	Sundeep	R6AQJGUP6P86
3	AGYHHIERNXKA6P5T7CZLXKVPT7IQ	S.Sayeed Ahmed	R1KD19VHEDVOOR
4	AG4OGOFWXJZTQ2HKYI0COY3KXF2Q	jaspreet singh	R3C02RMYQMK6FC

	review_title	review_content \
0	Satisfied	Looks durable Charging is fine tooNo complains
1	Charging is really fast	Charging is really fast
2	Value for money	good product.
3	Product review	Till now satisfied with the quality.
4	Good quality	This is a good product . The charging speed is...

	img_link \
0	https://m.media-amazon.com/images/W/WEBP_40237...
1	https://m.media-amazon.com/images/W/WEBP_40237...
2	https://m.media-amazon.com/images/W/WEBP_40237...
3	https://m.media-amazon.com/images/W/WEBP_40237...
4	https://m.media-amazon.com/images/W/WEBP_40237...

	product_link
0	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
1	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
2	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
3	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...

4 <https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...>

```
[8]: sales['category'] = sales['category'].str.split('|')
sales.head()
```

```
[8]: product_id product_name \
0 B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
1 B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
2 B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
3 B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
4 B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...

category discounted_price \
0 [Computers&Accessories, Accessories&Peripheral... 399.0
1 [Computers&Accessories, Accessories&Peripheral... 399.0
2 [Computers&Accessories, Accessories&Peripheral... 399.0
3 [Computers&Accessories, Accessories&Peripheral... 399.0
4 [Computers&Accessories, Accessories&Peripheral... 399.0

actual_price discount_percentage rating rating_count \
0 1099.0 64.0 4.2 24269
1 1099.0 64.0 4.2 24269
2 1099.0 64.0 4.2 24269
3 1099.0 64.0 4.2 24269
4 1099.0 64.0 4.2 24269

about_product \
0 High Compatibility : Compatible With iPhone 12...
1 High Compatibility : Compatible With iPhone 12...
2 High Compatibility : Compatible With iPhone 12...
3 High Compatibility : Compatible With iPhone 12...
4 High Compatibility : Compatible With iPhone 12...

user_id user_name review_id \
0 AG3D604STAQKAY2UVGEUV46KN35Q Manav R3HXWTOLRPONMF
1 AHMY5CWJMMK5BJRBSNLYT30NILA Adarsh gupta R2AJM3LFTLZHFO
2 AHCTC6ULH4XB6YHDY6PCH2R772LQ Sundeep R6AQJGUP6P86
3 AGYHHIERNXKA6P5T7CZLXKVPT7IQ S.Sayeed Ahmed R1KD19VHEDV0OR
4 AG4OGOFWXJZTQ2HKYIOCOY3KXF2Q jaspreet singh R3C02RMYQMK6FC

review_title review_content \
0 Satisfied Looks durable Charging is fine tooNo complains
1 Charging is really fast Charging is really fast
2 Value for money good product.
3 Product review Till now satisfied with the quality.
4 Good quality This is a good product . The charging speed is...
```

```

img_link \
0 https://m.media-amazon.com/images/W/WEBP_40237...
1 https://m.media-amazon.com/images/W/WEBP_40237...
2 https://m.media-amazon.com/images/W/WEBP_40237...
3 https://m.media-amazon.com/images/W/WEBP_40237...
4 https://m.media-amazon.com/images/W/WEBP_40237...

```

```

product_link
0 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
1 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
2 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
3 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
4 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...

```

```
[9]: sales["category"].value_counts()
```

```

[9]: category
[Computers&Accessories, Accessories&Peripherals, Cables&Accessories, Cables,
USBCables] 1845
[Electronics, WearableTechnology, SmartWatches]
596
[Electronics, Mobiles&Accessories, Smartphones&BasicMobiles, Smartphones]
505
[Electronics, HomeTheater,TV&Video, Televisions, SmartTelevisions]
490
[Electronics, Headphones,Earbuds&Accessories, Headphones, In-Ear]
400
...
[Electronics, HomeAudio, Speakers, MultimediaSpeakerSystems]
8
[Home&Kitchen, Kitchen&HomeAppliances, Vacuum,Cleaning&Ironing,
Vacuums&FloorCare, VacuumAccessories, VacuumBags, HandheldBags] 8
[Health&PersonalCare, HomeMedicalSupplies&Equipment, HealthMonitors,
WeighingScales, DigitalBathroomScales] 4
[Computers&Accessories, Tablets]
4
[Electronics, HomeAudio, MediaStreamingDevices, StreamingClients]
4
Name: count, Length: 211, dtype: int64

```

```
[10]: unique_categories = set()
sales['category'].apply(lambda x: unique_categories.update(x))
```

```

[10]: 0      None
      1      None
      2      None
      3      None

```

```

4          None
...
11496      None
11497      None
11498      None
11499      None
11500      None
Name: category, Length: 11501, dtype: object

```

```
[11]: #unique_categories
```

```
[12]: product_category_mapping = []
      for index, row in sales.iterrows():
          for category in row['category']:
              product_category_mapping.append((row['product_id'], category))

      #product_category_mapping
```

Authorship of the code - Dhyey Joshi

0.2 Sentiment Analysis using VADER Method

```
[13]: !pip install gensim
```

```

Requirement already satisfied: gensim in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (4.3.2)
Requirement already satisfied: numpy>=1.18.5 in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (from
gensim) (1.25.2)
Requirement already satisfied: scipy>=1.7.0 in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (from
gensim) (1.11.2)
Requirement already satisfied: smart-open>=1.8.1 in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (from
gensim) (7.0.4)
Requirement already satisfied: wrapt in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (from
smart-open>=1.8.1->gensim) (1.16.0)

WARNING: You are using pip version 21.1.3; however, version 24.0 is available.
You should consider upgrading via the
'c:\users\acer\appdata\local\programs\python\python39\python.exe -m pip install
--upgrade pip' command.

```

```
[14]: import pandas as pd
      import gensim
      from gensim import corpora
      import nltk
```

```

from nltk.corpus import stopwords
from nltk.stem.wordnet import WordNetLemmatizer
from nltk.tokenize import RegexpTokenizer

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import os

from sklearn.preprocessing import LabelEncoder
from sklearn.utils import resample
from sklearn.feature_extraction.text import CountVectorizer
from nltk.sentiment.vader import SentimentIntensityAnalyzer

from nltk.tokenize import word_tokenize
from nltk.stem import WordNetLemmatizer
from nltk.stem import PorterStemmer, LancasterStemmer
from nltk.stem.snowball import SnowballStemmer
from nltk.corpus import stopwords
from nltk.corpus import wordnet
import string
from string import punctuation
import nltk
import re

```

```

[15]: nltk.download("stopwords")
      nltk.download('punkt')
      nltk.download('wordnet')

```

```

[nltk_data] Downloading package stopwords to
[nltk_data] C:\Users\Acer\AppData\Roaming\nltk_data...
[nltk_data] Package stopwords is already up-to-date!
[nltk_data] Downloading package punkt to
[nltk_data] C:\Users\Acer\AppData\Roaming\nltk_data...
[nltk_data] Package punkt is already up-to-date!
[nltk_data] Downloading package wordnet to
[nltk_data] C:\Users\Acer\AppData\Roaming\nltk_data...
[nltk_data] Package wordnet is already up-to-date!

```

```
[15]: True
```

```

[16]: stop_words = stopwords.words('english')
      porter_stemmer = PorterStemmer()
      lancaster_stemmer = LancasterStemmer()
      snowball_stemmer = SnowballStemmer(language="english")
      lizr = WordNetLemmatizer()

```

```

def text_processing(text):
    # convert text into lowercase
    text = text.lower()

    # remove new line characters in text
    text = re.sub(r'\n', ' ', text)

    # remove punctuations from text
    text = re.sub('[%s]' % re.escape(punctuation), "", text)

    # remove references and hashtags from text
    text = re.sub("^a-zA-Z0-9$","", text)

    # remove multiple spaces from text
    text = re.sub(r'\s+', ' ', text, flags=re.I)

    # remove special characters from text
    text = re.sub(r'\W', ' ', text)

    text = ' '.join([word for word in word_tokenize(text) if word not in
↳stop_words])

    # stemming using porter stemmer from nltk package - msh a7sn 7aga - momken:
↳lancaster, snowball
    text=' '.join([porter_stemmer.stem(word) for word in word_tokenize(text)])
    text=' '.join([lancaster_stemmer.stem(word) for word in
↳word_tokenize(text)])
    text=' '.join([snowball_stemmer.stem(word) for word in word_tokenize(text)])

    # lemmatizer using WordNetLemmatizer from nltk package
    text=' '.join([lwr.lemmatize(word) for word in word_tokenize(text)])

    return text

```

```
[17]: sample_sales_data = sales.copy()
```

```

[18]: nltk.download('omw-1.4')
data_copy = sample_sales_data.copy()
data_copy.review_content = data_copy.review_content.apply(lambda text:
↳text_processing(text))

data_copy.head(15)

```

[nltk_data] Downloading package omw-1.4 to

[nltk_data] C:\Users\Acer\AppData\Roaming\nltk_data...

[nltk_data] Package omw-1.4 is already up-to-date!

```
[18]:
```

	product_id	product_name \
0	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
1	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
2	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
3	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
4	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
5	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
6	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
7	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
8	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
9	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
10	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
11	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
12	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
13	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
14	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...

	category	discounted_price \
0	[Computers&Accessories, Accessories&Peripheral...	399.0
1	[Computers&Accessories, Accessories&Peripheral...	399.0
2	[Computers&Accessories, Accessories&Peripheral...	399.0
3	[Computers&Accessories, Accessories&Peripheral...	399.0
4	[Computers&Accessories, Accessories&Peripheral...	399.0
5	[Computers&Accessories, Accessories&Peripheral...	399.0
6	[Computers&Accessories, Accessories&Peripheral...	399.0
7	[Computers&Accessories, Accessories&Peripheral...	399.0
8	[Computers&Accessories, Accessories&Peripheral...	199.0
9	[Computers&Accessories, Accessories&Peripheral...	199.0
10	[Computers&Accessories, Accessories&Peripheral...	199.0
11	[Computers&Accessories, Accessories&Peripheral...	199.0
12	[Computers&Accessories, Accessories&Peripheral...	199.0
13	[Computers&Accessories, Accessories&Peripheral...	199.0
14	[Computers&Accessories, Accessories&Peripheral...	199.0

	actual_price	discount_percentage	rating	rating_count \
0	1099.0	64.0	4.2	24269
1	1099.0	64.0	4.2	24269
2	1099.0	64.0	4.2	24269
3	1099.0	64.0	4.2	24269
4	1099.0	64.0	4.2	24269
5	1099.0	64.0	4.2	24269
6	1099.0	64.0	4.2	24269
7	1099.0	64.0	4.2	24269
8	349.0	43.0	4.0	43994
9	349.0	43.0	4.0	43994

10	349.0	43.0	4.0	43994
11	349.0	43.0	4.0	43994
12	349.0	43.0	4.0	43994
13	349.0	43.0	4.0	43994
14	349.0	43.0	4.0	43994

```

                                about_product \
0  High Compatibility : Compatible With iPhone 12...
1  High Compatibility : Compatible With iPhone 12...
2  High Compatibility : Compatible With iPhone 12...
3  High Compatibility : Compatible With iPhone 12...
4  High Compatibility : Compatible With iPhone 12...
5  High Compatibility : Compatible With iPhone 12...
6  High Compatibility : Compatible With iPhone 12...
7  High Compatibility : Compatible With iPhone 12...
8  Compatible with all Type C enabled devices, be...
9  Compatible with all Type C enabled devices, be...
10 Compatible with all Type C enabled devices, be...
11 Compatible with all Type C enabled devices, be...
12 Compatible with all Type C enabled devices, be...
13 Compatible with all Type C enabled devices, be...
14 Compatible with all Type C enabled devices, be...

```

	user_id	user_name	review_id \
0	AG3D604STAQKAY2UVGEUV46KN35Q	Manav	R3HXWTOLRPONMF
1	AHMY5CWJMMK5BJRBBSNLYT3ONILA	Adarsh gupta	R2AJM3LFTLZHFO
2	AHCTC6ULH4XB6YHDY6PCH2R772LQ	Sundeep	R6AQJGUP6P86
3	AGYHHIERNXKA6P5T7CZLXKVPT7IQ	S.Sayeed Ahmed	R1KD19VHEDVOOR
4	AG40G0FWXJZTQ2HKYIOCOY3KXF2Q	jaspreet singh	R3C02RMYQMK6FC
5	AENGU523SXMOS7JPDTW52PNNVWGQ	Khaja moin	R39GQRVBUZBWGY
6	AEQJHCVTNINBS4FKTBGQRQTGTE5Q	Anand	R2K9EDOE15QIRJ
7	AFC3FFC5PKFF5PMA52S3VCH0Z5FQ	S.ARUMUGAM	R30I7YT648TL8I
8	AECPFYFQVRUWC3KGNLJIOREFP5LQ	ArdKn	RGIQEG07R9HS2
9	AGYYVPDD7YG7FYNBXNGXZJT525AQ	Nirbhay kumar	R1SMWZQ86XIN8U
10	AHONIZU3ICIEHQIGQ6R2VFRSBXOQ	Sagar Viswanathan	R2J3Y1WL29GWDE
11	AFPHD2CRPDZMWMBL7WXRSVYWS5JA	Asp	RYGGSOM09S3KY
12	AEZ346GX3HJ404XNRPHCNHXQURMQ	Placeholder	R17KQRUTAN5DKS
13	AEPSWFPNECK034PUC7I56ITGXR6Q	BharanI	R3AAQGS6HP2QUK
14	AHWVEHR5DYLVT02KF3IZATFQSWQ	sonia	R1HDNOG6T02CCA

```

                                review_title \
0                                Satisfied
1          Charging is really fast
2          Value for money
3          Product review
4          Good quality
5          Good product

```

6	Good Product
7	As of now seems good
8	A Good Braided Cable for Your Type C Device
9	Good quality product from ambrane
10	Super cable
11	As
12	Good quality
13	Good product
14	its good

	review_content \
0	look dur charg fin toono complain
1	charg reall fast
2	good produc
3	til satisf qualit
4	good produc charg spee slow origin iphon cabl
5	good qualit
6	would recommend
7	https://m.media-amazon.com/images/wwebp402378t1imagesi...
8	ord cabl connect phon android auto car cabl re...
9	qualit good pric main thing didnt ev thought c...
10	valu money
11	extr leng
12	good
13	work fin
14	produc qualit good

	img_link \
0	https://m.media-amazon.com/images/W/WEBP_40237...
1	https://m.media-amazon.com/images/W/WEBP_40237...
2	https://m.media-amazon.com/images/W/WEBP_40237...
3	https://m.media-amazon.com/images/W/WEBP_40237...
4	https://m.media-amazon.com/images/W/WEBP_40237...
5	https://m.media-amazon.com/images/W/WEBP_40237...
6	https://m.media-amazon.com/images/W/WEBP_40237...
7	https://m.media-amazon.com/images/W/WEBP_40237...
8	https://m.media-amazon.com/images/W/WEBP_40237...
9	https://m.media-amazon.com/images/W/WEBP_40237...
10	https://m.media-amazon.com/images/W/WEBP_40237...
11	https://m.media-amazon.com/images/W/WEBP_40237...
12	https://m.media-amazon.com/images/W/WEBP_40237...
13	https://m.media-amazon.com/images/W/WEBP_40237...
14	https://m.media-amazon.com/images/W/WEBP_40237...

	product_link
0	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
1	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...

```

2 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
3 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
4 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
5 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
6 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
7 https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...
8 https://www.amazon.in/Ambrane-Unbreakable-Char...
9 https://www.amazon.in/Ambrane-Unbreakable-Char...
10 https://www.amazon.in/Ambrane-Unbreakable-Char...
11 https://www.amazon.in/Ambrane-Unbreakable-Char...
12 https://www.amazon.in/Ambrane-Unbreakable-Char...
13 https://www.amazon.in/Ambrane-Unbreakable-Char...
14 https://www.amazon.in/Ambrane-Unbreakable-Char...

```

```

[19]: nltk.download('vader_lexicon')
sentiments = SentimentIntensityAnalyzer()
data_copy["Positive"] = [sentiments.polarity_scores(i)["pos"] for i in
    ↳data_copy["review_title"]]
data_copy["Negative"] = [sentiments.polarity_scores(i)["neg"] for i in
    ↳data_copy["review_title"]]
data_copy["Neutral"] = [sentiments.polarity_scores(i)["neu"] for i in
    ↳data_copy["review_title"]]
data_copy['Compound'] = [sentiments.polarity_scores(i)["compound"] for i in
    ↳data_copy["review_title"]]
score = data_copy["Compound"].values
sentiment = []
for i in score:
    if i >= 0.05 :
        sentiment.append('Positive')
    elif i <= -0.05 :
        sentiment.append('Negative')
    else:
        sentiment.append('Neutral')
data_copy["Sentiment"] = sentiment
data_copy.head(20)

```

```

[nltk_data] Downloading package vader_lexicon to
[nltk_data] C:\Users\Acer\AppData\Roaming\nltk_data...
[nltk_data] Package vader_lexicon is already up-to-date!

```

```

[19]:      product_id      product_name \
0  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
1  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
2  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
3  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
4  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...
5  B07JW9H4J1  Wayona Nylon Braided USB to Lightning Fast Cha...

```

6	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
7	B07JW9H4J1	Wayona Nylon Braided USB to Lightning Fast Cha...
8	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
9	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
10	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
11	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
12	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
13	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
14	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
15	B098NS6PVG	Ambrane Unbreakable 60W / 3A Fast Charging 1.5...
16	B096MSW6CT	Sounce Fast Phone Charging Cable & Data Sync U...
17	B096MSW6CT	Sounce Fast Phone Charging Cable & Data Sync U...
18	B096MSW6CT	Sounce Fast Phone Charging Cable & Data Sync U...
19	B096MSW6CT	Sounce Fast Phone Charging Cable & Data Sync U...

		category	discounted_price	\
0	[Computers&Accessories, Accessories&Peripheral...		399.0	
1	[Computers&Accessories, Accessories&Peripheral...		399.0	
2	[Computers&Accessories, Accessories&Peripheral...		399.0	
3	[Computers&Accessories, Accessories&Peripheral...		399.0	
4	[Computers&Accessories, Accessories&Peripheral...		399.0	
5	[Computers&Accessories, Accessories&Peripheral...		399.0	
6	[Computers&Accessories, Accessories&Peripheral...		399.0	
7	[Computers&Accessories, Accessories&Peripheral...		399.0	
8	[Computers&Accessories, Accessories&Peripheral...		199.0	
9	[Computers&Accessories, Accessories&Peripheral...		199.0	
10	[Computers&Accessories, Accessories&Peripheral...		199.0	
11	[Computers&Accessories, Accessories&Peripheral...		199.0	
12	[Computers&Accessories, Accessories&Peripheral...		199.0	
13	[Computers&Accessories, Accessories&Peripheral...		199.0	
14	[Computers&Accessories, Accessories&Peripheral...		199.0	
15	[Computers&Accessories, Accessories&Peripheral...		199.0	
16	[Computers&Accessories, Accessories&Peripheral...		199.0	
17	[Computers&Accessories, Accessories&Peripheral...		199.0	
18	[Computers&Accessories, Accessories&Peripheral...		199.0	
19	[Computers&Accessories, Accessories&Peripheral...		199.0	

	actual_price	discount_percentage	rating	rating_count	\
0	1099.0	64.0	4.2	24269	
1	1099.0	64.0	4.2	24269	
2	1099.0	64.0	4.2	24269	
3	1099.0	64.0	4.2	24269	
4	1099.0	64.0	4.2	24269	
5	1099.0	64.0	4.2	24269	
6	1099.0	64.0	4.2	24269	
7	1099.0	64.0	4.2	24269	
8	349.0	43.0	4.0	43994	

9	349.0	43.0	4.0	43994
10	349.0	43.0	4.0	43994
11	349.0	43.0	4.0	43994
12	349.0	43.0	4.0	43994
13	349.0	43.0	4.0	43994
14	349.0	43.0	4.0	43994
15	349.0	43.0	4.0	43994
16	1899.0	90.0	3.9	7928
17	1899.0	90.0	3.9	7928
18	1899.0	90.0	3.9	7928
19	1899.0	90.0	3.9	7928

about_product \

0	High Compatibility : Compatible With iPhone 12...
1	High Compatibility : Compatible With iPhone 12...
2	High Compatibility : Compatible With iPhone 12...
3	High Compatibility : Compatible With iPhone 12...
4	High Compatibility : Compatible With iPhone 12...
5	High Compatibility : Compatible With iPhone 12...
6	High Compatibility : Compatible With iPhone 12...
7	High Compatibility : Compatible With iPhone 12...
8	Compatible with all Type C enabled devices, be...
9	Compatible with all Type C enabled devices, be...
10	Compatible with all Type C enabled devices, be...
11	Compatible with all Type C enabled devices, be...
12	Compatible with all Type C enabled devices, be...
13	Compatible with all Type C enabled devices, be...
14	Compatible with all Type C enabled devices, be...
15	Compatible with all Type C enabled devices, be...
16	Fast Charger& Data Sync -With built-in safet...
17	Fast Charger& Data Sync -With built-in safet...
18	Fast Charger& Data Sync -With built-in safet...
19	Fast Charger& Data Sync -With built-in safet...

	user_id ...	review_id \
0	AG3D604STAQKAY2UVGEUV46KN35Q ...	R3HXWTOLRPONMF
1	AHMY5CWJMMK5BJRBBSNLYT3ONILA ...	R2AJM3LFTLZHFO
2	AHCTC6ULH4XB6YHDY6PCH2R772LQ ...	R6AQJGUP6P86
3	AGYHHIERNXKA6P5T7CZLXKVPT7IQ ...	R1KD19VHEDV00R
4	AG40G0FWXJZTQ2HKYIOCOY3KXF2Q ...	R3C02RMYQMK6FC
5	AENGU523SXMOS7JPDTW52PNNVWGQ ...	R39GQRBVBZBWGY
6	AEQJHCVTNINBS4FKTBGQRQTGTE5Q ...	R2K9EDOE15QIRJ
7	AFC3FFC5PKFF5PMA52S3VCH0Z5FQ ...	R30I7YT648TL8I
8	AECPPFYQVRUWC3KGNLJIREFP5LQ ...	RGIQEG07R9HS2
9	AGYYVPDD7YG7FYNBXNGXZJT525AQ ...	R1SMWZQ86XIN8U
10	AHONIZU3ICIEHQIGQ6R2VFRSBXOQ ...	R2J3Y1WL29GWDE
11	AFPHD2CRPDZMWMBL7WXRSVYWS5JA ...	RYGGSOM09S3KY

12	AEZ346GX3HJ404XNRPHCNHXQURMQ	...	R17KQRUTAN5DKS
13	AEPSWFPNECK034PUC7I56ITGXR6Q	...	R3AAQGS6HP2QUK
14	AHWVEHR5DYLVFT02KF3IZATFQSWQ	...	R1HDNOG6T02CCA
15	AH4QT33M55677I7ISQOAKEQWACYQ	...	R3PHKXYA5AFE0U
16	AGU3BBQ2V2DDAMOAKGFAWDDQ6QHA	...	R3J3EQQ9TZI5ZJ
17	AESFLDV2PT363T2AQLWQOWZ4N30A	...	R3E7WBGK7ID0KV
18	AHTPQRIMGUD4BYR5YIHBH3CCGEFQ	...	RWU79XKQ6I1QF
19	AEUVWXYPLT7PZLLZENE02NODPBQ	...	R25X4TBMPY91LX

		review_title	\
0		Satisfied	
1	Charging is really fast		
2	Value for money		
3	Product review		
4	Good quality		
5	Good product		
6	Good Product		
7	As of now seems good		
8	A Good Braided Cable for Your Type C Device		
9	Good quality product from ambrane		
10	Super cable		
11	As		
12	Good quality		
13	Good product		
14	its good		
15	Good quality for the price but one issue with ...		
16	Good speed for earlier versions		
17	Good Product		
18	Working good		
19	Good for the price		

		review_content	\
0	look dur charg fin toono complain		
1	charg reall fast		
2	good produc		
3	til satisf qualit		
4	good produc charg spee slow origin iphon cabl		
5	good qualit		
6	would recommend		
7	httpsmmediaamazoncomimageswebp402378t1imagesi...		
8	ord cabl connect phon android auto car cabl re...		
9	qualit good pric main thing didnt ev thought c...		
10	valu money		
11	extr leng		
12	good		
13	work fin		
14	produc qualit good		

```

15                                     good
16                               quit dur sturd
17  httpsmmediaamazoncomimageswebp402378t1imagesi...
18                                     work good
19  httpsmmediaamazoncomimageswebp402378t1imagesi...

```

```

                                     img_link \
0  https://m.media-amazon.com/images/W/WEBP_40237...
1  https://m.media-amazon.com/images/W/WEBP_40237...
2  https://m.media-amazon.com/images/W/WEBP_40237...
3  https://m.media-amazon.com/images/W/WEBP_40237...
4  https://m.media-amazon.com/images/W/WEBP_40237...
5  https://m.media-amazon.com/images/W/WEBP_40237...
6  https://m.media-amazon.com/images/W/WEBP_40237...
7  https://m.media-amazon.com/images/W/WEBP_40237...
8  https://m.media-amazon.com/images/W/WEBP_40237...
9  https://m.media-amazon.com/images/W/WEBP_40237...
10 https://m.media-amazon.com/images/W/WEBP_40237...
11 https://m.media-amazon.com/images/W/WEBP_40237...
12 https://m.media-amazon.com/images/W/WEBP_40237...
13 https://m.media-amazon.com/images/W/WEBP_40237...
14 https://m.media-amazon.com/images/W/WEBP_40237...
15 https://m.media-amazon.com/images/W/WEBP_40237...
16 https://m.media-amazon.com/images/W/WEBP_40237...
17 https://m.media-amazon.com/images/W/WEBP_40237...
18 https://m.media-amazon.com/images/W/WEBP_40237...
19 https://m.media-amazon.com/images/W/WEBP_40237...

```

	product_link	Positive	Negative	\
0	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	1.000	0.0	
1	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.000	0.0	
2	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.545	0.0	
3	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.000	0.0	
4	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.744	0.0	
5	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.744	0.0	
6	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.744	0.0	
7	https://www.amazon.in/Wayona-Braided-WN3LG1-Sy...	0.420	0.0	
8	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.326	0.0	
9	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.420	0.0	
10	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.796	0.0	
11	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.000	0.0	
12	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.744	0.0	
13	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.744	0.0	
14	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.744	0.0	
15	https://www.amazon.in/Ambrane-Unbreakable-Char...	0.163	0.0	
16	https://www.amazon.in/Sounce-iPhone-Charging-C...	0.420	0.0	
17	https://www.amazon.in/Sounce-iPhone-Charging-C...	0.744	0.0	


```

18 https://www.amazon.in/Sounce-iPhone-Charging-C... 0.744 0.0
19 https://www.amazon.in/Sounce-iPhone-Charging-C... 0.492 0.0

```

```

Neutral Compound Sentiment
0 0.000 0.4215 Positive
1 1.000 0.0000 Neutral
2 0.455 0.3400 Positive
3 1.000 0.0000 Neutral
4 0.256 0.4404 Positive
5 0.256 0.4404 Positive
6 0.256 0.4404 Positive
7 0.580 0.4404 Positive
8 0.674 0.4404 Positive
9 0.580 0.4404 Positive
10 0.204 0.5994 Positive
11 1.000 0.0000 Neutral
12 0.256 0.4404 Positive
13 0.256 0.4404 Positive
14 0.256 0.4404 Positive
15 0.837 0.2382 Positive
16 0.580 0.4404 Positive
17 0.256 0.4404 Positive
18 0.256 0.4404 Positive
19 0.508 0.4404 Positive

```

[20 rows x 21 columns]

```

[20]: # Filter rows where the Sentiment is Negative
negative_sentiment_rows = data_copy.loc[data_copy["Sentiment"] == 'Negative']

# Display the rows with Negative sentiment
print(negative_sentiment_rows)

```

```

product_id product_name \
47 B08Y1TFSP6 pTron Solero TB301 3A Type-C Data and Fast Cha...
50 B08WRWPM22 boAt Micro USB 55 Tangle-free, Sturdy Micro US...
129 B0B6F7LX4C MI 80 cm (32 inches) 5A Series HD Ready Smart ...
149 B08WRBG3XW boAt Type C A325 Tangle-free, Sturdy Type C Ca...
150 B08WRBG3XW boAt Type C A325 Tangle-free, Sturdy Type C Ca...
... ..
11451 B00TI8E7BI Philips HD9306/06 1.5-Litre Electric Kettle (M...
11458 B07J9KXQCC Libra Room Heater for Home, Room Heaters Home ...
11460 B0B3JSWG81 NGI Store 2 Pieces Pet Hair Removers for Your ...
11471 B01M6453MB Prestige Delight PRW0 Electric Rice Cooker (1 ...
11482 B009P2LIL4 Bajaj Majesty RX10 2000 Watts Heat Convector R...

category discounted_price \

```

47	[Computers&Accessories, Accessories&Peripheral...	149.00
50	[Computers&Accessories, Accessories&Peripheral...	176.63
129	[Electronics, HomeTheater,TV&Video, Television...	13999.00
149	[Computers&Accessories, Accessories&Peripheral...	199.00
150	[Computers&Accessories, Accessories&Peripheral...	199.00
...
11451	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2695.00
11458	[Home&Kitchen, Heating,Cooling&AirQuality, Roo...	949.00
11460	[Home&Kitchen, Kitchen&HomeAppliances, Vacuum,...	199.00
11471	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2280.00
11482	[Home&Kitchen, Heating,Cooling&AirQuality, Roo...	2219.00

	actual_price	discount_percentage	rating	rating_count	\
47	1000.0	85.0	3.9	24871	
50	499.0	65.0	4.1	15188	
129	24999.0	44.0	4.2	32840	
149	499.0	60.0	4.1	13045	
150	499.0	60.0	4.1	13045	
...	
11451	2695.0	0.0	4.4	2518	
11458	2299.0	59.0	3.6	550	
11460	999.0	80.0	3.1	2	
11471	3045.0	25.0	4.1	4118	
11482	3080.0	28.0	3.6	468	

	about_product	\
47	Fast Charging & Data Sync: Solero TB301 Type-C...	
50	It Ensures High Speed Transmission And Chargin...	
129	Note : The brands, Mi and Xiaomi, are part of ...	
149	Type C A 325 Cable Is Designed With A Perfect ...	
150	Type C A 325 Cable Is Designed With A Perfect ...	
...	...	
11451	Food grade stainless steel, Frequency: 50 Hz. ...	
11458	Libra room heater for home has cool, warm or h...	
11460	Versatile, Protects Your Clothes: MoveCatcher ...	
11471	230 Volts, 400 watts, 1 Year	
11482	International design and styling Two heat sett...	

	user_id	...	review_id	\
47	AEP4MK3EK0BDKTGPJTRN5RBDIODA	...	R1XN72FU6Q37IH	
50	AER5ZGIXXVYG3AWZTRZT7M2BYCEA	...	R64CRSTE9SLW1	
129	AG7XYZRCSKX6G20LO7DVZWIZ3PUQ	...	R2UGDZSGFF01K7	
149	AFHKIURZM4R62UEXTOCZLI2FPQ6A	...	R3ULCCZZHBNLA4	
150	AEW6K4E5A4RUWRFUDINQE5WWSQ	...	RELIQ4H7CYX2Q	
...	
11451	AE4PHOB4VRRT6W2L4E5TT4QROAWA	...	R39U1YGSKUXRN6	
11458	AE4BFRYLLJQRZJLJ7550H7DYIE4A	...	R8AVX9DP1CA8T	
11460	AFPKVN5KLHB4MHSYDS25Q5MIWWKQ	...	R180KMWGX8SAOL	

11471 AH0V63EYPKKFN2RY43FLDE05XSYA ... R1VM993161IYRW
 11482 AEQTWNQ6GKTOSJ03ZEPHRT56VCA ... R30GEQWZH4DYFA

	review_title \
47	Sturdy but does not support 33w charging
50	Does not charge Lenovo m8 tab
129	Good price but the OS lags
149	Not useful
150	Doesn't fit properly
...	...
11451	Broken material given
11458	receive faulty product
11460	Useless
11471	Don't buy this 1 litre Prestige rice cooker. A...
11482	DEFECTIVE PRODUCT

	review_content \
47	sturd support 33w charg
50	bought charg mobl tab doesnt work lenovo m8 tab
129	produc pric rang good run android 12 lag hop u...
149	singl disconnect issu
150	alway fac origin mi cabl box bought 1 tim last...
...	...
11451	produc qualit excel u model past 4 yr without ...
11458	control knob mark scal bod otherw perform heat...
11460	work advert piec cam nic cle hair stuck posit ...
11471	bad exper buy prestig 1l ric cook screw bottom...
11482	cold air

	img_link \
47	https://m.media-amazon.com/images/I/31wOPjcSxl...
50	https://m.media-amazon.com/images/W/WEBP_40237...
129	https://m.media-amazon.com/images/I/51fmHk3km+...
149	https://m.media-amazon.com/images/W/WEBP_40237...
150	https://m.media-amazon.com/images/W/WEBP_40237...
...	...
11451	https://m.media-amazon.com/images/I/41JyZuDzDg...
11458	https://m.media-amazon.com/images/I/51GEjZAmNR...
11460	https://m.media-amazon.com/images/W/WEBP_40237...
11471	https://m.media-amazon.com/images/I/41gzDxk4+k...
11482	https://m.media-amazon.com/images/W/WEBP_40237...

	product_link	Positive	Negative \
47	https://www.amazon.in/Solero-TB301-Charging-48...	0.000	0.325
50	https://www.amazon.in/boAt-Micro-USB-Tangle-Fr...	0.000	0.289
129	https://www.amazon.in/MI-inches-Ready-Android-...	0.212	0.353
149	https://www.amazon.in/boAt-A325-Tangle-Free-Ch...	0.000	0.706
150	https://www.amazon.in/boAt-A325-Tangle-Free-Ch...	0.000	0.513

```

...
11451 https://www.amazon.in/Philips-HD9306-06-1-5-Li... 0.000 0.608
11458 https://www.amazon.in/LIBRA-Portable-Heater-Ad... 0.000 0.535
11460 https://www.amazon.in/Hair-Removers-Laundry-Re... 0.000 1.000
11471 https://www.amazon.in/Prestige-Delight-PRW0-1-... 0.000 0.228
11482 https://www.amazon.in/Bajaj-RX-10-2000-Watt-Co... 0.000 0.744

```

```

Neutral Compound Sentiment
47      0.675 -0.4380 Negative
50      0.711 -0.2584 Negative
129     0.435 -0.3182 Negative
149     0.294 -0.3412 Negative
150     0.487 -0.2755 Negative
...
11451    0.392 -0.4767 Negative
11458    0.465 -0.3182 Negative
11460    0.000 -0.4215 Negative
11471    0.772 -0.5927 Negative
11482    0.256 -0.4404 Negative

```

[843 rows x 21 columns]

```
[21]: data_copy['Sentiment'].value_counts()
```

```

[21]: Sentiment
Positive    7885
Neutral     2773
Negative     843
Name: count, dtype: int64

```

```
[22]: data_copy = data_copy.drop(columns=['Positive', 'Negative', 'Neutral', 'Compound'])
```

```
[23]: data_copy['review_content'] = sales['review_content']
data_copy
```

```

[23]: product_id product_name \
0      B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
1      B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
2      B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
3      B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
4      B07JW9H4J1 Wayona Nylon Braided USB to Lightning Fast Cha...
...
11496 B01486F4G6 Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11497 B01486F4G6 Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11498 B01486F4G6 Borosil Jumbo 1000-Watt Grill Sandwich Maker (...
11499 B01486F4G6 Borosil Jumbo 1000-Watt Grill Sandwich Maker (...

```

11500 B01486F4G6 Borosil Jumbo 1000-Watt Grill Sandwich Maker (...)

	category	discounted_price \
0	[Computers&Accessories, Accessories&Peripheral...	399.0
1	[Computers&Accessories, Accessories&Peripheral...	399.0
2	[Computers&Accessories, Accessories&Peripheral...	399.0
3	[Computers&Accessories, Accessories&Peripheral...	399.0
4	[Computers&Accessories, Accessories&Peripheral...	399.0
...
11496	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2863.0
11497	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2863.0
11498	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2863.0
11499	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2863.0
11500	[Home&Kitchen, Kitchen&HomeAppliances, SmallKi...	2863.0

	actual_price	discount_percentage	rating	rating_count \
0	1099.0	64.0	4.2	24269
1	1099.0	64.0	4.2	24269
2	1099.0	64.0	4.2	24269
3	1099.0	64.0	4.2	24269
4	1099.0	64.0	4.2	24269
...
11496	3690.0	22.0	4.3	6987
11497	3690.0	22.0	4.3	6987
11498	3690.0	22.0	4.3	6987
11499	3690.0	22.0	4.3	6987
11500	3690.0	22.0	4.3	6987

	about_product \
0	High Compatibility : Compatible With iPhone 12...
1	High Compatibility : Compatible With iPhone 12...
2	High Compatibility : Compatible With iPhone 12...
3	High Compatibility : Compatible With iPhone 12...
4	High Compatibility : Compatible With iPhone 12...
...	...
11496	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...
11497	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...
11498	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...
11499	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...
11500	Brand-Borosil, Specification â€" 23V ~ 5Hz;1 W...

	user_id	user_name	review_id \
0	AG3D604STAQKAY2UVGEUV46KN35Q	Manav	R3HXWTOLRPONMF
1	AHMY5CWJMMK5BJRBBSNLYT30NILA	Adarsh gupta	R2AJM3LFTLZHFO
2	AHCTC6ULH4XB6YHDY6PCH2R772LQ	Sundeep	R6AQJGUP6P86
3	AGYHHIERNXKA6P5T7CZLXKVPT7IQ	S.Sayeed Ahmed	R1KD19VHEDV00R
4	AG40GOFWXJZTQ2HKYIOCOY3KXF2Q	jaspreet singh	R3C02RMYQMK6FC

```

...
11496 AHXCDNSXAESERITAFELQABFVNLCA PARDEEP R2ZC03S4QXOW4Y
11497 AGRZD6CHLCUNOLMMIMIHUCG7PIFA Anindya Pramanik R186H8YW34BQD5
11498 AFQZVGSOS0JHKFQQMCEI4725QEKQ Vikas Singh R10NC3D321N59G
11499 AEALVGXXIP460ZVXKRUXSDWZJMEA Harshada Pimple REKF75G4SOAOX
11500 AGEFL3AY7YXEFZA4ZJU3LP7K70JQ Saw a. R2G0ZT4JQX322I

```

```

review_title \
0 Satisfied
1 Charging is really fast
2 Value for money
3 Product review
4 Good quality

```

```

...
11496 Excellent product
11497 A good product for household use
11498
11499 Best product
11500 Good

```

```

review_content \
0 Looks durable Charging is fine tooNo complains
1 Charging is really fast
2 good product.
3 Till now satisfied with the quality.
4 This is a good product . The charging speed is...

```

```

...
11496 It is a nice product
11497 easy to use. The grilling function is also wo...
11498 Very good product
11499 This is a pretty powerful sandwich maker
11500 for home use. The product looks good

```

```

img_link \
0 https://m.media-amazon.com/images/W/WEBP_40237...
1 https://m.media-amazon.com/images/W/WEBP_40237...
2 https://m.media-amazon.com/images/W/WEBP_40237...
3 https://m.media-amazon.com/images/W/WEBP_40237...
4 https://m.media-amazon.com/images/W/WEBP_40237...

```

```

...
11496 https://m.media-amazon.com/images/W/WEBP_40237...
11497 https://m.media-amazon.com/images/W/WEBP_40237...
11498 https://m.media-amazon.com/images/W/WEBP_40237...
11499 https://m.media-amazon.com/images/W/WEBP_40237...
11500 https://m.media-amazon.com/images/W/WEBP_40237...

```

product_link Sentiment

```

0      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy... Positive
1      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy... Neutral
2      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy... Positive
3      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy... Neutral
4      https://www.amazon.in/Wayona-Braided-WN3LG1-Sy... Positive
...
11496 https://www.amazon.in/Borosil-Jumbo-1000-Watt-... Positive
11497 https://www.amazon.in/Borosil-Jumbo-1000-Watt-... Positive
11498 https://www.amazon.in/Borosil-Jumbo-1000-Watt-... Neutral
11499 https://www.amazon.in/Borosil-Jumbo-1000-Watt-... Positive
11500 https://www.amazon.in/Borosil-Jumbo-1000-Watt-... Positive

```

[11501 rows x 17 columns]

```
[24]: sales_df = data_copy
```

0.3 MySQL Database Connection

This code establishes a connection to a MySQL database using the `mysql.connector` module in Python. It connects to a MySQL server running locally (localhost) with a specified username and password. After establishing the connection, it creates a cursor object to execute SQL queries and interact with the database.

```
[25]: !pip install mysql-connector-python
```

```

Requirement already satisfied: mysql-connector-python in
c:\users\acer\appdata\local\programs\python\python39\lib\site-packages (8.3.0)

WARNING: You are using pip version 21.1.3; however, version 24.0 is available.
You should consider upgrading via the
'c:\users\acer\appdata\local\programs\python\python39\python.exe -m pip install
--upgrade pip' command.

```

```

[26]: import mysql.connector

conn = mysql.connector.connect(
    host="127.0.0.1",
    user="root",
    password="root"
)

cursor = conn.cursor()

```

0.4 Creating the Database

```
[27]: cursor.execute("CREATE DATABASE IF NOT EXISTS amazon_sales_project")
```

```
[28]: conn.database = 'amazon_sales_project'
```

```
[29]: # Extracting unique products and its details
products = sales_df.drop_duplicates(subset=['product_id'])[['product_id',
    ↳ 'product_name', 'discounted_price', 'actual_price', 'discount_percentage',
    ↳ 'rating', 'rating_count', 'about_product', 'img_link', 'product_link']]

# Extracting unique users
users = sales_df[['user_id', 'user_name']].drop_duplicates()
```

Authorship of the code - Vedika Halwasiya

```
[30]: # Extracting reviews details
reviews = sales_df[['review_id', 'product_id', 'user_id', 'review_title',
    ↳ 'review_content', 'Sentiment']]

# Converting unique categories to a DataFrame
categories_df = pd.DataFrame(list(unique_categories), columns=['category_name'])
categories_df.reset_index(inplace=True)
categories_df.rename(columns={'index': 'category_id'}, inplace=True)

# Updating the product_category_mapping to use category_id instead of
    ↳ category_name
category_name_to_id = {row['category_name']: row['category_id'] for index, row
    ↳ in categories_df.iterrows()}
product_category_mapping_updated = [(product_id, category_name_to_id[category])
    ↳ for product_id, category in product_category_mapping]

product_category_mapping_df = pd.DataFrame(product_category_mapping_updated,
    ↳ columns=['product_id', 'category_id'])

product_category_mapping_df = product_category_mapping_df.drop_duplicates()
```

```
[31]: products.to_csv('./data/products.csv', index=False)
users.to_csv('./data/users.csv', index=False)
reviews.to_csv('./data/reviews.csv', index=False)
categories_df.to_csv('./data/categories.csv', index=False)
product_category_mapping_df.to_csv('./data/categoryassign.csv', index=False)
```

```
[32]: cursor.execute("DROP TABLE IF EXISTS Reviews")

cursor.execute("DROP TABLE IF EXISTS Users")

cursor.execute("DROP TABLE IF EXISTS CategoryAssignments")

cursor.execute("DROP TABLE IF EXISTS Categories")
```



```
cursor.execute("DROP TABLE IF EXISTS Products")
```

0.4.1 Creating the Tables

[33]: *## Authorship of the code - Kabir Chaturvedi*

Products table creation

```
cursor.execute("""
CREATE TABLE IF NOT EXISTS Products (
    product_id VARCHAR(255) PRIMARY KEY,
    product_name VARCHAR(255) NOT NULL,
    discounted_price DECIMAL(10, 2),
    actual_price DECIMAL(10, 2),
    discount_percentage DECIMAL(5, 2),
    rating DECIMAL(3, 1) DEFAULT 0 CHECK (rating >= 0 AND rating <= 5),
    rating_count INT DEFAULT 0,
    about_product TEXT,
    img_link TEXT,
    product_link VARCHAR(768)
);
""")
```

Authorship of the code - Vedika Halwasiya

Users table creation

```
cursor.execute("""
CREATE TABLE IF NOT EXISTS Users (
    user_id VARCHAR(255) PRIMARY KEY,
    user_name VARCHAR(255) NOT NULL
);
""")
```

Reviews table creation

```
cursor.execute("""
CREATE TABLE IF NOT EXISTS Reviews (
    review_id VARCHAR(255) PRIMARY KEY,
    product_id VARCHAR(255) NOT NULL,
    user_id VARCHAR(255) NOT NULL,
    review_title TEXT,
    review_content TEXT,
    sentiment VARCHAR(50),
    FOREIGN KEY (product_id) REFERENCES Products(product_id) ON DELETE CASCADE,
    FOREIGN KEY (user_id) REFERENCES Users(user_id) ON DELETE CASCADE,
    UNIQUE(product_id, user_id)
);
""")
```

```

## Authorship of the code - Dhyey Joshi

# Categories Table creation
cursor.execute("""
CREATE TABLE IF NOT EXISTS Categories (
    category_id INT AUTO_INCREMENT PRIMARY KEY,
    category_name VARCHAR(255) UNIQUE NOT NULL
);
""")

# Category Assignment Table creation
cursor.execute("""
CREATE TABLE IF NOT EXISTS CategoryAssignments (
    product_id VARCHAR(255),
    category_id INT,
    PRIMARY KEY (product_id, category_id),
    FOREIGN KEY (product_id) REFERENCES Products(product_id) ON DELETE CASCADE,
    FOREIGN KEY (category_id) REFERENCES Categories(category_id) ON DELETE_
↵CASCADE
);
""")

```

Authorship of the code - Kabir Chaturvedi

0.4.2 Inserting data into the tables created

```

[34]: import csv
import mysql.connector

def load_csv_to_mysql(csv_file_path, table_name, cursor):
    with open(csv_file_path, mode='r', encoding='utf-8') as csv_file:
        csv_reader = csv.reader(csv_file)
        headers = next(csv_reader) # To get the column names from the first row
        placeholders = ', '.join(['%s'] * len(headers))
        # Using INSERT IGNORE to ignore inserting duplicate values
        insert_query = f'INSERT IGNORE INTO {table_name} ({", ".join(headers)})_
↵VALUES ({placeholders})'
        for row in csv_reader:
            # Converting empty strings in the row to NULL in SQL
            row = [None if x == '' else x for x in row]
            cursor.execute(insert_query, tuple(row))
        conn.commit()

load_csv_to_mysql('./data/products.csv', 'Products', cursor)
load_csv_to_mysql('./data/users.csv', 'Users', cursor)
load_csv_to_mysql('./data/reviews.csv', 'Reviews', cursor)

```

```
load_csv_to_mysql('./data/categories.csv', 'Categories', cursor)
load_csv_to_mysql('./data/categoryassign.csv', 'CategoryAssignments', cursor)
```

```
[35]: cursor.execute("SELECT * FROM Products LIMIT 5")
for row in cursor.fetchall():
    print()
    print(row)
```

('B002PD61Y4', 'D-Link DWA-131 300 Mbps Wireless Nano USB Adapter (Black)', Decimal('507.00'), Decimal('1208.00'), Decimal('58.00'), Decimal('4.1'), 8131, 'Connects your computer to a high-speed wireless network|Supports WPA/WPA2 wireless encryption to help prevent outside intrusion and protect your personal information from being exposed.|3 Year Brand Warranty|2.4Ghz frequency band (300mbps)|2 fixed internal Wi-Fi antenna|N300 MIMO Wi-Fi USB Adapter|This is a plug and play device with generic configuration|Compatible with all CCTV DVRs', 'https://m.media-amazon.com/images/I/31+NwZ8gb1L._SX300_SY300_.jpg', 'https://www.amazon.in/D-Link-DWA-131-Wireless-Adapter-Black/dp/B002PD61Y4/ref=sr_1_50?qid=1672909126&s=electronics&sr=1-50')

('B002SZEOLG', 'TP-Link Nano USB WiFi Dongle 150Mbps High Gain Wireless Network Wi-Fi Adapter for PC Desktop and Laptops, Supports Windows 10/8.1/8/7/XP, Linux, Mac OS X (TL-WN722N)', Decimal('749.00'), Decimal('1339.00'), Decimal('44.00'), Decimal('4.2'), 179692, '150 Mbps Wi-Fi -- Exceptional wireless speed up to 150Mbps brings best experience for video streaming or internet calls|Easy Set up -- Easy wireless security encryption at a push of the WPS button|Antenna -- 4dBi detachable Omni Directional antenna, remarkably strengthen signal power of the USB adapter|Compatibility -- Windows 11/10/8.1/8/7/XP, Mac OS 10.15 and earlier, Linux|Interface -- USB 2.0|In an unlikely case of product quality related issue, we may ask you to reach out to brand's customer service support and seek resolution. We will require brand proof of issue to process replacement request.', 'https://m.media-amazon.com/images/I/31Wb+A3VVdL._SY300_SX300_.jpg', 'https://www.amazon.in/TP-Link-TL-WN722N-150Mbps-Wireless-Adapter/dp/B002SZEOLG/ref=sr_1_162?qid=1672909131&s=electronics&sr=1-162')

('B003B00484', 'Duracell Plus AAA Rechargeable Batteries (750 mAh) Pack of 4', Decimal('399.00'), Decimal('499.00'), Decimal('20.00'), Decimal('4.3'), 27201, "Duracell Rechargeable AAA 750mAh batteries stay charged for up to 12 months, when not in use|Unused Duracell Rechargeable AAA 750mAh batteries are guaranteed to last 3 years|Duracell Rechargeable AAA 750mAh batteries come pre-charged, ready to use|Duracell Rechargeable AAA 750mAh batteries can be recharged 100's times|Suited for regularly used devices like wireless mouse or babyphone|They are available in AA 1300mAh and AAA 750mAh sizes|They work in any NiMH charger", 'https://m.media-amazon.com/images/I/418YrbHVLCL._SX300_SY300_QL70_FMwebp_.jpg', 'https://www.amazon.in/Duracell-AAA-750mAh-Rechargeable-Batteries/dp/B003B00484/ref=sr_1_148?qid=1672903002&s=computers&sr=1-148')

('B003L62T7W', 'Logitech B100 Wired USB Mouse, 3 yr Warranty, 800 DPI Optical Tracking, Ambidextrous PC/Mac/Laptop - Black', Decimal('279.00'), Decimal('375.00'), Decimal('26.00'), Decimal('4.3'), 31534, "A comfortable, ambidextrous shape feels good in either hand, so you feel more comfortable as you work-even at the end of the day.|With 800 dpi sensitivity, you'll get precise cursor control so you can edit documents and navigate the Web more efficiently.|Side-to-side scrolling plus zoom lets you instantly zoom in or out and scroll horizontally and vertically. Perfect for working with spreadsheets and presentations.|Zero setup with flexible connectivity means you just plug it into your USB or PS/2 port-it works right out of the box.|This mouse is built by Logitech-the mouse experts. It comes with the quality and design we've built into more than a billion mice, more than any other manufacturer.", 'https://m.media-amazon.com/images/I/31iFF1KbkpL._SX300_SY300_QL70_FMwebp_.jpg', 'https://www.amazon.in/Logitech-B100-Optical-Mouse-Black/dp/B003L62T7W/ref=sr_1_151?qid=1672903002&s=computers&sr=1-151')

('B004I05BMQ', 'Logitech M235 Wireless Mouse, 1000 DPI Optical Tracking, 12 Month Life Battery, Compatible with Windows, Mac, Chromebook/PC/Laptop', Decimal('699.00'), Decimal('995.00'), Decimal('30.00'), Decimal('4.5'), 54405, 'You can surf the Web with more comfort and ease-thanks to the contoured design with soft rubber grips. And your mouse is easy to slip into a bag when you want to take it with you.|You'll enjoy smooth cursor control, precise tracking and easy text selection on the surfaces where you use your computer most.|The tiny Unifying receiver connects up to six Unifying-compatible devices with a powerful, reliable wireless connection (up to 25 meters).|You can go a full year without battery hassles. The On/Off switch helps conserve power, smart sleep mode extends battery life and an indicator light eliminates surprises.|You get a mouse you can count on with the high quality and reliability that have made Logitech the global leader for mice-plus a three-year limited hardware warranty.', 'https://m.media-amazon.com/images/I/31CtVvtFt+L._SY300_SX300_.jpg', 'https://www.amazon.in/Logitech-M235-Wireless-Mouse-Grey/dp/B004I05BMQ/ref=sr_1_163?qid=1672903002&s=computers&sr=1-163')

```
[36]: cursor.execute("SELECT * FROM Users LIMIT 5")
for row in cursor.fetchall():
    print()
    print(row)
```

('AE22E2AXODSPNK3EBIHNGYS5LOSA', 'Subhajit Kansa Banik')

('AE22MK2NXQD3ZARLIOL3SLD4GU6A', 'Vishal Tiwari')

('AE22Y3KIS7SE6LI3HE2VS6WWPU4Q', 'Srinivas Pasumarthi')

('AE23RS3W7GZ07LHYKJU6KSKVM4MQ', 'Mithila Saha')

('AE23WGYTUMB5R6JJMBU4V43JIW7Q', 'Nageswararao')

```
[37]: cursor.execute("SELECT * FROM Reviews LIMIT 5")
      for row in cursor.fetchall():
          print()
          print(row)
```

('R100Y29EIOKGW9', 'B08H6B3G96', 'AE4HN6JZ6ZJYA2ACUAQIUXSP5FA', 'Plage big size', 'Wanted a heavy steam iron. This works very well. Lots of steam and easily irons out clothes. Very easy on fabrics too so you are able to use the high steam setting to remove out wrinkles on clothes without worrying about the fabric setting too much..', 'Neutral')

('R101TILZBOMQ6F', 'B0814P4L98', 'AHHCC6KDIDI70F6J6HV70BGG2JGQ', 'Good quality storage bag', 'https://m.media-amazon.com/images/I/7168PizheiL._SY88.jpg', 'Positive')

('R101VJD80D1Z15', 'B0883KDSXC', 'AEMICKNJILKDILX34NH2M3J46IAQ', 'Good product product thanks usha.', 'Good product with good quality.', 'Positive')

('R10365HEDURWI9', 'B07GVGTSLN', 'AEXK37TSBFHSP2TYE63YPKETWQ7Q', 'Nice product .', 'Sturdy packing', 'Positive')

('R103G20V60FA3Q', 'B085CZ3SR1', 'AH3BI36C3I7GJFS5QMG2MKJEVQKQ', 'product review MI charger!!!', "i'm using it for 2 weeks now. No issues with the product. I am satisfied with the product.thank you.", 'Neutral')

```
[38]: cursor.execute("SELECT * FROM Categories LIMIT 5")
      for row in cursor.fetchall():
          print()
          print(row)
```

(216, '3DGlasses')

(136, 'Accessories')

(13, 'Accessories&Peripherals')

(239, 'Adapters')

(218, 'Adapters&Multi-Outlets')

```
[39]: cursor.execute("SELECT * FROM CategoryAssignments LIMIT 5")
      for row in cursor.fetchall():
          print()
          print(row)
```

('B00N3XLDW0', 1)

('B07S7DCJKS', 2)

('B08461VC1Z', 2)

('B08QJJCY2Q', 2)

('B08WJ86PV2', 2)

0.5 Functionality-Focused Queries

Authorship of the code - Dhyey Joshi

0.5.1 1: Product Comparison

Users can compare products based on features such as price, rating, and category.

Query: Retrieve products for comparison

```
[40]: cursor.execute("""
SELECT product_id, product_name, actual_price, discounted_price, rating
FROM Products
WHERE product_id IN ('B08HJDJ86NZ', 'B08DDRGWTJ');
""")

for row in cursor.fetchall():
    print()
    print(row)
```

('B08DDRGWTJ', 'MI Usb Type-C Cable Smartphone (Black)', Decimal('299.00'),
Decimal('229.00'), Decimal('4.3'))

('B08HJDJ86NZ', 'boAt Deuce USB 300 2 in 1 Type-C & Micro USB Stress Resistant,
Tangle-Free, Sturdy Cable with 3A Fast Charging & 480mbps Data Transmission,
10000+ Bends Lifespan and Extended 1.5m Length(Martian Red)', Decimal('699.00'),
Decimal('329.00'), Decimal('4.2'))

0.5.2 2: Search Products

Allow users to search for products by name, category, or specific attributes.

Query: Search for products by name

```
[41]: cursor.execute("""
SELECT product_id, product_name, actual_price, rating
FROM Products
WHERE product_name LIKE '%Wayona Nylon%';
""")
```

```

for row in cursor.fetchall():
    print()
    print(row)

```

```

('B07F1P8KNV', 'Wayona Nylon Braided Usb Type C 3Ft 1M 3A Fast Charger Cable For Samsung Galaxy S9 S8 (Wc3Cb1, Black)', Decimal('1099.00'), Decimal('4.2'))

```

```

('B07JGDB5M1', 'Wayona Nylon Braided 2M / 6Ft Fast Charge Usb To Lightning Data Sync And Charging Cable For Iphone, Ipad Tablet (6 Ft Pack Of 1, Grey)', Decimal('1299.00'), Decimal('4.2'))

```

```

('B07JH1C41D', 'Wayona Nylon Braided (2 Pack) Lightning Fast Usb Data Cable Fast Charger Cord For Iphone, Ipad Tablet (3 Ft Pack Of 2, Grey)', Decimal('1999.00'), Decimal('4.2'))

```

```

('B07JH1CBGW', 'Wayona Nylon Braided Usb Syncing And Charging Cable Sync And Charging Cable For Iphone, Ipad (3 Ft, Black) - Pack Of 2', Decimal('1999.00'), Decimal('4.2'))

```

```

('B07JNVF678', 'Wayona Nylon Braided USB Data Sync and Fast Charging 3A Short Power Bank Cable For iPhones, iPad Air, iPad mini, iPod Nano and iPod Touch (Grey)', Decimal('999.00'), Decimal('4.2'))

```

```

('B07JPJJZ2H', 'Wayona Nylon Braided Lightning USB Data Sync & 3A Charging Cable for iPhones, iPad Air, iPad Mini, iPod Nano and iPod Touch (3 FT Pack of 1, Grey)', Decimal('1299.00'), Decimal('4.2'))

```

```

('B07JW1Y6XV', 'Wayona Nylon Braided 3A Lightning to USB A Syncing and Fast Charging Data Cable for iPhone, Ipad (3 FT Pack of 1, Black)', Decimal('1099.00'), Decimal('4.2'))

```

```

('B07JW9H4J1', 'Wayona Nylon Braided USB to Lightning Fast Charging and Data Sync Cable Compatible for iPhone 13, 12,11, X, 8, 7, 6, 5, iPad Air, Pro, Mini (3 FT Pack of 1, Grey)', Decimal('1099.00'), Decimal('4.2'))

```

0.5.3 3: Review Sentiment Analysis

Display review sentiments for products to help users make informed decisions.

Query: Retrieve reviews and ratings for a specific product

```

[42]: cursor.execute("""
SELECT R.review_content, R.Sentiment
FROM Reviews R
JOIN Products P ON R.product_id = P.product_id
WHERE P.product_id = 'B08DDRGWTJ';

```

```
"""
```

```
for row in cursor.fetchall():  
    print(row)
```

```
('Original cable', 'Positive')  
(('Original MI cable. Will charge upto 33 watts. Got it for Rs 150. I have 67  
watt charger and I want a cable for my car so I went for it. I checked the  
performance with battery charging app. The charging speed is exactly half of my  
67 watt original cable. Go for it.', 'Positive')  
(('Everything is Okay. But packaging is not good feeling like seller gave is used  
cable.', 'Positive')  
(('I bought this cable at 129. Using this cable for Android auto in my car.  
Perfectly works without any glitch.', 'Positive')  
(('It provided me turbo charging. I recommend for all Redmi note 10s mobile  
phones. As it provide turbo charging. I am veri happy with this product.',  
'Positive')  
(('Good product', 'Neutral')  
(('Good product but cost is more.', 'Positive')  
(('Worth for money - suitable for Android auto... my purpose served in car...got  
it for Rs.150', 'Positive')
```

0.5.4 4: Trending Products

Identify and display trending products based on ratings and the number of reviews.

Query: Retrieve top-rated products

```
[43]: cursor.execute("""  
SELECT p.product_id, p.product_name, p.rating, COUNT(r.review_id) as  
↪review_count  
FROM Products p  
LEFT JOIN Reviews r ON p.product_id = r.product_id  
GROUP BY p.product_id, p.product_name, p.rating  
ORDER BY p.rating DESC, review_count DESC  
LIMIT 10;  
""")  
  
for row in cursor.fetchall():  
    print()  
    print(row)
```

```
('B09ZHCJDP1', 'Amazon Basics Wireless Mouse | 2.4 GHz Connection, 1600 DPI |  
Type - C Adapter | Upto 12 Months of Battery Life | Ambidextrous Design |  
Suitable for PC/Mac/Laptop', Decimal('5.0'), 8)
```

```
('B0BP7XLX48', 'Syncwire LTG to USB Cable for Fast Charging Compatible with
```


Phone 5/ 5C/ 5S/ 6/ 6S/ 7/8/ X/XR/XS Max/ 11/12/ 13 Series and Pad Air/Mini, Pod & Other Devices (1.1 Meter, White)', Decimal('5.0'), 5)

('B0B53DS4TF', 'Instant Pot Air Fryer, Vortex 2QT, Touch Control Panel, 360° EvenCrisp Technology, Uses 95 % less Oil, 4-in-1 Appliance: Air Fry, Roast, Bake, Reheat (Vortex 1.97Litre, Black)', Decimal('4.8'), 8)

('B0BQ3K23Y1', 'Oratech Coffee Frother electric, milk frother electric, coffee beater, cappuccino maker, Coffee Foamer, Mocktail Mixer, Coffee Foam Maker, coffee whisker electric, Froth Maker, coffee stirrers electric, coffee frothers, Coffee Blender, (6 Month Warranty) ', Decimal('4.8'), 8)

('B0BR4F878Q', 'Swiffer Instant Electric Water Heater Faucet Tap Home-Kitchen Instantaneous Water Heater Tank less for Tap, LED Electric Head Water Heaters Tail Gallon Comfort(3000W) ((Pack of 1))', Decimal('4.8'), 3)

('B09WN3SRC7', 'Sony Bravia 164 cm (65 inches) 4K Ultra HD Smart LED Google TV KD-65X74K (Black)', Decimal('4.7'), 8)

('B0B23LW7NV', 'Spigen EZ Fit Tempered Glass Screen Protector for iPhone 14 Pro Max - 2 Pack (Sensor Protection)', Decimal('4.7'), 8)

('B0BLC2BYPX', 'Zuvexa USB Rechargeable Electric Foam Maker - Handheld Milk Wand Mixer Frother for Hot Milk, Hand Blender Coffee, Egg Beater (Black)', Decimal('4.7'), 8)

('B0BM9H2NY9', 'Multifunctional 2 in 1 Electric Egg Boiling Steamer Egg Frying Pan Egg Boiler Electric Automatic Off with Egg Boiler Machine Non-Stick Electric Egg Frying Pan-Tiger Woods (Multy)', Decimal('4.7'), 8)

('B0BP89YBC1', 'Campfire Spring Chef Prolix Instant Portable Water Heater Geyser 1Ltr. for Use Home Stainless Steel Baking Rack | Restaurant | Office | Labs | Clinics | Saloon | with Installation Kit (With MCB)', Decimal('4.7'), 7)

Authorship of the code - Vedika Halwasiya

0.5.5 5: Discounts and Deals

Highlight products with the best discounts.

Query: Retrieve products with the highest discounts

```
[44]: cursor.execute("""
SELECT product_id, product_name, actual_price, discounted_price,
       ↪discount_percentage
FROM Products
WHERE discounted_price IS NOT NULL AND actual_price > discounted_price
ORDER BY discount_percentage DESC
LIMIT 10;
```

```
""")
```

```
for row in cursor.fetchall():  
    print(row)
```

```
('B097C564GC', 'rts [2 Pack] Mini USB C Type C Adapter Plug, Type C Female to  
USB A Male Charger Charging Cable Adapter Converter compatible for iPhone,  
Samsung S20 ultra/S21/S10/S8/S9/MacBook Pro iPad Silver', Decimal('4999.00'),  
Decimal('294.00'), Decimal('94.00'))  
(('B0BF4YBLPX', 'Fire-Boltt Ninja Call Pro Plus 1.83" Smart Watch with Bluetooth  
Calling, AI Voice Assistance, 100 Sports Modes IP67 Rating, 240*280 Pixel High  
Resolution', Decimal('19999.00'), Decimal('1799.00'), Decimal('91.00'))  
(('B0BF54972T', 'Fire-Boltt Ninja Call Pro Plus 1.83" Smart Watch with Bluetooth  
Calling, AI Voice Assistance, 100 Sports Modes IP67 Rating, 240*280 Pixel High  
Resolution', Decimal('19999.00'), Decimal('1799.00'), Decimal('91.00'))  
(('B0BF54LXW6', 'Fire-Boltt Ninja Call Pro Plus 1.83" Smart Watch with Bluetooth  
Calling, AI Voice Assistance, 100 Sports Modes IP67 Rating, 240*280 Pixel High  
Resolution', Decimal('19999.00'), Decimal('1799.00'), Decimal('91.00'))  
(('B0BF563HB4', 'Fire-Boltt Ninja Call Pro Plus 1.83" Smart Watch with Bluetooth  
Calling, AI Voice Assistance, 100 Sports Modes IP67 Rating, 240*280 Pixel High  
Resolution', Decimal('19999.00'), Decimal('1799.00'), Decimal('91.00'))  
(('B0BF57RN3K', 'Fire-Boltt Ninja Call Pro Plus 1.83" Smart Watch with Bluetooth  
Calling, AI Voice Assistance, 100 Sports Modes IP67 Rating, 240*280 Pixel High  
Resolution', Decimal('19999.00'), Decimal('1799.00'), Decimal('91.00'))  
(('B085HY1DGR', 'Sounce Spiral Charger Cable Protector Data Cable Saver Charging  
Cord Protective Cable Cover Headphone MacBook Laptop Earphone Cell Phone Set of  
3 (Cable Protector (12 Units))', Decimal('999.00'), Decimal('99.00'),  
Decimal('90.00'))  
(('B08W56G1K9', 'LAPSTER Spiral Charger Spiral Charger Cable Protectors for Wires  
Data Cable Saver Charging Cord Protective Cable Cover Set of 3 (12 Pieces)',  
Decimal('999.00'), Decimal('99.00'), Decimal('90.00'))  
(('B08X77LM8C', 'Silicone Rubber Earbuds Tips, Eartips, Earpads, Earplugs, for  
Replacement in Earphones and Bluetooth Medium Size (10 Pcs Black)',  
Decimal('999.00'), Decimal('99.00'), Decimal('90.00'))  
(('B096MSW6CT', 'Sounce Fast Phone Charging Cable & Data Sync USB Cable  
Compatible for iPhone 13, 12,11, X, 8, 7, 6, 5, iPad Air, Pro, Mini & iOS  
Devices', Decimal('1899.00'), Decimal('199.00'), Decimal('90.00'))
```

0.5.6 6: User Reviews and Ratings Dashboard

Provide a dashboard for users to see all their reviews and ratings, allowing them to modify or delete their contributions.

Query: Retrieve all reviews by a specific user

```
[45]: user_id_to_lookup = 'AE22E2AXODSPNK3EBIHNGYS5LOSA'  
  
cursor.execute("""
```

```

SELECT r.review_id, r.product_id, p.product_name, r.review_title, r.
    review_content, r.sentiment, p.rating
FROM Reviews r
JOIN Products p
ON r.product_id = p.product_id
WHERE r.user_id = %s
ORDER BY r.review_id DESC;""", (user_id_to_lookup,))

for row in cursor.fetchall():
    print(row)

```

```

('R2ONXP5WQXARB6', 'BOB31FR4Y2', 'Boult Audio Omega with 30dB ANC+ ENC, 32H
Playtime, 45ms Latency Gaming Mode, Quad Mic Zen ENC, 3 Equalizer Modes, ANC,
Type-C Fast Charging, IPX5 True Wireless in Ear Bluetooth Earbuds (Black)',
'JUST OK', ' have to do it with built in mobile equalizer.', 'Positive',
Decimal('3.7'))

```

0.5.7 7: Category-Wise Product Browsing

Allow users to browse products by category. This functionality would use the Categories and CategoryAssignments tables to display products within a specific category.

Query: Retrieve products by a specific category

```

[46]: category_name = "Electronics"
cursor.execute("""
SELECT p.product_id, p.product_name, p.actual_price, p.rating
FROM Products p
JOIN CategoryAssignments ca ON p.product_id = ca.product_id
JOIN Categories c ON ca.category_id = c.category_id
WHERE c.category_name = %s
ORDER BY p.rating DESC
LIMIT 10;
""", (category_name,))

for row in cursor.fetchall():
    print(row)

```

```

('B09WN3SRC7', 'Sony Bravia 164 cm (65 inches) 4K Ultra HD Smart LED Google TV
KD-65X74K (Black)', Decimal('139900.00'), Decimal('4.7'))
('BOB23LW7NV', 'Spigen EZ Fit Tempered Glass Screen Protector for iPhone 14 Pro
Max - 2 Pack (Sensor Protection)', Decimal('2899.00'), Decimal('4.7'))
('B08TGG316Z', '10k 8k 4k HDMI Cable, Certified 48Gbps 1ms Ultra High Speed HDMI
2.1 Cable 4k 120Hz 144Hz 2k 165Hz 8k 60Hz Dynamic HDR ARC eARC DTS:X Compatible
for Mac Gaming PC Soundbar TV Monitor Laptop PS5 4 Xbox', Decimal('2399.00'),
Decimal('4.6'))
('B095RTJH1M', 'Spigen EZ Fit Tempered Glass Screen Protector Guard for iPhone
14/13/13 Pro - 2 Pack', Decimal('2899.00'), Decimal('4.6'))

```

```
( 'B0B244R4KB', 'Spigen EZ Fit Tempered Glass Screen Protector for iPhone 14 Pro
- 2 Pack (Sensor Protection)', Decimal('2899.00'), Decimal('4.6'))
( 'B0B9BXKBC7', 'WeCool S5 Long Selfie Stick, with Large Reinforced Tripod Stand
up to 61 Inch / 156 Cms, Ultra Long Multi Function Bluetooth Selfie Stick with
1/4 Screw Compatible with Gopro, Camera, and Ring Light', Decimal('3999.00'),
Decimal('4.6'))
( 'B0083T2310', 'Belkin Essential Series 4-Socket Surge Protector Universal
Socket with 5ft Heavy Duty Cable (Grey)', Decimal('1499.00'), Decimal('4.5'))
( 'B00R1P3B40', 'Fujifilm Instax Mini Single Pack 10 Sheets Instant Film for Fuji
Instant Cameras', Decimal('549.00'), Decimal('4.5'))
( 'B0116MIKKC', 'Goldmedal Curve Plus 202042 Plastic Spice 3-Pin 240V Universal
Travel Adaptor (White)', Decimal('171.00'), Decimal('4.5'))
( 'B014SZ090Y', 'Duracell Ultra Alkaline AA Battery, 8 Pcs', Decimal('315.00'),
Decimal('4.5'))
```

0.5.8 8: Best Sellers in a Specific Category

Identify and showcase the best-selling products within a specified category based on ratings and the number of reviews.

Query: Retrieve products from the desired category based on ratings and number of reviews

```
[47]: category_name = "Speakers"
cursor.execute("""
SELECT p.product_id, p.product_name, COUNT(r.review_id) AS review_count, p.
rating, c.category_name
FROM Products p
JOIN Reviews r ON p.product_id = r.product_id
JOIN CategoryAssignments ca ON p.product_id = ca.product_id
JOIN Categories c ON ca.category_id = c.category_id
WHERE c.category_name = %s
GROUP BY p.product_id, c.category_name
ORDER BY review_count DESC, p.rating DESC
LIMIT 10;
""", (category_name,))

for row in cursor.fetchall():
    print(row)
```

```
( 'B07B88KQZ8', 'JBL Go 2, Wireless Portable Bluetooth Speaker with Mic, JBL
Signature Sound, Vibrant Color Options with IPX7 Waterproof & AUX (Blue)', 8,
Decimal('4.3'), 'Speakers')
( 'B08SMJT55F', 'boAt Stone 250 Portable Wireless Speaker with 5W RMS Immersive
Audio, RGB LEDs, Up to 8HRS Playtime, IPX7 Water Resistance, Multi-Compatibility
Modes(Black)', 8, Decimal('4.2'), 'Speakers')
( 'B07NC12T2R', 'boAt Stone 650 10W Bluetooth Speaker with Upto 7 Hours Playback,
IPX5 and Integrated Controls (Blue)', 8, Decimal('4.2'), 'Speakers')
( 'B08CRRQK6Z', 'Zebronics Zeb-JUKEBAR 3900, 80W Multimedia soundbar with
```

```

subwoofer Supporting Bluetooth, HDMI(ARC), Coaxial Input, AUX, USB & Remote
Control (Black)', 8, Decimal('4.2'), 'Speakers')
('B08JMC1988', 'boAt Stone 180 5W Bluetooth Speaker with Upto 10 Hours Playback,
1.75" Driver, IPX7 & TWS Feature(Black)', 8, Decimal('4.1'), 'Speakers')
('B07W6VWZ8C', 'Infinity (JBL Fuze Pint, Wireless Ultra Portable Mini Speaker
with Mic, Deep Bass, Dual Equalizer, Bluetooth 5.0 with Voice Assistant Support
for Mobiles (Black)', 8, Decimal('4.1'), 'Speakers')
('B07W7Z6DVL', 'Infinity (JBL Fuze 100, Wireless Portable Bluetooth Speaker with
Mic, Deep Bass, Dual Equalizer, IPX7 Waterproof, Rugged Fabric Design (Black)',
8, Decimal('4.1'), 'Speakers')
('BOB12K5BPM', 'ZEBRONICS Zeb-Astra 20 Wireless BT v5.0 Portable Speaker with
10W RMS Output, TWS, 10H Backup Approx, Built in Rechargeable Battery FM Radio,
AUX, mSD, USB, Call Function and Dual 52mm Drivers Multi', 8, Decimal('3.9'),
'Speakers')
('B07L3NDN24', 'ZEBRONICS Zeb-Fame 5watts 2.0 Multi Media Speakers with AUX, USB
and Volume Control (Black)', 8, Decimal('3.9'), 'Speakers')
('B07YNTJ8ZM', 'Zebronics ZEB-COUNTY 3W Wireless Bluetooth Portable Speaker With
Supporting Carry Handle, USB, SD Card, AUX, FM & Call Function. (Green)', 8,
Decimal('3.9'), 'Speakers')

```

Authorship of the code - Kabir Chaturvedi

0.5.9 9: New Arrivals

Showcase the latest products added to the marketplace.

Query: Retrieve products recently added to the catalog

```

[48]: cursor.execute("""
SELECT product_id, product_name, actual_price, img_link
FROM Products
ORDER BY product_id DESC
LIMIT 10;
""")

for row in cursor.fetchall():
    print(row)

```

```

('B0BR4F878Q', 'Swiffer Instant Electric Water Heater Faucet Tap Home-Kitchen
Instantaneous Water Heater Tank less for Tap, LED Electric Head Water Heaters
Tail Gallon Comfort(3000W) ((Pack of 1))', Decimal('1999.00'), 'https://m.media-
amazon.com/images/I/41+t2HWvWFL._SY300_SX300_.jpg')
('B0BQ3K23Y1', 'Oratech Coffee Frother electric, milk frother electric, coffee
beater, cappuccino maker, Coffee Foamer, Mocktail Mixer, Coffee Foam Maker,
coffee whisker electric, Froth Maker, coffee stirrers electric, coffee frothers,
Coffee Blender, (6 Month Warranty) ', Decimal('499.00'), 'https://m.media-amazon
.com/images/W/WEBP_402378-T2/images/I/41t3WVU1RmL._SX300_SY300_QL70_FMwebp_.jpg'
)
('BOBPJBTB3F', 'Khaitan ORFin Fan heater for Home and kitchen-KO 2215',

```

```
Decimal('2495.00'), 'https://m.media-amazon.com/images/W/WEBP_402378-T1/images/I/31B8Pd1SmLL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBPCJM7TB', 'WIDEWINGS Electric Handheld Milk Wand Mixer Frother for Latte Coffee Hot Milk, Milk Frother for Coffee, Egg Beater, Hand Blender, Coffee Beater with Stand', Decimal('999.00'), 'https://m.media-amazon.com/images/I/41sJ4KQa5xL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBPBXNQQT', 'Room Heater Warmer Wall-Outlet 400 Watts Electric Handy Room Heater (Room Heaters Home for Bedroom, Reading Books, Work, bathrooms, Rooms, Offices, Home Offices,2022', Decimal('1989.00'), 'https://m.media-amazon.com/images/W/WEBP_402378-T1/images/I/51ey0zzictL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBPBG712X', 'Portable, Handy Compact Plug-in Portable Digital Electric Heater Fan Wall-Outlet Handy Air Warmer Blower Adjustable Timer Digital Display Heater for Home/Office/Camper (Black, 400 Watts)', Decimal('1199.00'), 'https://m.media-amazon.com/images/W/WEBP_402378-T1/images/I/51ey0zzictL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBP89YBC1', 'Campfire Spring Chef Prolix Instant Portable Water Heater Geyser 1Ltr. for Use Home Stainless Steel Baking Rack | Restaurant | Office | Labs | Clinics | Saloon | with Installation Kit (With MCB)', Decimal('3500.00'), 'https://m.media-amazon.com/images/W/WEBP_402378-T1/images/I/41hoHTbN5rL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBP7XLX48', 'Syncwire LTG to USB Cable for Fast Charging Compatible with Phone 5/ 5C/ 5S/ 6/ 6S/ 7/8/ X/XR/XS Max/ 11/12/ 13 Series and Pad Air/Mini, Pod & Other Devices (1.1 Meter, White)', Decimal('1999.00'), 'https://m.media-amazon.com/images/I/3170oQfs1gL._SX300_SY300_QL70_FMwebp_.jpg')
('BOBP18W8TM', 'Fire-Boltt Gladiator 1.96" Biggest Display Smart Watch with Bluetooth Calling, Voice Assistant &123 Sports Modes, 8 Unique UI Interactions, SpO2, 24/7 Heart Rate Tracking', Decimal('9999.00'), 'https://m.media-amazon.com/images/I/51vHAEYKeWL._SX300_SY300_QL70_ML2_.jpg')
('BOBNXFDTZ2', 'Fire-Boltt Tank 1.85" Bluetooth Calling Smart Watch, 123 Sports Mode, 8 UI Interactions, Built in Speaker & Mic, 7 Days Battery & Fire-Boltt Health Suite', Decimal('11999.00'), 'https://m.media-amazon.com/images/I/41vQwUamFcL._SX300_SY300_QL70_ML2_.jpg')
```

0.5.10 10: Top Rated Products

Display the top-rated products within a specified rating threshold.

Query: Retrieve top-rated products with a rating of 4.0 and above

```
[49]: cursor.execute("""
SELECT product_id, product_name, rating
FROM Products
WHERE rating >= 4.0
ORDER BY rating DESC, rating_count DESC
LIMIT 10;
""")
for row in cursor.fetchall():
    print(row)
```

('B09ZHCJDP1', 'Amazon Basics Wireless Mouse | 2.4 GHz Connection, 1600 DPI | Type - C Adapter | Upto 12 Months of Battery Life | Ambidextrous Design | Suitable for PC/Mac/Laptop', Decimal('5.0'))

('B0BP7XLX48', 'Syncwire LTG to USB Cable for Fast Charging Compatible with Phone 5/ 5C/ 5S/ 6/ 6S/ 7/8/ X/XR/XS Max/ 11/12/ 13 Series and Pad Air/Mini, Pod & Other Devices (1.1 Meter, White)', Decimal('5.0'))

('B0BR4F878Q', 'Swiffer Instant Electric Water Heater Faucet Tap Home-Kitchen Instantaneous Water Heater Tank less for Tap, LED Electric Head Water Heaters Tail Gallon Comfort(3000W) ((Pack of 1))', Decimal('4.8'))

('B0B53DS4TF', 'Instant Pot Air Fryer, Vortex 2QT, Touch Control Panel, 360° EvenCrisp Technology, Uses 95 % less Oil, 4-in-1 Appliance: Air Fry, Roast, Bake, Reheat (Vortex 1.97Litre, Black)', Decimal('4.8'))

('B0BQ3K23Y1', 'Oratech Coffee Frother electric, milk frother electric, coffee beater, cappuccino maker, Coffee Foamer, Mocktail Mixer, Coffee Foam Maker, coffee whisker electric, Froth Maker, coffee stirrers electric, coffee frothers, Coffee Blender, (6 Month Warranty) ', Decimal('4.8'))

('B0B23LW7NV', 'Spigen EZ Fit Tempered Glass Screen Protector for iPhone 14 Pro Max - 2 Pack (Sensor Protection)', Decimal('4.7'))

('B09WN3SRC7', 'Sony Bravia 164 cm (65 inches) 4K Ultra HD Smart LED Google TV KD-65X74K (Black)', Decimal('4.7'))

('B0BP89YBC1', 'Campfire Spring Chef Prolix Instant Portable Water Heater Geyser 1Ltr. for Use Home Stainless Steel Baking Rack | Restaurant | Office | Labs | Clinics | Saloon | with Installation Kit (With MCB)', Decimal('4.7'))

('B0BM9H2NY9', 'Multifunctional 2 in 1 Electric Egg Boiling Steamer Egg Frying Pan Egg Boiler Electric Automatic Off with Egg Boiler Machine Non-Stick Electric Egg Frying Pan-Tiger Woods (Multy)', Decimal('4.7'))

('B0BM4KTNL1', 'FIGMENT Handheld Milk Frother Rechargeable, 3-Speed Electric Frother for Coffee with 2 Whisks and Coffee Decoration Tool, Coffee Frother Mixer, CRESCENT ENTERPRISES VRW0.50BK (A1)', Decimal('4.7'))

0.5.11 11: Most Reviewed Products

Identify which products are generating the most conversation based on review counts.

Query: Retrieve products with the highest number of reviews

```
[50]: cursor.execute("""
SELECT P.product_id, P.product_name, COUNT(R.review_id) as review_count
FROM Products P
JOIN Reviews R ON P.product_id = R.product_id
GROUP BY P.product_id
ORDER BY review_count DESC
LIMIT 10;
""")

for row in cursor.fetchall():
    print(row)
```

('B09YV4MW2T', "Fire-Boltt India's No 1 Smartwatch Brand Talk 2 Bluetooth

Calling Smartwatch with Dual Button, Hands On Voice Assistance, 60 Sports Modes, in Built Mic & Speaker with IP68 Rating", 9)
('B08WRBG3XW', 'boAt Type C A325 Tangle-free, Sturdy Type C Cable with 3A Rapid Charging & 480mbps Data Transmission(Black)', 9)
('B097R25DP7', 'Noise ColorFit Pulse Smartwatch with 3.56 cm (1.4") Full Touch HD Display, SpO2, Heart Rate, Sleep Monitors & 10-Day Battery - Jet Black', 9)
('B09ZQK9X8G', 'Noise ColorFit Pro 4 Advanced Bluetooth Calling Smart Watch with 1.72" TruView Display, Fully-Functional Digital Crown, 311 PPI, 60Hz Refresh Rate, 500 NITS Brightness (Charcoal Black)', 9)
('B09MT84WV5', 'Samsung EVO Plus 128GB microSDXC UHS-I U3 130MB/s Full HD & 4K UHD Memory Card with Adapter (MB-MC128KA), Blue', 9)
('B09V12K8NT', 'boAt Wave Lite Smartwatch with 1.69" HD Display, Sleek Metal Body, HR & SpO2 Level Monitor, 140+ Watch Faces, Activity Tracker, Multiple Sports Modes, IP68 & 7 Days Battery Life(Active Black)', 9)
('B07T4D9FNY', 'iBELL SEK15L Premium 1.5 Litre Stainless Steel Electric Kettle,1500W Auto Cut-Off Feature,Silver with Black', 8)
('B0759QMF85', 'TP-Link AC750 Dual Band Wireless Cable Router, 4 10/100 LAN + 10/100 WAN Ports, Support Guest Network and Parental Control, 750Mbps Speed Wi-Fi, 3 Antennas (Archer C20) Blue, 2.4 GHz', 8)
('B098R25TGC', 'Noise Buds VS201 V2 in-Ear Truly Wireless Earbuds with Dual Equalizer | with Mic | Total 14-Hour Playtime | Full Touch Control | IPX5 Water Resistance and Bluetooth v5.1 (Olive Green)', 8)
('BOBBFJ9M3X', 'Redmi 11 Prime 5G (Meadow Green, 4GB RAM 64GB ROM) | Prime Design | MTK Dimensity 700 | 50 MP Dual Cam | 5000mAh | 7 Band 5G', 8)

0.5.12 12: Category-Wise Discounts and Deals

Highlighting categories where users can find the best discounts currently available.

Query: Retrieve categories with best discounts

```
[51]: cursor.execute("""
SELECT C.category_name, MIN(P.discounted_price/P.actual_price) AS max_discount
FROM Categories C
JOIN CategoryAssignments CA ON C.category_id = CA.category_id
JOIN Products P ON CA.product_id = P.product_id
WHERE P.discounted_price IS NOT NULL
GROUP BY C.category_name
ORDER BY max_discount DESC
LIMIT 5;
""")

for row in cursor.fetchall():
    print(row)
```

```
('Copy&PrintingPaper', Decimal('1.000000'))
('Toys&Games', Decimal('1.000000'))
('Arts&Crafts', Decimal('1.000000'))
('WoodenPencils', Decimal('1.000000'))
```



```
('Film', Decimal('1.000000'))
```

```
[52]: conn.close()
```