Experiment – 2: Sentiment analysis on customer review on products

Amazon Product Reviews Sentiment Analysis with Python

Amazon is an American multinational corporation that focuses on e-commerce, cloud computing, digital streaming, and artificial intelligence products. But it is mainly known for its e-commerce platform which is one of the biggest online shopping platforms today. There are so many customers buying products from Amazon that today Amazon earns an average of $ 638.1 million per day. So having such a large customer base, it will turn out to be an amazing data science project if we can analyze the sentiments of Amazon product reviews. So, in this article, I will walk you through the task of Amazon Product Reviews Sentiment Analysis with Python.

The dataset we're using for the task of Amazon product reviews sentiment analysis was downloaded from Kaggle. This dataset contains the product reviews of over 568,000 customers who have purchased products from Amazon. So let's start this task by importing the necessary Python libraries and the dataset:

```
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
from nltk.sentiment.vader import SentimentIntensityAnalyzer
sentiments = SentimentIntensityAnalyzer()
data = pd.read_csv("Reviews.csv")
print(data.head())
```

```
   Id   ProductId          UserId                      ProfileName  \
0   1  B001E4KFG0  A3SGXH7AUHU8GW                       delmartian
1   2  B00813GRG4  A1D87F6ZCVE5NK                           dll pa
2   3  B000LQOCH0   ABXLMWJIXXAIN  Natalia Corres "Natalia Corres"
3   4  B000UA0QIQ  A395BORC6FGVXV                             Karl
4   5  B006K2ZZ7K  A1UQRSCLF8GW1T    Michael D. Bigham "M. Wassir"

   HelpfulnessNumerator  HelpfulnessDenominator  Score        Time  \
0                     1                       1      5  1303862400
1                     0                       0      1  1346976000
2                     1                       1      4  1219017600
3                     3                       3      2  1307923200
4                     0                       0      5  1350777600

                Summary                                         Text
0  Good Quality Dog Food  I have bought several of the Vitality canned d...
1      Not as Advertised  Product arrived labeled as Jumbo Salted Peanut...
2  "Delight" says it all  This is a confection that has been around a fe...
3         Cough Medicine  If you are looking for the secret ingredient i...
4            Great taffy  Great taffy at a great price.  There was a wid...
```

```
print(data.describe())
```

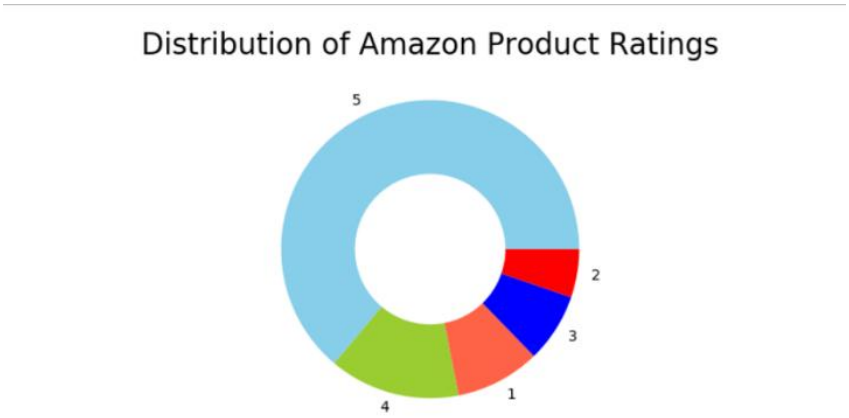
```
                Id  HelpfulnessNumerator  HelpfulnessDenominator  \
count  568454.000000         568454.000000            568454.00000
mean   284227.500000              1.743817                 2.22881
std    164098.679298              7.636513                 8.28974
min         1.000000              0.000000                 0.00000
25%    142114.250000              0.000000                 0.00000
50%    284227.500000              0.000000                 1.00000
75%    426340.750000              2.000000                 2.00000
max    568454.000000            866.000000               923.00000

               Score          Time
count  568454.000000  5.684540e+05
mean        4.183199  1.296257e+09
std         1.310436  4.804331e+07
min         1.000000  9.393408e+08
25%         4.000000  1.271290e+09
50%         5.000000  1.311120e+09
75%         5.000000  1.332720e+09
max         5.000000  1.351210e+09
```

As this dataset is very large, it contains some missing values, so remove all the rows containing the missing values:

```
data = data.dropna()
```

The Score column of this dataset contains the ratings that customers have given to the product based on their experience with the product. So let's take a look at the rating breakdown to see how most customers rate the products they buy from Amazon:

```
ratings = data["Score"].value_counts()
numbers = ratings.index
quantity = ratings.values
custom_colors = ["skyblue", "yellowgreen", 'tomato', "blue", "red"]
plt.figure(figsize=(10, 8))
plt.pie(quantity, labels=numbers, colors=custom_colors)
central_circle = plt.Circle((0, 0), 0.5, color='white')
fig = plt.gcf()
fig.gca().add_artist(central_circle)
plt.rc('font', size=12)
plt.title("Distribution of Amazon Product Ratings", fontsize=20)
plt.show()
```



According to the figure above, more than half of people rated products they bought from Amazon with 5 stars, which is good. Now, we're going to add three more columns to this dataset as Positive, Negative, and Neutral by calculating the sentiment scores of the customer reviews mentioned in the Text column of the dataset:

```
sentiments = SentimentIntensityAnalyzer()
data["Positive"] = [sentiments.polarity_scores(i)["pos"] for i in data["Text"]]
data["Negative"] = [sentiments.polarity_scores(i)["neg"] for i in data["Text"]]
data["Neutral"] = [sentiments.polarity_scores(i)["neu"] for i in data["Text"]]
print(data.head())
```

```
   Id   ProductId          UserId  ... Positive  Negative  Neutral
0   1  B001E4KFG0  A3SGXH7AUHU8GW  ...    0.305     0.000    0.695
1   2  B00813GRG4  A1D87F6ZCVE5NK  ...    0.000     0.138    0.862
2   3  B000LQOCH0   ABXLMWJIXXAIN  ...    0.155     0.091    0.754
3   4  B000UA0QIQ  A395BORC6FGVXV  ...    0.000     0.000    1.000
4   5  B006K2ZZ7K  A1UQRSCLF8GW1T  ...    0.448     0.000    0.552

[5 rows x 13 columns]
```

Now we can see how most people rated the products they bought from Amazon:

```
x = sum(data["Positive"])
y = sum(data["Negative"])
z = sum(data["Neutral"])
def sentiment_score(a, b, c):
    if (a>b) and (a>c):
        print("Positive □ ")
    elif (b>a) and (b>c):
```

```
        print("Negative □ ")
    else:
        print("Neutral □ ")
sentiment_score(x, y, z)
```

Output:

```
Neutral □
```

So, most people are neutral when submitting their experiences with the products they have purchased from Amazon. Now let's see the total of all sentiment scores:

```
print("Positive: ", x)
print("Negative: ", y)
print("Neutral: ", z)
```

Output:

```
Positive:  109328.1269999992
Negative:  24033.022999999564
Neutral:  435043.95799998916
```