Dataset :
CONSUMER REVIEWS OF AMAZON PRODUCTS

The dataset used for sentiment analysis is 'Consumer Reviews of Amazon Products' **.**
This is a list of over 34,000 consumer reviews for Amazon products like the Kindle, Fire TV Stick, and more. The dataset includes basic product information, rating, review text, and more for each product.

Preprocessing steps:

1. First we asseseed the shape of the dataframe. 34660 rows * 21 columns found.
2. Nan values of each column is assessed. We have found that only 1 Nan value is there in reviews.text column.
3. Row containing Nan values in reviews.text column removed.
4. We selected 'name' and 'reviews.text' for data processing.
5. Selected the words of reviews in column 'reviews.text' which contain alphabets, then removed stopwords and punctuation , did lemmatization and converted to lowercase.
6. Converted the preprocessed text to a Spacy doc vector and stored in column 'nlp_list'

Sentiment analysis:

We have created analyse_sentiment_column() function in which a dataframe passed as an argument.
Using nlp_list column, polarity of review is assessed using TextBlob() ..
The polarity found is used to determine the sentiment of the review.
If polarity > 0, sentiment is positive
If polarity < 0, sentiment is negative
If polarity is 0, sentiment is neutral
Polarity and sentiment columns are added to the dataframe and returned by the function analyse_sentiment_column().

We have dropped unwanted columns used for data processing and resultant dataframe is printed wherein it shows sentiment of each review.

Insights:

We have tried sentiment analysis for selected reviews to assess the accuracy of our function.

Most of the analysis found by the function is found to be correct.

The reviews shown as positive contains positive words like Great, Love, easy

The reviews shown as negative contains negative words like annoying, limited, wrong

But, some positive reviews which do not contain positive words are considered as neutral.

Ex:

Review: Really like the updates this product has in comparison to my first one

Sentiment:
131   neutral

The review below explains both pros and cons, but still the function identified it as negative.

Review: Pros: 5 Ghz wifi, supports expansion cards Cons: app store a little
limited though there is apparently a workaround Other: the ads fed from Amazon
are not terribly intrusive Overall, the tablet seems to work well and is a
good value,
Sentiment:
1801   negative

In the example below, though the review is actually positive, because of the negative word in the sentence, it is considered as negative by our function. This proves that the sentiment analysis is not very accurate. In a few cases it has gone wrong.

Review: It works well and for the price you can't go wrong.
Sentiment:
10303   negative

Output of the program:

Sample of amazon_product_reviews.csv :

                  id   name   asins ... reviews.userCity reviews.userProvince
reviews.username

0 AVqkIhwDv8e3D1O-lebb All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... B01AHB9CN2 ...   NaN
NaN   Adapter

1 AVqkIhwDv8e3D1O-lebb All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... B01AHB9CN2 ...   NaN
NaN   truman

2 AVqkIhwDv8e3D1O-lebb All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... B01AHB9CN2 ...   NaN
NaN   DaveZ

3 AVqkIhwDv8e3D1O-lebb All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... B01AHB9CN2 ...   NaN
NaN   Shacks

4 AVqkIhwDv8e3D1O-lebb All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... B01AHB9CN2 ...   NaN
NaN   explore42

[5 rows x 21 columns]

Shape of dataframe is (34660, 21)

Nan values in each column:

```
id                   0
name                6760
asins                2
brand                0
categories           0
keys                 0
manufacturer         0
reviews.date        39
reviews.dateAdded   10621
reviews.dateSeen     0
reviews.didPurchase 34659
reviews.doRecommend  594
reviews.id          34659
reviews.numHelpful   529
reviews.rating      33
reviews.sourceURLs   0
reviews.text         1
reviews.title        6
reviews.userCity    34660
reviews.userProvince 34660
reviews.username     7
dtype: int64
```

Dataframe with required columns for data analysis:

                    name   reviews.text

0 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... This product so far has not disappointed. My c...

1 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... great for beginner or experienced person. Boug...

2 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... Inexpensive tablet for him to use and learn on...

3 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... I've had my Fire HD 8 two weeks now and I love...

4 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... I bought this for my grand daughter when she c...

Dataframe after preprocessing of processed_reviews column :

                          name ...   processed_reviews

0 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... product far disappoint child love use like abi...

1 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ...   great beginner experienced person buy gift love

2 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... inexpensive tablet use learn step nabi thrille...

3 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... fire hd week love tablet great value prime mem...

4 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... buy grand daughter come visit set user enter a...

[5 rows x 3 columns]

Dataframe when reviews.text processed column content converted to nlp tokens :

                          name ...   nlp_list

0 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... (product, far, disappoint, child, love, use, l...

1 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... (great, beginner, experienced, person, buy, gi...

2 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... (inexpensive, tablet, use, learn, step, nabi, ...

3 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... (fire, hd, week, love, tablet, great, value, p...

4 All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,... ... (buy, grand, daughter, come, visit, set, user,...

[5 rows x 4 columns]

Sample of dataframe with polarity and sentiment columns added :

	name	reviews.text	...	polarity	sentiment
0	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	This product so far has not disappointed. My c...	...	0.300000	positive
1	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	great for beginner or experienced person. Boug...	...	0.700000	positive
2	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	Inexpensive tablet for him to use and learn on...	...	0.600000	positive
3	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	I've had my Fire HD 8 two weeks now and I love...	...	0.432222	positive
4	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	I bought this for my grand daughter when she c...	...	0.258929	positive

[5 rows x 6 columns]

Result with sentiment analysis :

	name	reviews.text	sentiment
0	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	This product so far has not disappointed. My c...	positive
1	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	great for beginner or experienced person. Boug...	positive
2	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	Inexpensive tablet for him to use and learn on...	positive
3	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	I've had my Fire HD 8 two weeks now and I love...	positive
4	All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi,...	I bought this for my grand daughter when she c...	positive

SAMPLES OF SENTIMENT ANALYSIS

Product : All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: Great product. Love the Amazon ecosystem. The Freetime subscription is a must

Sentiment:

101   positive

Name: sentiment, dtype: object

Product : All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: I'm new to tablets but this one is pretty easy to understand and use.There's a decent amounts of apps at start up, which can be good and bad.

Sentiment:

1000   positive

Name: sentiment, dtype: object

Product :All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: Pros: 5 Ghz wifi, supports expansion cardsCons: app store a little limited though there is apparently a workaround Other: the ads fed from Amazon are not terribly intrusiveOverall, the tablet seems to work well and is a good value,

Sentiment:

1801   negative

Name: sentiment, dtype: object

Product : All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: upgraded my 3 year old kindle- same old. doesnt seem that great of a difference. the graphical interface still sucks but its decent for reading.

Sentiment:

1898   negative

Name: sentiment, dtype: object

Product : All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: Really like the updates this product has in comparison to my first one

Sentiment:

131   neutral

Name: sentiment, dtype: object

Product : All-New Fire HD 8 Tablet, 8 HD Display, Wi-Fi, 16 GB - Includes Special Offers, Magenta

Review: The tablet is not for me it is for a Christmas gift

Sentiment:

399   neutral

Name: sentiment, dtype: object

Product : Fire Tablet, 7 Display, Wi-Fi, 8 GB - Includes Special Offers, Magenta

Review: It works well and for the price you can't go wrong.

Sentiment:

10303   negative

Name: sentiment, dtype: object

Similarity between reviews:

Review 1 Need to buy a tablet for my Mother as a Christmas gift. Functionality is great and she uses it for all her online needs

Review 2 The Fire HD 8 is the perfect size EReader. Big enough to see the text but small enough to hold comfortably.

Similarity between review 1 and review 2 : 0.7639795907879998

Review 1 This replaced my old original kindle fire. What a great upgrade.

Review 2 This is a very good tablet. The only con is you may have to reboot it too often.

Similarity between review 1 and review 2: 0.7186979954248104

Review 1 If you actually paid 20 for this adapter, you're out of your mind.

Review 2 I mean... it work fine, but 20 fine There's nothing special here and it's a joke that Amazon doesn't just ship a charging plug with the Kindle in the first place. You should be able to find plenty of non-OEM chargers that'll work in terms of watts and voltage for far less money, like 5.

Similarity between review 1 and review 2 : 0.8511587089743357

Review 1 Great tablet just what my wife wanted, loves the wifi, much better than her old one.

Review 2 I purchased this for my wife so that she has an option other than her phone or laptop to browse the internet.

Similarity between review 1 and review 2 : 0.8314092779120578