

```
In [1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import sqlite3
import nltk
import string
```

The column or features in the dataset:

Id

ProductId – unique identifier for the product

UserId – unique identifier for the user

ProfileName

HelpfulnessNumerator – number of users who found the review helpful

HelpfulnessDenominator – number of users who indicated whether they found the review helpful or not

Score – rating between 1 and 5

Time – timestamp for the review

Summary – brief summary of the review

Text – text of the review

In [2]: `df = pd.read_csv('Reviews.csv')`

```
print(df.shape)
df.head()
```

(568454, 10)

Out[2]:

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



In [3]: `df.shape`

Out[3]: (568454, 10)

## What is sentiment analysis?

Sentiment analysis is the computational task of automatically determining what feelings a writer is expressing in text. Some examples of applications for sentiment analysis include:

1. Analyzing the social media discussion around a certain topic
2. Evaluating survey responses
3. Determining whether product reviews are positive or negative

Sentiment analysis is not perfect. It also cannot tell you why a writer is feeling a certain way. However, it can be useful to quickly summarize some qualities of text, especially if you have so much text that a human reader cannot analyze it. For this project, the goal is to classify Food reviews based on customers' text.

```
In [4]: from textblob import TextBlob
```

```
In [5]: TextBlob(df['Summary'][0]).sentiment.polarity
```

```
Out[5]: 0.7
```

```
In [6]: ## takes 3 mins  
polarity=[] # list which will contain the polarity of the comments  
  
for i in df['Summary']:  
    try:  
        polarity.append(TextBlob(i).sentiment.polarity)  
    except:  
        polarity.append(0)
```

```
In [7]: len(polarity)
```

```
Out[7]: 568454
```

```
In [8]: data=df.copy()
```

```
In [9]: data['polarity']=polarity
```

In [10]: `data.head()`

Out[10]:

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

In [11]: `data['polarity'].nunique()`

Out[11]: 4578

## Lets perform EDA for the Positive sentences¶

In [12]: `data_positive = data[data['polarity']>0]`  
`data_positive.shape`

Out[12]: (331665, 11)

In [13]: `from wordcloud import WordCloud, STOPWORDS`

```
In [14]: stopwords=set(STOPWORDS)
```

```
In [15]: positive=data_positive[0:200000]
```

```
In [16]: total_text= (' '.join(data_positive['Summary']))
```

```
In [17]: len(total_text)
```

```
Out[17]: 8465012
```

```
In [18]: total_text[0:10000]
```

```
Out[18]: 'Good Quality Dog Food Great taffy Nice Taffy Great! Just as good as
the expensive brands! Wonderful, tasty taffy Healthy Dog Food The Best
Hot Sauce in the World My cats LOVE this "diet" food better than their
regular food My Cats Are Not Fans of the New Food fresh and greasy! Lo
ve it! GREAT SWEET CANDY! Always fresh Delicious product! Great Bargai
n for the Price The Best Hot Sauce in the World Great machine! Best of
the Instant Oatmeals Good Instant Great Irish oatmeal for those in a h
urry! satisfying Love Gluten Free Oatmeal!!! GOOD WAY TO START THE DA
Y.... Wife\'s favorite Breakfast Why wouldn\'t you buy oatmeal from Mc
anns? Tastes great! Good Hot Breakfast Great taste and convenience goo
d Very good but next time I won\'t order the Variety Pack HOT! And go
od! Came back for more :) Roasts up a smooth brew Our guests love i
t! Awesome Deal! Awsome - Kids in neighborhood loved us! great deal. B
etter price for this at Target great source of electrolytes Great for
preventing cramps Taste is not so good. How much would you pay for a b
ag of chocolate pretzels? Great Gummi! Best ever latice tart nothing s
pecial Good Taste great this is the best Delicious! Great Natural Bala
nce Lamb and Rice Great food! Great for my dogs allergies Great for st
omach problems! Better life for you dog! Great Food Great food for my
my dog who has a sensitive stomach. Great dog food Mmmmm Mmmmm good.
Great Dog Food! Good healthy dog food Great dog food Great allergy sen
sitive dog food, dogs love it Perfect for our English Bulldog with All
ergies Taste wise it is a 6 star item Great Support Loved these Tartle
ts The best My Idea of a Good Diet Food. Delicious tea the best tea ev
er... freah bright clean Wonderful Tea Great cookies Best everyday coo
kie! So Far So Good Best Cat Food Great food. Perfect Cat Food For Old
er Cats! Good for Feline UTI Palatable and healthy Healthy & They LOVE
It! Wonderful food - perfect for allergic kitties Tastes great. Love H
ot & Spicy. Bad price here. My favorite ramen Amazing to the last bit
e. Great spicy flavor Great value and convenient ramen great flavor Ta
stes great, but is cheaper locally. Tastes awesome & looks beautiful H
appy Face Simply the BEST! Excellent Product/Life Saver Nice snack Goo
d Licorice I love these!!!!!!! Great for the kids! Sweet with a nice
kick! Love the salsa!! awesome cornmeal GREAT marinade! Awesome stuff
tastes good Great flavor of Jell-o. Great Deal Great tasting sea salt
WITH iodine tastes very fresh Simple but good Not the greatest tastin
g.. Not Bad Right size, taste This stuff is soooooo good! Best Stuff Ev
er Worked great! Delicious! Fluffy, Soft, Delicious and Sugary Sweet G
reat but not as good as it was back in the day as a teen EXCELLENT LEM
ON JUICE Great Product Handy Never paid that much ! Great product to h
elp you sleep Perfect for gluten-free chocolate chip cookies Make a fr
esh fruit tart, light and beautiful not bad for instant healthy coffee
It\'s ok I love it! great taste and has health benefits! Tastes Great.
Arrived in 2 days! Great for after lunch Nice little mints, but price
y. These mints are awesome! Love these! And reusable containers A huge
hit at the office! Love \'em, they\'re great! Love these! fresh! bette
r than average, more expensive than average. Great For Fat Cats and Se
nior Citizens Best by the case More Hot/Spicy than McCormick\'s Brand
Ahmad Loose Imperial Blend Tea is great for the price Nice tea Best Ah
mad Tea My favorite tea Best tea ever! DELICIOUS Best Bloody Mary mixe
r The Best Love this tea! Really Nice Taste! High Quality... But it ga
ve my dog wicked gas.. Great tasting green tea and such a great deal.
OMG best chocolate jelly belly Excellent loose tea. Good anytime hot t
ea Wonderful! Best way to buy kcups delicious Super! SuperFoods are S
uper easy! Best Energy Shot For Me Great for Gluten-free lifestyle!! E
```

xcellent but not perfect Good product Thanks for the review Scott great Awesome Sugar! Great product - weak packaging Excellent! Excellent for G/F Amazing! Very tasty chips! Excellent Taste it's fabulous, but \*not\* from amazon! Not mild enough for me lol Great Natural Energy Great Energy The best energy shot out there, smooth and organic! Fantastic, natural energy Way better than Guayaki! Doesn't taste that good but provides you the energy Favorite energy shot and all natural too! natural energy boost Best energy shot I have ever tasted! The Best Good Stuff Great energy drink without artificial ingredients Flavor getting better, energy is great Fantastic! WOW Very Dissapointed Very Good Coffee Very Tasty Excellent coffee Hot! Hot and delicious ABSOLUTELY DELICIOUS! Great gag gift arrived FAST No broken creamers! Shipped great Better Packaging Perfect for work Yes, this is real excellent coffee!!! Does not taste very good Love, Love, Love These! great for eating whole foods, clean with veggie brush Absolutely LOVE IT!! Only good for ice Great for teething Wonderful idea-difficult to clean. I wasn't that impressed Love the Fresh Food Feeder!! Great Beans!!! Good stuff! excellent - exactly what I expected These are the Best! Love Love Love The product is great but the price is out of line Perfect! great taste Excellent Everyday Olive Oil Love Weavers, I am a fan. Treat yourself to the best coffee! Drinking it now, love the latin america "aroma" GREAT SNACK Best Bar My New Granola Bar Another Husband Favorite Very Smooth Coffee - Highly Recommended My favorite Good Coffee Greatest Oil since slice bread !!!!!!! Best Ever! Deliciously scrumptious This is really good stuff Porcini Mushrooms an excellent product Excellent flavor, mostly large pieces The Best Good for the money not the highest quality, but good for the price. Fresh - Whole.. perfect Fresh and Tasty Cat won't go near it! Simply Wild Chick & Brown Rice for Cats A Great All Around Mix Great mix Perfect mix for egg-allergic! Arrowhead Mills whole grain buttermilk Pancakes are easy! Good for Egg Allergy Great Healthy Snack Sweet and Soothing A Fantastic & Healthy Product Great product Excellent tea! best roast ever Franch's is the best VERY GOOD! Great taste and easy for a single guy! Look elsewhere for your whole grains These are Famous for a reason. Wow God, I love these cookies!!! Fresh, Lightly-Spiced, Crunchy Kettle Chips. Good Value, Good Product. glad to find them in 1 oz size pretty good, could be better Best chips ever Kettle potato chips: Sweet onion Ridiculously Good Delicious! I love these chips. They are thick and crunchy! Quite good Delicious WOW!!!! Best gluten-free dairy-free chips A unique flavor for fans of Thai food Honey Dijon leaves bad aftertaste, NY Cheddar are pretty good Very good. Excellent! A delicious, crisp chip with good flavor BEST BUY in BBQ Chips Love Them! Best deal ever! Excellent Thai-flavored chip Best Kettle Chips! Delicious as always! Not quite the best... One of Their Best Flavors Love these chips! Highly addictive chips These are AWESOME! By far my favorite chips Good chips, more cheese Pretty good tasting chip Best sour cream & onion chip I've had Great chips Fabulous! Great Chip! Excellent balance of taste, crunchiness, and moisture Very good chips at a great price. Great chips! Good and tangy the best chips ever I do not even like kettle chips and I love these You have to love sea salt and vinegar already amazing chips Best Chip Ever Tangy, spicy, and sweet- oh my! The best I've had Excellent chip! Delicious!! Love Kettle Chips Best unsalted chips Love Kettle Chips, but not this flavor! Crisp Delicious, what else did you expect? Great Value I have had better "Jalapeno Kettle Chips" Spicy but good boulder salt and malt vinegar chips are way better Lightly Salted, Heavily Delicious! Too Much Flavor Love at first bite! Tongue-puckering tang and crunch! The Best Chips...PERIOD! Delicious Extra Crunchy Best Salt & Vinegar!

Gourmet powerful Salt & Vinegar chips! Great deal Best Chips out there!!! Great price, but not as tangy as I expected. Absolutely, Positively Delicious completely ripped off C H I P.....C H I P.....H O O R A Y.....!!!!!! : ) ( B A C K Y A R D.....B A R B E C U E ) Not the Best THESE ARE VERY GOOD USED to be my favorite chips Not as good as the English sell Not so good. delicious Kettle Chips Make Great Mouse Food great (hot) new flavor.... Favorite Kettle flavor and a great value! Kettle Brand Potato Chips - New York Cheddar My favorite flavor So much flavor your farts will smell like sweet onions Great Chip! Awesome and delicious! Good chips YUM! If you want a snack, have something REALLY good! a good buy Good chips Awesome Great chips with very low sodium My favorite Kettle Chip Best salt & vinegar chips out there! Amazing Service Pretty tasty and decently spiced. . . . Great Tasting Chips Good deal but close expiration date! GREAT TASTING CHIPS Buy These, Eat These, Be Happy! Fantastic Sweet, salty, tangy: the way a snack should be Some of the best chips anywhere Delicious! Lightly salted, yet tasty Crunch. Wow! Great strong flavor Best Chips Out There! These chips tasted good awesome chips Delicious! Tangy and delicious snack Best Chip Best Chips I've Ever Tasted Love the smaller bags! Ok but Miss Vickie's Are Better These chips are awesome if not best but.... GREAT DEAL What a great tea at this price delicious Great well balanced Earl Grey Best Earl Grey ever favorite Earl Grey tea Delicious The best A HUGE Success Do not taste from bottle! Mix with vanilla for true flavor. The oldest soft drink is still the best! Caramel flavor, excellent for baking and toppings (tips for using agave, too) Great buy! excellent sweetener Good, but container could be better Great stuff! Healthy Sweetener Great way replacing the sugar Great substitute sweetener The Best Healthy Stuff Sweet success great product Best price on agave nectar that I've found How this could be good? Best tea I ever had Who needs salsa when chips taste this good? Delicious! Organic yummy chips what more can you ask for These are the best widely available bbq chips'

```
In [19]: import re
total_text=re.sub('[^a-zA-Z]', ' ',total_text)
```



```
In [20]: total_text
```

```
Out[20]: 'Good Quality Dog Food Great taffy Nice Taffy Great Just as good as  
the expensive brands Wonderful tasty taffy Healthy Dog Food The Bes  
t Hot Sauce in the World My cats LOVE this diet food better than th  
eir regular food My Cats Are Not Fans of the New Food fresh and greas  
y Love it GREAT SWEET CANDY Always fresh Delicious product Great  
Bargain for the Price The Best Hot Sauce in the World Great machine  
Best of the Instant Oatmeals Good Instant Great Irish oatmeal for tho  
se in a hurry satisfying Love Gluten Free Oatmeal GOOD WAY TO STA  
RT THE DAY Wife s favorite Breakfast Why wouldn t you buy oatmeal  
from Mcanns Tastes great Good Hot Breakfast Great taste and conveni  
ence good Very good but next time I won t order the Variety Pack HOT  
And good Came back for more Roasts up a smooth brew Our guests  
love it Awesome Deal Awsome Kids in neighborhood loved us great  
deal Better price for this at Target great source of electrolytes Gr  
eat for preventing cramps Taste is not so good How much would you pa  
y for a bag of chocolate pretzels Great Gummi Best ever latice tart  
nothing special Good Taste great this is the best Delicious Great Na  
tural Balance Lamb and Rice Great food Great for my dogs allergies G  
reat for stomach problems Better life for you dog Great Food Great  
food for my dog who has a sensitive stomach Great dog food Mmmmm
```

```
In [21]: ## remove extra spaces  
total_text=re.sub(' +',' ',total_text)
```

```
In [22]: total_text[0:10000]
```

```
Out[22]: 'Good Quality Dog Food Great taffy Nice Taffy Great Just as good as th
e expensive brands Wonderful tasty taffy Healthy Dog Food The Best Hot
Sauce in the World My cats LOVE this diet food better than their regul
ar food My Cats Are Not Fans of the New Food fresh and greasy Love it
GREAT SWEET CANDY Always fresh Delicious product Great Bargain for the
Price The Best Hot Sauce in the World Great machine Best of the Instan
t Oatmeals Good Instant Great Irish oatmeal for those in a hurry satis
fying Love Gluten Free Oatmeal GOOD WAY TO START THE DAY Wife s favori
te Breakfast Why wouldn t you buy oatmeal from Mcanns Tastes great Goo
d Hot Breakfast Great taste and convenience good Very good but next ti
me I won t order the Variety Pack HOT And good Came back for more Roas
ts up a smooth brew Our guests love it Awesome Deal Awsome Kids in nei
ghborhood loved us great deal Better price for this at Target great so
urce of electrolytes Great for preventing cramps Taste is not so good
How much would you pay for a bag of chocolate pretzels Great Gummi Bes
t ever lattice tart nothing special Good Taste great this is the best D
elicious Great Natural Balance Lamb and Rice Great food Great for my d
ogs allergies Great for stomach problems Better life for you dog Great
Food Great food for my my dog who has a sensitive stomach Great dog fo
od Mmmmm Mmmmm good Great Dog Food Good healthy dog food Great dog foo
d Great allergy sensitive dog food dogs love it Perfect for our Englis
h Bulldog with Allergies Taste wise it is a star item Great Support Lo
ved these Tartlets The best My Idea of a Good Diet Food Delicious tea
the best tea ever freah bright clean Wonderful Tea Great cookies Best
everyday cookie So Far So Good Best Cat Food Great food Perfect Cat Fo
od For Older Cats Good for Feline UTI Palatable and healthy Healthy Th
ey LOVE It Wonderful food perfect for allergic kitties Tastes great Lo
ve Hot Spicy Bad price here My favorite ramen Amazing to the last bite
Great spicy flavor Great value and convenient ramen great flavor Taste
s great but is cheaper locally Tastes awesome looks beautiful Happy Fa
ce Simply the BEST Excellent Product Life Saver Nice snack Good Licori
ce I love these Great for the kids Sweet with a nice kick Love the sal
sa awesome cornmeal GREAT marinade Awesome stuff tastes good Great fla
vor of Jell o Great Deal Great tasting sea salt WITH iodine tastes ver
y fresh Simple but good Not the greatest tasting Not Bad Right size ta
ste This stuff is soooooo good Best Stuff Ever Worked great Delicious F
luffy Soft Delicious and Sugary Sweet Great but not as good as it was
back in the day as a teen EXCELLENT LEMON JUICE Great Product Handy Ne
ver paid that much Great product to help you sleep Perfect for gluten
free chocolate chip cookies Make a fresh fruit tart light and beautifu
l not bad for instant healthy coffee It s ok I love it great taste and
has health benefits Tastes Great Arrived in days Great for after lunch
Nice little mints but pricey These mints are awesome Love these And re
usable containers A huge hit at the office Love em they re great Love
these fresh better than average more expensive than average Great For
Fat Cats and Senior Citizens Best by the case More Hot Spicy than McCo
rmick s Brand Ahmad Loose Imperial Blend Tea is great for the price Ni
ce tea Best Ahmad Tea My favorite tea Best tea ever DELICIOUS Best Blo
ody Mary mixer The Best Love this tea Really Nice Taste High Quality B
ut it gave my dog wicked gas Great tasting green tea and such a great
deal OMG best chocolate jelly belly Excellent loose tea Good anytime h
ot tea Wonderful Best way to buy kcups delicious Super SuperFoods are
Super easy Best Energy Shot For Me Great for Gluten free lifestyle Exc
ellent but not perfect Good product Thanks for the review Scott great
Awesome Sugar Great product weak packaging Excellent Excellent for G F
```

Amazing Very tasty chips Excellent Taste it s fabulous but not from amazon Not mild enough for me lol Great Natural Energy Great Energy The best energy shot out there smooth and organic Fantastic natural energy Way better than Guayaki Doesn t taste that good but provides you the energy Favorite energy shot and all natural too natural energy boost Best energy shot I have ever tasted The Best Good Stuff Great energy drink without artificial ingredients Flavor getting better energy is great Fantastic WOW Very Dissapointed Very Good Coffee Very Tasty Excellent coffee Hot Hot and delicious ABSOLUTELY DELICIOUS Great gag gift arrived FAST No broken creamers Shipped great Better Packaging Perfect for work Yes this is real excellent coffee Does not taste very good Love Love Love These great for eating whole foods clean with veggie brush Absolutely LOVE IT Only good for ice Great for teething Wonderful idea difficult to clean I wasn t that impressed Love the Fresh Food Feeder Great Beans Good stuff excellent exactly what I expected These are the Best Love Love Love The product is great but the price is out of line Perfect great taste Excellent Everyday Olive Oil Love Weavers I am a fan Treat yourself to the best coffee Drinking it now love the latin america aroma GREAT SNACK Best Bar My New Granola Bar Another Husband Favorite Very Smooth Coffee Highly Recommended My favorite Good Coffee Greatest Oil since slice bread Best Ever Deliciously scrumptious This is really good stuff Porcini Mushrooms an excellent product Excellent flavor mostly large pieces The Best Good for the money not the highest quality but good for the price Fresh Whole perfect Fresh and Tasty Cat won t go near it Simply Wild Chick Brown Rice for Cats A Great All Around Mix Great mix Perfect mix for egg allergic Arrowhead Mills whole grain buttermilk Pancakes are easy Good for Egg Allergy Great Healthy Snack Sweet and Soothing A Fantastic Healthy Product Great product Excellent tea best roast ever Franch s is the best VERY GOOD Great taste and easy for a single guy Look elsewhere for your whole grains These are Famous for a reason Wow God I love these cookies Fresh Lightly Spiced Crunchy Kettle Chips Good Value Good Product glad to find them in oz size pretty good could be better Best chips ever Kettle potato chips Sweet onion Ridiculously Good Delicious I love these chips They are thick and crunchy Quite good Delicious WOW Best gluten free dairy free chips A unique flavor for fans of Thai food Honey Dijon leaves bad after taste NY Cheddar are pretty good Very good Excellent A delicious crisp chip with good flavor BEST BUY in BBQ Chips Love Them Best deal ever Excellent Thai flavored chip Best Kettle Chips Delicious as always Not quite the best One of Their Best Flavors Love these chips Highly addictive chips These are AWESOME By far my favorite chips Good chips more cheese Pretty good tasting chip Best sour cream onion chip I ve had Great chips Fabulous Great Chip Excellent balance of taste crunchiness and moisture Very good chips at a great price Great chips Good and tangy the best chips ever I do not even like kettle chips and I love these You have to love sea salt and vinegar already amazing chips Best Chip Ever Tangy spicy and sweet oh my The best I ve had Excellent chip Delicious Love Kettle Chips Best unsalted chips Love Kettle Chips but not this flavor Crisp Delicious what else did you expect Great Value I have had better Jalapeno Kettle Chips Spicy but good boulder salt and malt vinegar chips are way better Lightly Salted Heavily Delicious Too Much Flavor Love at first bite Tongue puckering tang and crunch The Best Chips PERIOD Delicious Extra Crunchy Best Salt Vinegar Gourmet powerful Salt Vinegar chips Great deal Best Chips out there Great price but not as tangy as I expected Absotively Posilutely Delicious completely ripped off C H I P C H I P H O O R A Y B A C K Y A R D B A R B E C U E Not the Best THESE ARE VERY GOOD USED to be my favorite chips Not as g

ood as the English sell Not so good delicious Kettle Chips Make Great Mouse Food great hot new flavor Favorite Kettle flavor and a great value Kettle Brand Potato Chips New York Cheddar My favorite flavor So much flavor your farts will smell like sweet onions Great Chip Awesome and delicious Good chips YUM If you want a snack have something REALLY good a good buy Good chips Awesome Great chips with very low sodium My favorite Kettle Chip Best salt vinegar chips out there Amazing Service Pretty tasty and decently spiced Great Tasting Chips Good deal but close expiration date GREAT TASTING CHIPS Buy These Eat These Be Happy Fantastic Sweet salty tangy the way a snack should be Some of the best chips anywhere Delicious Lightly salted yet tasty Crunch Wow Great strong flavor Best Chips Out There These chips tasted good awesome chips Delicious Tangy and delicious snack Best Chip Best Chips I've Ever Tasted Love the smaller bags Ok but Miss Vickie's Are Better These chips are awesome if not best but GREAT DEAL What a great tea at this price delicious Great well balanced Earl Grey Best Earl Grey ever favorite Earl Grey tea Delicious The best A HUGE Success Do not taste from bottle Mix with vanilla for true flavor The oldest soft drink is still the best Caramel flavor excellent for baking and toppings tips for using agave too Great buy excellent sweetener Good but container could be better Great stuff Healthy Sweetener Great way replacing the sugar Great substitute sweetener The Best Healthy Stuff Sweet success great product Best price on agave nectar that I've found How this could be good Best tea I ever had Who needs salsa when chips taste this good Delicious Organic yummy chips what more can you ask for These are the best widely available bbq chips My favorite chips from Kettle Amazing Taste Best Chip Ever Plocky's Sweet Smokey Chipotle Whole Grain Tortilla The best tortilla chips I have ever eaten Such an excellent chip Great Huge fan of these chips Plocky's tortilla chips tasty and healthy Tasty but make sure you have gum delicious and healthy Unique schrumshist and tasty Tortilla Chips Best kept secret Delicious'

In [23]: `len(total_text)`

Out[23]: 8155137



```
In [26]: data_negative.head()
```

```
Out[26]:
```

	Id	ProductId	UserId	ProfileName	HelpfulnessNumerator	HelpfulnessDenor
16	17	B001GVISJM	A3KLWF6WQ5BNYO	Erica Neathery	0	
26	27	B001GVISJM	A3RXAU2N8KV45G	lady21	0	
57	58	B004N5KULM	ASCNNAJU6SXF8	S. Beck	1	
61	62	B004N5KULM	A7ZK2A3VIW7X9	Peggy	0	
62	63	B001EO5TPM	A1E09XGZUR78C6	gary sturrock	2	

```
In [27]: total_negative= (' '.join(data_negative['Summary']))
```

In [28]: `total_negative`

ppointed: Perhaps something was wrong with the batch... \$4 down the u  
rain Big Disappointment Worst Frosting Ever worst frosting ever City  
Steam, not much steam in this brew. great coffee - terrible price Hor  
rible .. dont buy it Not one but twice came broken. disappointment is  
this serious??? 10 bucks?? Even at \$15 seems a little overpriced. Cho  
colate - How can you go wrong? Odd Fake Flavor - Not Recommended Not  
like other countries Cadbury Mediocre, but cheap You can't go wrong  
Yummy, but small... Be Very Berry Wary. Too thin the garbanzo beans i  
n it give horrible gas hard to find tea The most awful taste Not Hot  
Not hot, not habanero Not good Hard to find cereal found! Cereal is g  
reat. Price is awful. Delicate Asian salad dressing... Not exactly a  
s described Crumbled cookies are no fun to eat Impossible to Find! aw  
ful awful Unbelievable deal on a hard to find product! No more stale  
chips. Cheap! Ketchup powdery coating excessive, overdone gritty PLEA  
SE!!!!!!Don't waste your money Hard to please kitty LOVES it Non Alco  
holic.. bland Arrived broken and isn't eligible for return? Items in  
this Gift Basket were bad -- old and stale Dried UP Mostly dry Like t  
o gamble? Buying the St. Patty's Dried Fruit Basket is a Crap-Shoot  
Vendor ripped off all of their cultures from other vendors Not nearly  
as good as Bissinger's French Long False Advertising Not what I expe

In [29]: `import re`

`total_negative=re.sub('[^a-zA-Z]', ' ',total_negative)`

In [30]: `len(total_negative)`

Out[30]: 1438541

In [31]: `total_negative`

Out[31]: 'poor taste Nasty No flavor How can you go wrong pretty expensive st  
ale product Bigger then other brands Order only in cold weather Bad  
disappointing My every day green tea BROKEN BOTTLE BOTTOMS Tasteless  
but low calorie Marley s Mellow Mood Lite Half Tea Half Lemonade Ne  
arly killed the cats CHANGED FORMULA MAKES CATS SICK Not a real t  
ea McClures bloody Mary mix Not Good Eukanuba puppy small breed dog f  
ood My everyday cup of Tea Disappointed Sad outcome Don t Waste Your  
Money Disappointed sugar in the raw Good product but terrible agricu  
ltural practices Sugar in the raw Sugar in the raw too expensive Not  
sure So awful I can barely describe AWFUL Bitter A saving grace for G  
reen Mountain Coffee Fantastic Chicken Noodle soup Heinz no more  
Disappointing Waste of money Ham Base MSG Ham Base Love the product d  
isappointed in the shipping poor item packaging Awful disappointing  
Hard a slight taste of jalapeno Heavy on the Vinegar These chips make  
me weak at the knees Not bad but a little hard to get used to Firm qu  
ality chip Not Very Creamy or Chivey Prefer other flavors Maybe t  
he worst chips ever They changed the Chips now they taste horrible G  
aaak An extreme potato chip Gone down hill STALE Beware buy  
ing these on special Stale Rancid Oil Taste And if You Like Even t  
he Tiniest Bit of Salt Flavor on Your Chips Disappointing Taste toward

In [32]: `total_negative=re.sub(' +', ' ',total_negative)`







```
In [37]: df.head()
```

Out[37]:

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

```
In [38]: raw=df.groupby(['UserId']).agg({'Summary':'count', 'Text':'count','Score':
raw
```

Out[38]:

	Summary	Text	Score	ProductId
UserId				
A3OXHLG6DIBRW8	448	448	4.535714	448
A1YUL9PCJR3JTY	421	421	4.494062	421
AY12DBB0U420B	389	389	4.647815	389
A281NPSIMI1C2R	365	365	4.841096	365
A1Z54EM24Y40LL	256	256	4.453125	256
...	...	...	...	...
A2HROKQO0GA5AF	1	1	3.000000	1
A2HROR28DMJV2W	1	1	5.000000	1
A2HRR8CO2Y20G8	1	1	5.000000	1
A2HRSML93IK9TR	1	1	5.000000	1
AZZZOVIBXHGDR	1	1	2.000000	1

256059 rows × 4 columns

```
In [39]: raw.columns=['Number_of_summaries','num_text','Avg_score','Number_of_products_purchased']
raw
```

Out[39]:

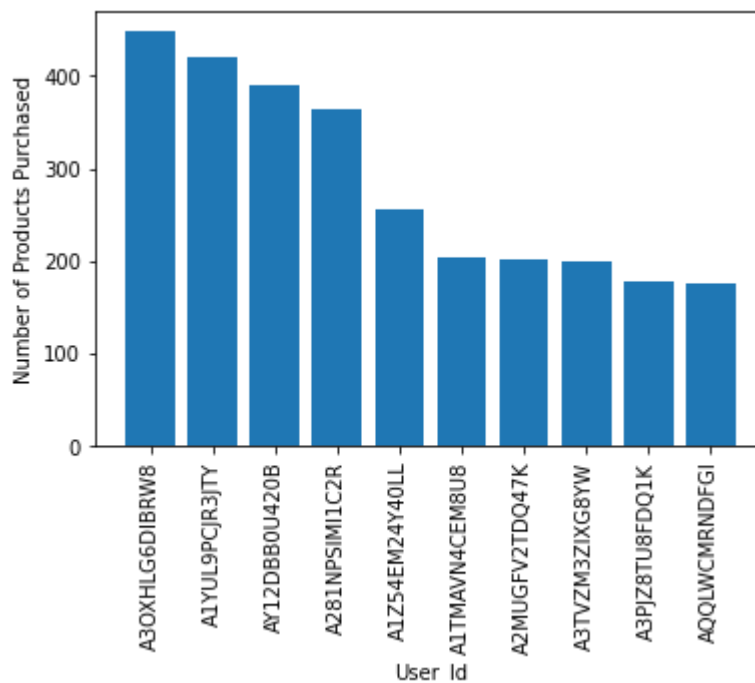
	Number_of_summaries	num_text	Avg_score	Number_of_products_purchased
UserId				
A3OXHLG6DIBRW8	448	448	4.535714	44
A1YUL9PCJR3JTY	421	421	4.494062	42
AY12DBB0U420B	389	389	4.647815	38
A281NPSIMI1C2R	365	365	4.841096	36
A1Z54EM24Y40LL	256	256	4.453125	25
...	...	...	...	.
A2HROKQO0GA5AF	1	1	3.000000	
A2HROR28DMJV2W	1	1	5.000000	
A2HRR8CO2Y20G8	1	1	5.000000	
A2HRSML93IK9TR	1	1	5.000000	
AZZZOVIBXHGDR	1	1	2.000000	

256059 rows × 4 columns

```
In [40]: user_10=raw.index[0:10]
number_10=raw['Number_of_products_purchased'][0:10]

plt.bar(user_10, number_10, label='java developer')
plt.xlabel('User_Id')
plt.ylabel('Number of Products Purchased')
plt.xticks(rotation='vertical')
```

```
Out[40]: ([0, 1, 2, 3, 4, 5, 6, 7, 8, 9],
 [Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, ''),
  Text(0, 0, '' )])
```



**These are the Top 10 Users so we can recommend more & more Products to these User Id as there will be a high probability that these person are going to be buy more**

**as data is so huge,so if your system takes a lot for the execution , u can considered some sample of data from entire data,**

as may be some of you have not that much good specifications in terms of processor ,RAM & HARD Disk..  
 so according to system specifications,u can considered some sample of data,if u have not issue with your specifications, u can go ahead with this bulky data

In [41]: `df.head()`

Out[41]:

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

In [42]: `## picking a random sample  
final=df.sample(n=2000)`

In [43]: `final=df[0:2000]`

check missing values in dataset

```
In [44]: final.isna().sum()
```

```
Out[44]: Id                0
ProductId                0
UserId                  0
ProfileName              0
HelpfulnessNumerator     0
HelpfulnessDenominator   0
Score                   0
Time                    0
Summary                  0
Text                     0
dtype: int64
```

### Removing the Duplicates if any

```
In [45]: final.duplicated().sum()
```

```
Out[45]: 0
```

**Analyse Length of Comments whether Customers are going to give Lengthy comments or short one**

```
In [46]: final.head()
```

Out[46]:

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

```
In [47]: final['Text'][0].split(' ')
```

```
Out[47]: ['I',  
          'have',  
          'bought',  
          'several',  
          'of',  
          'the',  
          'Vitality',  
          'canned',  
          'dog',  
          'food',  
          'products',  
          'and',  
          'have',  
          'found',  
          'them',  
          'all',  
          'to',  
          'be',  
          'of',  
          'good',  
          'quality.',  
          'The',  
          'product',  
          'looks',  
          'more',  
          'like',  
          'a',  
          'stew',  
          'than',  
          'a',  
          'processed',  
          'meat',  
          'and',  
          'it',  
          'smells',  
          'better.',  
          'My',  
          'Labrador',  
          'is',  
          'finicky',  
          'and',  
          'she',  
          'appreciates',  
          'this',  
          'product',  
          'better',  
          'than',  
          '',  
          'most.']
```

```
In [48]: len(final['Text'][0].split(' '))
```

```
Out[48]: 49
```



```
In [49]: final['Text'][0]
```

```
Out[49]: 'I have bought several of the Vitality canned dog food products and have found them all to be of good quality. The product looks more like a stew than a processed meat and it smells better. My Labrador is finicky and she appreciates this product better than most.'
```

```
In [50]: def calc_len(text):  
         return(len(text.split(' ')))
```

```
In [51]: final['text_length']=final['Text'].apply(calc_len)
```

```
/snap/jupyter/6/lib/python3.7/site-packages/ipykernel_launcher.py:1: SettingWithCopyWarning:
```

```
A value is trying to be set on a copy of a slice from a DataFrame.  
Try using .loc[row_indexer,col_indexer] = value instead
```

```
See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy  
(https://pandas.pydata.org/pandas-docs/stable/user\_guide/indexing.html#returning-a-view-versus-a-copy)
```

```
"""Entry point for launching an IPython kernel.
```

```
In [52]: pip install plotly
```

```
Requirement already satisfied: plotly in ./snap/jupyter/common/lib/python3.7/site-packages (4.14.3)
```

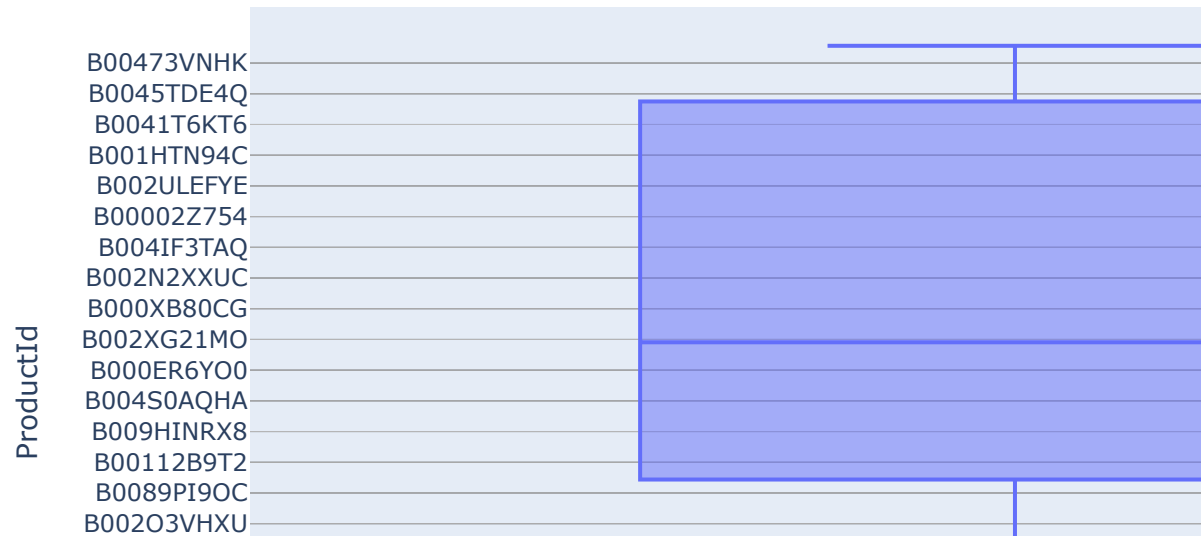
```
Requirement already satisfied: retrying>=1.3.3 in ./snap/jupyter/common/lib/python3.7/site-packages (from plotly) (1.3.3)
```

```
Requirement already satisfied: six in /snap/jupyter/6/lib/python3.7/site-packages (from plotly) (1.12.0)
```

```
Note: you may need to restart the kernel to use updated packages.
```

## box plot to show customer feedback

```
In [53]: import plotly.express as px
px.box(final, y="ProductId")
```



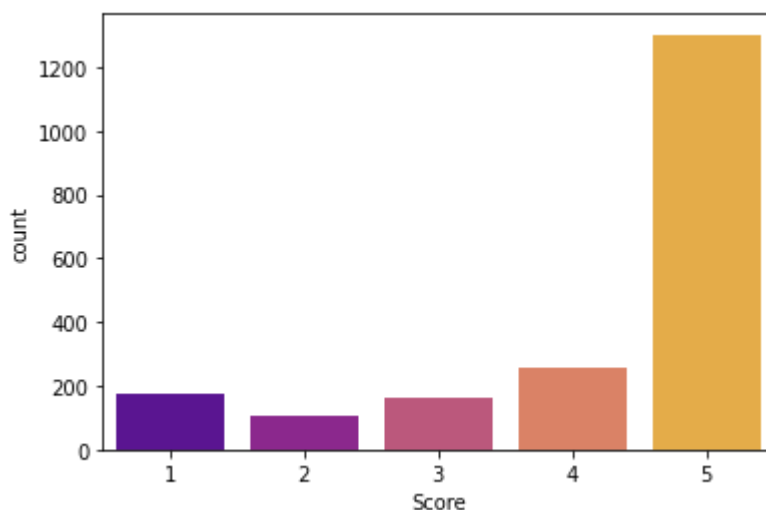
Analyze Score

```
In [54]: sns.countplot(final['Score'],palette='plasma')
```

/home/islam/snap/jupyter/common/lib/python3.7/site-packages/seaborn/\_decorators.py:43: FutureWarning:

Pass the following variable as a keyword arg: x. From version 0.12, the only valid positional argument will be `data`, and passing other arguments without an explicit keyword will result in an error or misinterpretation.

```
Out[54]: <AxesSubplot:xlabel='Score', ylabel='count'>
```



```
In [ ]:
```

**analyse behaviour of customer**

```
In [55]: final.head()
```

Out[55]:

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

```
In [56]: final['Text']=final['Text'].str.lower()
```

```
/snap/jupyter/6/lib/python3.7/site-packages/ipykernel_launcher.py:1: SettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame.  
Try using `.loc[row_indexer,col_indexer] = value` instead

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)  
([https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy))

```
In [57]: final['Text']
```

```
Out[57]: 0      i have bought several of the vitality canned d...
1      product arrived labeled as jumbo salted peanut...
2      this is a confection that has been around a fe...
3      if you are looking for the secret ingredient i...
4      great taffy at a great price.  there was a wid...

      ...
1995   i have to laugh at the reviews that said it wa...
1996   i had read some favorable reviews of this panc...
1997   i was expecting great things based on the revi...
1998   i love this pancake mix.  i bought my first ca...
1999   what can i say??  they are wonderful, and the ...
Name: Text, Length: 2000, dtype: object
```

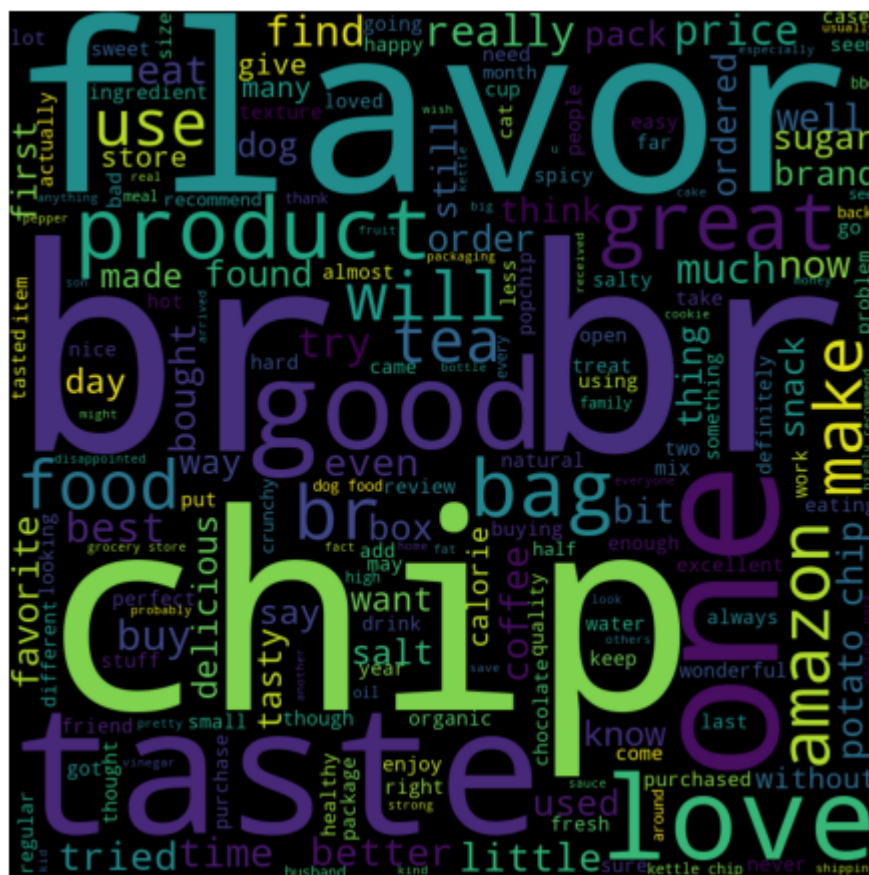
```
In [58]: from wordcloud import WordCloud, STOPWORDS
```

```
In [59]: comment_words=' '.join(final['Text'])
```

```
In [60]: stopwords = set(STOPWORDS)
```

```
In [61]: wordcloud=WordCloud(width=800 ,height=800 ,stopwords=stopwords).generate(
plt.figure(figsize = (8, 8))
plt.imshow(wordcloud)
plt.axis("off")
```

```
Out[61]: (-0.5, 799.5, 799.5, -0.5)
```



```
In [62]: final['Text'][34].replace('br', '')
```

```
Out[62]: "instant oatmeal can become soggy the minute the water hits the bowl.
mccann's instant oatmeal holds its texture, has excellent flavor, and
is good for you all at the same time. mccann's regular oat meal is exc
ellent, too, but may take a bit longer to prepare than most have time
for in the morning. this is the best instant and i've ever eaten, and
a very close second to the non-instant variety.< />< />mccann's instan
t irish oatmeal, variety pack of regular, apples & cinnamon, and maple
& own sugar, 10-count boxes (pack of 6)"
```

```
In [63]: for i in range(len(final['Text'])):
         final['Text'][i]=final['Text'][i].replace('br', '')
```

```
/snap/jupyter/6/lib/python3.7/site-packages/ipykernel_launcher.py:2: S
ettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)  
([https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy))

```
/snap/jupyter/6/lib/python3.7/site-packages/IPython/core/interactivesh
ell.py:3296: SettingWithCopyWarning:
```

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)  
([https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy))

```
In [64]: comment_words=' '.join(final['Text'])
```

```
In [65]: stopwords = set(STOPWORDS)
```

```
Out[66]: (-0.5, 799.5, 799.5, -0.5)
```





