

```

-----import important libraries-----
import pandas as pd
import numpy as np
import string
import spacy
from nltk.tokenize import word_tokenize
from nltk.corpus import stopwords
from nltk.stem import PorterStemmer
from sklearn.feature_extraction.text import CountVectorizer,TfidfVectorizer
import wordcloud
import matplotlib.pyplot as plt
from wordcloud import WordCloud,STOPWORDS
import seaborn as sns

```

```

-----read dataset-----
reviews = pd.read_csv('Downloads/extract_reviews.csv')
reviews

```

	stars	comment
0	1.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n I am total...
1	1.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Worst serv...
2	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n I am writi...
3	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Good one. ...
4	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n The best w...
...
1195	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Nice to re...
1196	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Very good ...
1197	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Awesome..\...
1198	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n excellent\...
1199	5.0 out of 5 stars	\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n\n Excellent ...

200 rows × 2 columns

```

reviews = [comment.strip() for comment in reviews.comment]
reviews = [comment for comment in reviews if comment]
reviews

```

['I am totally disappointed with the product. There was no call from the bosch for installation & Demo and parts were broken while transit & bosch technician claim for replacement of parts but there was no call from bosch regarding replacement.',
 "Worst service ever I came across in the entire purchase history of Amazon. Bosch Hyd service center as well as technicians lie about dead lines multiple times. You wait for them wasting your time and the technicians don't pick up your phone for days. Product may be good but it's incomplete without service and support. That's why people prefer Samsung for everything for their swift and sophisticated service network.",
 "I am writing this review after nearly an year of use and I do have experience of using a Samsung FL which my parents have. After discount, I paid, 26,990 which I think was quite a bargain and also I got around 2.5k for my old machine. Delivery was as expected from Amazon, hassle free and on time. The installation happened the next day. Person from Bosch was quite courteous and helpful. Though he did try to sell his own stand, machine cover etc etc. Now the machine itself is quite a looker, nice design in brushed chrome. I did not go for stand as I am keeping it on a level surface and I don't need to move it around. The washes are as expected. The major pros:- You can set temperature for any wash mode and upto 90 degrees Celsius. It's a boon for my wife who has dust allergies- My water consumption has reduced by at least 15 - 20 percent- Very less quantity of detergent required, less than even half by what is prescribed by the detergent company- Can take real heavy loads which was never possible in my previous top load 1- Very easy to operate, you can stop the wash cycle to put in things you may have forgotten- I have not faced any issue whatsoever in the last 1 year- The tap filter is really helpful but should be cleaned periodically. There are negatives also:- Good amount of sound is there, it is not at all silent. During spin it creates quite a ruckus- I have heard Bosch service is costly and was told by the installer that the door gasket costs 3.5k + taxes- Installation consisted of a mandatory charge of ~300 for a part which I can't remember now. I think should have been covered within the cost of the machine. This is a fantastic piece of technology and it works in making my life much easier and comfortable. Would highly recommend",
 "Good one. Really loved a new member in my family. Super cool and smooth, Best part of this product is there is no noise... amazing bosch. Very easy to use. I loved the structure color and design... Just wow... Really worth product... Its been a month I'm using it.. Thank you bosch and amazon",
 "The best washing machine seen/used till date. Very little noise, no vibrations (don't use a stand), and excellent wash quality. Also very little consumption of water.",
 "If I review only the product, I would say it's awesome. Such easy to use and no noise. Washing of clothes is Good. However if you purchase, please contact Bosch directly for installation, they did ours within same working day. But please don't wait for free installation by Amazon Home services. Amazon had sent one guy for installation, who knew nothing about the machine. Neither did he come in our chosen time slot, nor he picked up our calls. Finally after follow up with Amazon when he reached, he washed our 2 hours and could not even give us demo, let alone installation. Everytime we followed up with Amazon Home services, we were told person will come for installation within next 48 hours, needless to mention no body turned up till now (3 week after purchase). Response of Amazon Home services have been pathetic, also they are not bothered to reply on social media too. So, if you decide to purchase

```
reviews_text = ".join('reviews')
```

```
reviews_text
```

'I am totally disappointed with the product. There was no call from the Bosch for installation & Demo and parts were broken while transit & Bosch technician claim for replacement of parts but there was no call from Bosch regarding replacement. Worst service ever I came across in the entire purchase history of Amazon. Bosch Hyd service center as well as technicians lie about dead lines multiple times. You wait for them wasting your time and the technicians don't pick up your phone for days. Product may be good but it's incomplete without service and support. That's why people prefer Samsung for everything for their swift and sophisticated service network. I am writing this review after nearly an year of use and I do have experience of using a Samsung FL which my parents have. After discount, I paid, 26,990 which I think was quite a bargain and also I got around 2.5k for my old machine. Delivery was as expected from Amazon, hassle free and on time. The installation happened the next day. Person from Bosch was quite courteous and helpful. Though he did try to sell his own stand, machine cover etc etc. Now the machine itself is quite a looker, nice design in brushed chrome. I did not go for stand as I am keeping it on a level surface and I don't need to move it around. The washes are as expected. The major pros:- You can set temperature for any wash mode and upto 90 degrees Celsius. Its a boon for my wife who has dust allergies- My water consumption has reduced by at least 15 - 20 percent- Very less quantity of detergent required, less than even half by what is prescribed by the detergent company- Can take real heavy loads which was never possible in my previous top load 1- Very easy to operate, you can stop the wash cycle to put in things you may have forgotten- I have not faced any issue whatsoever in the last 1 year- The tap filter is really helpful but should be cleaned periodically There are negatives also:- Good amount of sound is there, it is not at all silent. During spin it creates quite a ruckus- I have heard Bosch service is costly and was told by the installer that the door gasket costs 3.5k + taxes- Installation consisted of a mandatory charge of ~300 for a part which I can't remember now. I think should have been covered within the cost of the machine This is a fantastic piece of technology and it works in making my life much easier and comfortable. Would highly recommend Good one. Really loved a new member in my family. Super cool and smooth, Best part of this product is there is no noise... amazing Bosch. Very easy to use. I loved the structure color and design... Just wow... Really worth product... Its been a month I'm using it.. Thank you Bosch and Amazon The best washing machine seen/used till date. Very little noise, no vibrations (don't use a stand), and excellent wash quality. Also very little consumption of water. If I review only the product, I would say it's awesome. Such each to use and no noise. Washing of clothes is Good. However if you purchase, please contact Bosch directly for installation, they did ours within same working day. But please don't wait for free installation by Amazon Home services. Amazon had sent one guy for installation, who knew nothing about the machine. Neither did he come in our chosen time slot, nor he picked up our calls. Finally after follow up with Amazon when he reached, he washed our 2 hours and could not even give us demo, let alone installation. Everytime we followed up with Amazon Home services, we were told person will come for installation within next 48 hours, needless to mention no body turned up till now (3 week after purchase). Response of Amazon Home services have been pathetic, also they are not bothered to reply on social media too. So, if you decide to purchase this is amazing machine, please don't rely on Amazon, call Bosch customer service and they will do it right away. It's been 9 months since I bought this WM and I am genuinely very happy. I moved from a Samsung Top load to this Bosch Front load and it is definitely one of the best decisions we ever made. Thing s I love the most: 1. The quick 15/30 feature is just priceless. 2. You can customize Spinning speeds upto 1200RPM. 3. You can customize Temperature setting

```
nopunctext = reviews_text.translate(str.maketrans("",string.punctuation))
```

```
nopunctext
```

'I am totally disappointed with the product. There was no call from the Bosch for installation & Demo and parts were broken while transit & Bosch technician claim for replacement of parts but there was no call from Bosch regarding replacement. Worst service ever I came across in the entire purchase history of Amazon. Bosch Hyd service center as well as technicians lie about dead lines multiple times. You wait for them wasting your time and the technicians don't pick up your phone for days. Product may be good but it's incomplete without service and support. That's why people prefer Samsung for everything for their swift and sophisticated service network. I am writing this review after nearly an year of use and I do have experience of using a Samsung FL which my parents have. After discount, I paid, 26,990 which I think was quite a bargain and also I got around 2.5k for my old machine. Delivery was as expected from Amazon, hassle free and on time. The installation happened the next day. Person from Bosch was quite courteous and helpful. Though he did try to sell his own stand, machine cover etc etc. Now the machine itself is quite a looker, nice design in brushed chrome. I did not go for stand as I am keeping it on a level surface and I don't need to move it around. The washes are as expected. The major pros:- You can set temperature for any wash mode and upto 90 degrees Celsius. Its a boon for my wife who has dust allergies- My water consumption has reduced by at least 15 - 20 percent- Very less quantity of detergent required, less than even half by what is prescribed by the detergent company- Can take real heavy loads which was never possible in my previous top load 1- Very easy to operate, you can stop the wash cycle to put in things you may have forgotten- I have not faced any issue whatsoever in the last 1 year- The tap filter is really helpful but should be cleaned periodically There are negatives also:- Good amount of sound is there, it is not at all silent. During spin it creates quite a ruckus- I have heard Bosch service is costly and was told by the installer that the door gasket costs 3.5k + taxes- Installation consisted of a mandatory charge of ~300 for a part which I can't remember now. I think should have been covered within the cost of the machine This is a fantastic piece of technology and it works in making my life much easier and comfortable. Would highly recommend Good one. Really loved a new member in my family. Super cool and smooth, Best part of this product is there is no noise... amazing Bosch. Very easy to use. I loved the structure color and design... Just wow... Really worth product... Its been a month I'm using it.. Thank you Bosch and Amazon The best washing machine seen/used till date. Very little noise, no vibrations (don't use a stand), and excellent wash quality. Also very little consumption of water. If I review only the product, I would say it's awesome. Such each to use and no noise. Washing of clothes is Good. However if you purchase, please contact Bosch directly for installation, they did ours within same working day. But please don't wait for free installation by Amazon Home services. Amazon had sent one guy for installation, who knew nothing about the machine. Neither did he come in our chosen time slot, nor he picked up our calls. Finally after follow up with Amazon when he reached, he washed our 2 hours and could not even give us demo, let alone installation. Everytime we followed up with Amazon Home services, we were told person will come for installation within next 48 hours, needless to mention no body turned up till now (3 week after purchase). Response of Amazon Home services have been pathetic, also they are not bothered to reply on social media too. So, if you decide to purchase this is amazing machine, please don't rely on Amazon, call Bosch customer service and they will do it right away. It's been 9 months since I bought this WM and I am genuinely very happy. I moved from a Samsung Top load to this Bosch Front load and it is definitely one of the best decisions we ever made. Thing s I love the most: 1. The quick 15/30 feature is just priceless. 2. You can customize Spinning speeds upto 1200RPM. 3. You can customize Temperature setting

```
texttokens = word_tokenize(nopunctext)
```

```
print(texttokens[0:50])
```

```
['I', 'am', 'totally', 'disappointed', 'with', 'the', 'product', 'There', 'was', 'no', 'call', 'from', 'the', 'Bosch', 'for', 'installation', 'Demo', 'and', 'parts', 'were', 'broken', 'while', 'transit', 'Bosch', 'technician', 'claim', 'for', 'replacement', 'of', 'parts', 'but', 'there', 'was', 'no', 'call', 'from', 'Bosch', 'regarding', 'replacement', 'Worst', 'service', 'ever', 'I', 'came', 'across', 'in', 'the', 'entire', 'purchase', 'history', 'of']
```

```
mystopwords = stopwords.words('english')
swlist = ['I','The','It','A']
mystopwords.extend(swlist)
nostoptokens = [word for word in texttokens if not word in mystopwords]
print(nostoptokens)
```

```
['totally', 'disappointed', 'productThere', 'call', 'bosch', 'installation', 'Demo', 'parts', 'broken', 'transit', 'bosch', 'technician', 'claim', 'replacem', 'parts', 'call', 'bosch', 'regarding', 'replacement', 'Worst', 'service', 'ever', 'came', 'across', 'entire', 'purchase', 'history', 'AmazonBo', 'sch', 'Hyd', 'service', 'center', 'well', 'technicians', 'lie', 'dead', 'lines', 'multiple', 'times', 'You', 'wait', 'wasting', 'time', 'technicians', 'dont', 'pick', 'phone', 'daysProduct', 'may', 'good', 'incomplete', 'without', 'service', 'support', 'Thats', 'people', 'prefer', 'Samsung', 'everythin', 'g', 'swift', 'sophisticated', 'service', 'network', 'writing', 'review', 'nearly', 'year', 'use', 'experience', 'using', 'Samsung', 'FL', 'parents', 'Af', 'ter', 'discount', 'paid', '26990', 'think', 'quite', 'bargain', 'also', 'got', 'around', '25k', 'old', 'machineDelivery', 'expected', 'Amazon', 'hassl', 'e', 'free', 'time', 'installation', 'happened', 'next', 'day', 'Person', 'Bosch', 'quite', 'courteous', 'helpful', 'Though', 'try', 'sell', 'stand', 'ma', 'chine', 'cover', 'etc', 'etcNow', 'machine', 'quite', 'looker', 'nice', 'design', 'brushed', 'chrome', 'go', 'stand', 'keeping', 'level', 'surface', 'do', 'nt', 'need', 'move', 'around', 'washes', 'expected', 'major', 'pros', 'You', 'set', 'temperature', 'wash', 'mode', 'upto', '90', 'degrees', 'Celsius', 'Its', 'boon', 'wife', 'dust', 'allergies', 'My', 'water', 'consumption', 'reduced', 'least', '15', '20', 'percent', 'Very', 'less', 'quantity', 'deterg', 'ent', 'required', 'less', 'even', 'half', 'prescribed', 'detergent', 'company', 'Can', 'take', 'real', 'heavy', 'loads', 'never', 'possible', 'previou', 's', 'top', 'load', '1', 'Very', 'easy', 'operate', 'stop', 'wash', 'cycle', 'put', 'things', 'may', 'forgotten', 'faced', 'issue', 'whatsoever', 'last', '1', 'year', 'tap', 'filter', 'really', 'helpful', 'cleaned', 'periodicallyThere', 'negatives', 'also', 'Good', 'amount', 'sound', 'silent', 'During', 'spin', 'creates', 'quite', 'ruckus', 'heard', 'Bosch', 'service', 'costly', 'told', 'installer', 'door', 'gasket', 'costs', '35k', 'taxes', 'Installati', 'on', 'consisted', 'mandatory', 'change', '300', 'part', 'cant', 'remember', 'think', 'covered', 'within', 'cost', 'machineThis', 'fantastic', 'piece', 'technology', 'works', 'making', 'life', 'much', 'easier', 'comfortable', 'Would', 'highly', 'recommend', 'Good', 'one', 'Really', 'loved', 'new', 'memb', 'er', 'family', 'Super', 'cool', 'smooth', 'Best', 'part', 'product', 'noiseamazing', 'bosch', 'Very', 'easy', 'use', 'loved', 'structure', 'color', 'des', 'ign', 'Just', 'wow', 'Really', 'worth', 'product', 'Its', 'month', 'Im', 'using', 'Thank', 'bosch', 'amazon', 'best', 'washing', 'machine', 'seenused', 'till', 'date', 'Very', 'little', 'noise', 'vibrations', 'dont', 'use', 'stand', 'excellent', 'wash', 'quality', 'Also', 'little', 'consumption', 'wate', 'r', 'If', 'review', 'product', 'would', 'say', 'awesome', 'Such', 'use', 'noise', 'Washing', 'clothes', 'GoodHowever', 'purchase', 'please', 'contact', 'Bosch', 'directly', 'installation', 'within', 'working', 'day', 'But', 'please', 'dont', 'wait', 'free', 'installation', 'Amazon', 'Home', 'services', 'Amazon', 'sent', 'one', 'guy', 'installation', 'knew', 'nothing', 'machine', 'Neither', 'come', 'chosen', 'time', 'slot', 'picked', 'calls', 'Finally', 'follow', 'Amazon', 'reached', 'washed', '2', 'hours', 'could', 'even', 'give', 'us', 'demo', 'let', 'alone', 'installation', 'Everytime', 'followed',
```

```
lowerwords = [comment.lower() for comment in nostoptokens]
print(lowerwords)
```

```
['totally', 'disappointed', 'productThere', 'call', 'bosch', 'installation', 'Demo', 'parts', 'broken', 'transit', 'bosch', 'technician', 'claim', 'replacem', 'parts', 'call', 'bosch', 'regarding', 'replacement', 'Worst', 'service', 'ever', 'came', 'across', 'entire', 'purchase', 'history', 'AmazonBo', 'sch', 'Hyd', 'service', 'center', 'well', 'technicians', 'lie', 'dead', 'lines', 'multiple', 'times', 'You', 'wait', 'wasting', 'time', 'technicians', 'dont', 'pick', 'phone', 'daysProduct', 'may', 'good', 'incomplete', 'without', 'service', 'support', 'Thats', 'people', 'prefer', 'Samsung', 'everythin', 'g', 'swift', 'sophisticated', 'service', 'network', 'writing', 'review', 'nearly', 'year', 'use', 'experience', 'using', 'Samsung', 'FL', 'parents', 'Af', 'ter', 'discount', 'paid', '26990', 'think', 'quite', 'bargain', 'also', 'got', 'around', '25k', 'old', 'machineDelivery', 'expected', 'Amazon', 'hassl', 'e', 'free', 'time', 'installation', 'happened', 'next', 'day', 'Person', 'Bosch', 'quite', 'courteous', 'helpful', 'Though', 'try', 'sell', 'stand', 'ma', 'chine', 'cover', 'etc', 'etcNow', 'machine', 'quite', 'looker', 'nice', 'design', 'brushed', 'chrome', 'go', 'stand', 'keeping', 'level', 'surface', 'do', 'nt', 'need', 'move', 'around', 'washes', 'expected', 'major', 'pros', 'You', 'set', 'temperature', 'wash', 'mode', 'upto', '90', 'degrees', 'Celsius', 'Its', 'boon', 'wife', 'dust', 'allergies', 'My', 'water', 'consumption', 'reduced', 'least', '15', '20', 'percent', 'Very', 'less', 'quantity', 'deterg', 'ent', 'required', 'less', 'even', 'half', 'prescribed', 'detergent', 'company', 'Can', 'take', 'real', 'heavy', 'loads', 'never', 'possible', 'previou', 's', 'top', 'load', '1', 'Very', 'easy', 'operate', 'stop', 'wash', 'cycle', 'put', 'things', 'may', 'forgotten', 'faced', 'issue', 'whatsoever', 'last', '1', 'year', 'tap', 'filter', 'really', 'helpful', 'cleaned', 'periodicallyThere', 'negatives', 'also', 'Good', 'amount', 'sound', 'silent', 'During', 'spin', 'creates', 'quite', 'ruckus', 'heard', 'Bosch', 'service', 'costly', 'told', 'installer', 'door', 'gasket', 'costs', '35k', 'taxes', 'Installati', 'on', 'consisted', 'mandatory', 'change', '300', 'part', 'cant', 'remember', 'think', 'covered', 'within', 'cost', 'machineThis', 'fantastic', 'piece', 'technology', 'works', 'making', 'life', 'much', 'easier', 'comfortable', 'Would', 'highly', 'recommend', 'Good', 'one', 'Really', 'loved', 'new', 'memb', 'er', 'family', 'Super', 'cool', 'smooth', 'Best', 'part', 'product', 'noiseamazing', 'bosch', 'Very', 'easy', 'use', 'loved', 'structure', 'color', 'des', 'ign', 'Just', 'wow', 'Really', 'worth', 'product', 'Its', 'month', 'Im', 'using', 'Thank', 'bosch', 'amazon', 'best', 'washing', 'machine', 'seenused', 'till', 'date', 'Very', 'little', 'noise', 'vibrations', 'dont', 'use', 'stand', 'excellent', 'wash', 'quality', 'Also', 'little', 'consumption', 'wate', 'r', 'If', 'review', 'product', 'would', 'say', 'awesome', 'Such', 'use', 'noise', 'Washing', 'clothes', 'GoodHowever', 'purchase', 'please', 'contact', 'Bosch', 'directly', 'installation', 'within', 'working', 'day', 'But', 'please', 'dont', 'wait', 'free', 'installation', 'Amazon', 'Home', 'services', 'Amazon', 'sent', 'one', 'guy', 'installation', 'knew', 'nothing', 'machine', 'Neither', 'come', 'chosen', 'time', 'slot', 'picked', 'calls', 'Finally', 'follow', 'Amazon', 'reached', 'washed', '2', 'hours', 'could', 'even', 'give', 'us', 'demo', 'let', 'alone', 'installation', 'Everytime', 'followed',
```

```
ps = PorterStemmer()
stemmedtokens = [ps.stem(word) for word in lowerwords]
print(stemmedtokens)
```

```
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```



```
nlp = spacy.load('en')
doc = nlp(" ".join(lowerwords))
print(doc)
```

ement worst service ever came across entire purchase history amazonbosch hyd service center well technicians lie dead lines multiple times you wait wast
ing time technicians dont pick phone daysproduct may good incomplete without service support thats people prefer samsung everything swift sophisticated
service network writing review nearly year use experience using samsung fl parents after discount paid 26990 think quite bargain also got around 25k old
machinedelivery expected amazon hassle free time installation happened next day person bosch quite courteous helpful though try sell stand machine cover
etc etcnw machine quite looker nice design brushed chrome go stand keeping level surface dont need move around washes expected major pros you set tempe
rature wash mode upto 90 degrees celsius its boon wife dust allergies my water consumption reduced least 15 20 percent very less quantity detergent requ
ired less even half prescribed detergent company can take real heavy loads never possible previous top load 1 very easy operate stop wash cycle put thin
gs may forgotten faced issue whatsoever last 1 year tap filter really helpful cleaned periodicallythere negatives also good amount sound silent during s
pin creates quite ruckus heard bosch service costly told installer door gasket costs 35k taxes installation consisted mandatory charge 300 part cant rem
ember think covered within cost machinethis fantastic piece technology works making life much easier comfortable would highly recommend good one really
loved new member family super cool smooth best part product noiseamazing bosch very easy use loved structure color design just wow really worth product
its month im using thank bosch amazon best washing machine seemused till date very little noise vibrations dont use stand excellent wash quality also li
ttle consumption water if review product would say awesome such use noise washing clothes goodhowever purchase please contact bosch directly installatio
n within working day but please dont wait free installation amazon home services amazon sent one guy installation knew nothing machine neither come chos
en time slot picked calls finally follow amazon reached washed 2 hours could even give us demo let alone installation everytime followed amazon home ser
vices told person come installation within next 48 hours needless mention body turned till 3 week purchase response amazon home services pathetic also b
othered reply social media toooo decide purchase amazing machine please dont rely amazon call bosch customer service right away its 9 months since bough
t vm genuinely happyi moved samsung top load bosch front load definitely one best decisions ever madethings love mostl quick 1530 feature priceless2 you
customize spinning speeds upto 1200rpm3 you customize temperature settings4 quality cleaning impeccable5 build quality top notch topbottomi highly recom
mend product anyone looking good washing machine blindly go received product time not home parents received delivery boy told father per policy unbox sh
ow machine damage cancel order father told ok unfortunately delivered machine without unboxing amazon made effort book installation person bosch came fo
llowing 3 days unboxed check 4 sides told us machine minor dent right bottom side updated us still cancel order ask replacement want ask minor dent invi
sible first look lower bottom fine check machine problem order replacement machine performed well daily wash program 40 minutes program didnt noticed is
sue machine time 2 weeks went check tub cleaning tap resetting start using following day machine went well wash time spin 1200 rpm machine start vibrati
ng usual hearing unusual noise tub contacted bosch issue not cancel reorder machine amazon 10 days replacement warranty period lost time bosch service e
ngineer visited home take picture videos running machine told faulty machine delivered since past 12 days followup bosch persons still giving update say
ing replacement wait dont know product delivered time proper package issue installationcalled many times bosch service center took 4 days install n demo
it doesnt produce noise n washes clothes clean using since two yearsworking wellinstallation machine problematic company skilled persons small towns cit
iesthey send persons hiring local personsbut machine quite good performance why boschvs ifb have owned ifb elena frontload washing machine nine years wa

```
lemmas = [token.lemmas_ for token in doc]
print(lemmas)
```

```
['totally', 'disappointed', 'productthere', 'call', 'bosch', 'installation', 'demo', 'part', 'break', 'transit', 'bosch', 'technician', 'claim', 'repla  
ement', 'part', 'call', 'bosch', 'regard', 'replacement', 'bad', 'service', 'ever', 'come', 'across', 'entire', 'purchase', 'history', 'amazonbosch', 'l  
yd', 'service', 'center', 'well', 'technician', 'lie', 'dead', 'line', 'multiple', 'time', '-PRON-', 'wait', 'waste', 'time', 'technician', 'do', 'not',  
'pick', 'phone', 'daysproduct', 'may', 'good', 'incomplete', 'without', 'service', 'support', 'that', 's', 'people', 'prefer', 'samsung', 'everything',  
'swift', 'sophisticated', 'service', 'network', 'writing', 'review', 'nearly', 'year', 'use', 'experience', 'use', 'samsung', 'fl', 'parent', 'after',  
'discount', 'pay', '26990', 'think', 'quite', 'bargain', 'also', 'get', 'around', '25k', 'old', 'machinedelivery', 'expect', 'amazon', 'hassle', 'free',  
'time', 'installation', 'happen', 'next', 'day', 'person', 'bosch', 'quite', 'courteous', 'helpful', 'though', 'try', 'sell', 'stand', 'machine', 'cove  
r', 'etc', 'etcnw', 'machine', 'quite', 'looker', 'nice', 'design', 'brush', 'chrome', 'go', 'stand', 'keep', 'level', 'surface', 'do', 'not', 'need',  
'move', 'around', 'wash', 'expect', 'major', 'pro', '-PRON-', 'set', 'temperature', 'wash', 'mode', 'upto', '90', 'degree', 'celsius', '-PRON-', 'boon',  
'wife', 'dust', 'allergy', '-PRON-', 'water', 'consumption', 'reduce', 'least', '15', '20', 'percent', 'very', 'less', 'quantity', 'detergent', 'requir  
e', 'less', 'even', 'half', 'prescribed', 'detergent', 'company', 'can', 'take', 'real', 'heavy', 'load', 'never', 'possible', 'previous', 'top', 'loa  
d', '1', 'very', 'easy', 'operate', 'stop', 'wash', 'cycle', 'put', 'thing', 'may', 'forgotten', 'faced', 'issue', 'whatsoever', 'last', '1', 'year', 'i  
ap', 'filter', 'really', 'helpful', 'clean', 'periodicallythere', 'negative', 'also', 'good', 'amount', 'sound', 'silent', 'during', 'spin', 'create',  
'quite', 'ruckus', 'hear', 'bosch', 'service', 'costly', 'tell', 'installer', 'door', 'gasket', 'cost', '35k', 'tax', 'installation', 'consist', 'manda  
ory', 'charge', '300', 'part', 'can', 'not', 'remember', 'think', 'cover', 'within', 'cost', 'machinethis', 'fantastic', 'piece', 'technology', 'work',  
'make', 'life', 'much', 'easier', 'comfortable', 'would', 'highly', 'recommend', 'good', 'one', 'really', 'love', 'new', 'member', 'family', 'super', 'i  
ool', 'smooth', 'good', 'part', 'product', 'noiseamaze', 'bosch', 'very', 'easy', 'use', 'love', 'structure', 'color', 'design', 'just', 'wow', 'reall  
y', 'worth', 'product', '-PRON-', 'month', '-PRON-', 'be', 'use', 'thank', 'bosch', 'use', 'amazon', 'good', 'washing', 'machine', 'seenuse', 'till', 'date',  
'very', 'little', 'noise', 'vibration', 'do', 'not', 'use', 'stand', 'excellent', 'wash', 'quality', 'also', 'little', 'consumption', 'water', 'if', 'n  
view', 'product', 'would', 'say', 'awesome', 'such', 'use', 'noise', 'wash', 'clothe', 'goodhowever', 'purchase', 'please', 'contact', 'bosch', 'direct  
y', 'installation', 'within', 'work', 'day', 'but', 'please', 'do', 'not', 'wait', 'free', 'installation', 'amazon', 'home', 'services', 'amazon', 'sen  
d', 'one', 'guy', 'installation', 'know', 'nothing', 'machine', 'neither', 'come', 'choose', 'time', 'slot', 'pick', 'call', 'finally', 'follow', 'amaz  
n', 'reach', 'wash', '2', 'hour', 'could', 'even', 'give', '-PRON-', 'demo', 'let', 'alone', 'installation', 'everytime', 'follow', 'amazon', 'home', 's  
ervice', 'tell', 'person', 'come', 'installation', 'within', 'next', '48', 'hour', 'needless', 'mention', 'body', 'turn', 'till', '3', 'week', 'purchas  
e', 'response', 'amazon', 'home', 'service', 'pathetic', 'also', 'bother', 'reply', 'social', 'medium', 'toooso', 'decide', 'purchase', 'amazing', 'mach  
ne', 'please', 'do', 'not', 'rely', 'amazon', 'call', 'bosch', 'customer', 'service', 'right', 'away', '-PRON-', '9', 'month', 'since', 'buy', 'wm', 'gu  
ninely', 'happyi', 'move', 'samsung', 'top', 'load', 'bosch', 'front', 'load', 'definitely', 'one', 'good', 'decision', 'ever', 'madething', 'love', 'i  
ostl', 'quick', '1530', 'feature', '-PRON-', 'customize', 'spinning', 'speed', 'upto', '1200rpm3', '-PRON-', 'customize', 'temperature',  
'settings4', 'quality', 'clean', 'impeccable5', 'build', 'quality', 'top', 'notch', 'topbottomi', 'highly', 'recommend', 'product', 'anyone', 'look', 'i
```

```
cleanreviews = " ".join(lemmas)
cleanreviews
```

"totally disappointed productthere call bosch installation demo part break transit bosch technician claim replacement part call bosch regard replacement
bad service ever come across entire purchase history amazonbosch hyd service center well technician lie dead line multiple time -PRON- wait waste time t
echnician do not pick phone daysproduct may good incomplete without service support that s people prefer samsung everything swift sophisticated service
network writing review nearly year use experience use samsung fl parent after discount pay 26990 think quite bargain also get around 25k old machinedell
very expect amazon hassle free time installation happen next day person bosch quite courteous helpful though try sell stand machine cover etc etcnw mac
hine quite looker nice design brush chrome go stand keep level surface do not need move around wash expect major pro -PRON- set temperature wash mode up
to 90 degree celsius -PRON- boon wife dust allergy -PRON- water consumption reduce least 15 20 percent very less quantity detergent require less even ha
lf prescribed detergent company can take real heavy load never possible previous top load 1 very easy operate stop wash cycle put thing may forgotten fa
ced issue whatsoever last 1 year tap filter really helpful clean periodicallythere negative also good amount sound silent during spin create quite rucku
s hear bosch service costly tell installer door gasket cost 35k tax installation consist mandatory charge 300 part can not remember think cover within c
ost machinethis fantastic piece technology work make life much easier comfortable would highly recommend good one really love new member family super co
ol smooth good part product noiseamaze bosch very easy use love structure color design just wow really worth product -PRON- month -PRON- be use thank bo
sch amazon good washing machine seemuse till date very little noise vibration do not use stand excellent wash quality also little consumption water if r
eview product would say awesome such use noise wash clothe goodhowever purchase please contact bosch directly installation within work day but please do
not wait free installation amazon home services amazon send one guy installation know nothing machine neither come choose time slot pick call finally fo
llow amazon reach wash 2 hour could even give -PRON- demo let alone installation everytime follow amazon home service tell person come installation with
in next 48 hour needless mention body turn till 3 week purchase response amazon home service pathetic also bother reply social medium toooso decide purch
ase amazing machine please do not rely amazon call bosch customer service right away -PRON- 9 month since buy vm genuinely happyi move samsung top load
bosch front load definitely one good decision ever madething love mostl quick 1530 feature priceless2 -PRON- customize spinning speed upto 1200rpm3 -PRO
N- customize temperature settings4 quality clean impeccable5 build quality top notch topbottomi highly recommend product anyone look good washing machin
e blindly go receive product time not home parent receive delivery boy tell father per policy unbox show machine damage cancel order father tell ok unfo
rtunately deliver machine without unbox amazon make effort book installation person bosch come follow 3 day unboxed check 4 side tell -PRON- machine min
or dent right bottom side update -PRON- still cancel order ask replacement want ask minor dent invisible first look low bottom fine check machine proble
m order replacement machine perform well daily wash program 40 minute program do not noticed issue machine time 2 week go check tub cleaning tap reset s
tart use follow day machine go well wash time spin 1200 rpm machine start vibrate usual hear unusual noise tub contact bosch issue not cancel reorder ma
chine amazon 10 day replacement warranty period lose time bosch service engineer visit home take picture video run machine tell faulty machine deliver s
ince past 12 day followup bosch person still give update say replacement wait do not know product deliver time proper package issue installationcalld ma
ny time bosch service center take 4 day install n demoit do not produce noise n washes clothe clean use since two yearsworke wellinstallation machine pr
oblematic company skilled persons small towns citiesthey send persons hiring local personsbut machine quite good performance why boschvs ifb have own ifb etc

```
cv = CountVectorizer()
reviewscv = cv.fit_transform(lemmas)
```

```
print(cv.vocabulary_)
```

```
[ 'totally', 'disappointed', 'productthere', 'call', 'bosch', 'installation', 'demo', 'part', 'break', 'transit', 'bosch', 'technician', 'claim', 'replacem', 'part', 'call', 'bosch', 'regard', 'replacement', 'bad', 'service', 'ever', 'come', 'across', 'entire', 'purchase', 'history', 'amazonbosch', 'lyd', 'service', 'center', 'well', 'technician', 'lie', 'dead', 'line', 'multiple', 'time', '-PRON-', 'wait', 'waste', 'time', 'technician', 'do', 'not', 'pick', 'phone', 'daysproduct', 'may', 'good', 'incomplete', 'without', 'service', 'support', 'that', 's', 'people', 'prefer', 'samsung', 'everything', 'swift', 'sophisticated', 'service', 'network', 'writing', 'review', 'nearly', 'year', 'use', 'experience', 'use', 'samsung', 'fl', 'parent', 'after', 'discount', 'pay', '26990', 'think', 'quite', 'bargain', 'also', 'get', 'around', '25k', 'old', 'machinedelivery', 'expect', 'amazon', 'hassle', 'free', 'time', 'installation', 'happen', 'next', 'day', 'person', 'bosch', 'quite', 'courteous', 'helpful', 'though', 'try', 'sell', 'stand', 'machine', 'cover', 'etc', 'etcnow', 'machine', 'quite', 'looken', 'nice', 'design', 'brush', 'chrome', 'go', 'stand', 'keep', 'level', 'surface', 'do', 'not', 'need', 'move', 'around', 'wash', 'expect', 'major', 'pro', '-PRON-', 'set', 'temperature', 'wash', 'mode', 'upto', '90', 'degree', 'celsius', '-PRON-', 'boon', 'wife', 'dust', 'allergy', '-PRON-', 'water', 'consumption', 'reduce', 'can', 'least', '15', '20', 'percent', 'very', 'less', 'quantity', 'detergent', 'requir', 'e', 'less', 'even', 'half', 'prescribed', 'detergent', 'company', 'can', 'take', 'real', 'heavy', 'load', 'never', 'possible', 'previous', 'top', 'load', '1', 'very', 'easy', 'operate', 'stop', 'wash', 'cycle', 'put', 'thing', 'may', 'forgotten', 'faced', 'issue', 'whatsoever', 'last', '1', 'year', 'ap', 'filter', 'really', 'helpful', 'clean', 'periodicallythere', 'negative', 'also', 'good', 'amount', 'sound', 'silent', 'during', 'spin', 'create', 'quite', 'ruckus', 'hear', 'bosch', 'service', 'costly', 'tell', 'installer', 'door', 'gasket', 'cost', '35k', 'tax', 'installation', 'consist', 'mandat', 'ory', 'charge', '300', 'part', 'can', 'not', 'remember', 'think', 'cover', 'within', 'cost', 'machinethis', 'fantastic', 'piece', 'technology', 'work', 'make', 'life', 'much', 'easier', 'comfortable', 'would', 'highly', 'recommend', 'good', 'one', 'really', 'love', 'new', 'member', 'family', 'super', 'ool', 'smooth', 'good', 'part', 'product', 'noiseamaze', 'bosch', 'very', 'easy', 'use', 'love', 'structure', 'color', 'design', 'just', 'wow', 'reall', 'y', 'worth', 'product', '-PRON-', 'month', '-PRON-', 'be', 'use', 'thank', 'bosch', 'amazon', 'good', 'washing', 'machine', 'seenuse', 'till', 'date', 'very', 'little', 'noise', 'vibration', 'do', 'not', 'use', 'stand', 'excellent', 'wash', 'quality', 'also', 'little', 'consumption', 'water', 'if', 'ri', 'view', 'product', 'would', 'say', 'awesome', 'such', 'use', 'noise', 'wash', 'clothe', 'goodhowever', 'purchase', 'please', 'contact', 'bosch', 'direct', 'y', 'installation', 'within', 'work', 'day', 'but', 'please', 'do', 'not', 'wait', 'free', 'installation', 'amazon', 'home', 'services', 'amazon', 'sen', 'd', 'one', 'guy', 'installation', 'know', 'nothing', 'machine', 'neither', 'come', 'choose', 'time', 'slot', 'pick', 'call', 'finally', 'follow', 'amaz', 'n', 'reach', 'wash', '2', 'hour', 'could', 'even', 'give', '-PRON-', 'demo', 'let', 'alone', 'installation', 'everytime', 'follow', 'amazon', 'home', 'ervice', 'tell', 'person', 'come', 'installation', 'within', 'next', '48', 'hour', 'needless', 'mention', 'body', 'turn', 'till', '3', 'week', 'purchas', 'e', 'response', 'amazon', 'home', 'service', 'pathetic', 'also', 'bother', 'reply', 'social', 'medium', 'tooso', 'decide', 'purchase', 'amazing', 'mach', 'ne', 'please', 'do', 'not', 'rely', 'amazon', 'call', 'bosch', 'customer', 'service', 'right', 'away', '-PRON-', '9', 'month', 'since', 'buy', 'wm', 'g', 'nuinely', 'happyi', 'move', 'samsung', 'top', 'load', 'bosch', 'front', 'load', 'definitely', 'one', 'good', 'decision', 'ever', 'madething', 'love', 'ostl', 'quick', '1530', 'feature', 'priceless2', '-PRON-', 'customize', 'spinning', 'speed', 'upto', '1200rpm3', '-PRON-', 'customize', 'temperature', 'settings4', 'quality', 'clean', 'build', 'quality', 'top', 'notch', 'topbottomi', 'highly', 'recommend', 'product', 'anyone', 'look', 'i
```

```
print(cv.get_feature_names()[150:300])
```

```
[ '90', '96', 'aankh', 'ability', 'able', 'about', 'absolute', 'absolutely', 'absolve', 'abt', 'abutton', 'acceptable', 'accessoriesamazon', 'accessory', 'accidentally', 'accommodate', 'accord', 'accurate', 'accuratewith', 'acid', 'ack', 'acknowledge', 'across', 'act', 'acting', 'action', 'actually', 'ad', 'adamant', 'adapten', 'adaptor', 'add', 'addition', 'additional', 'address', 'adequate2', 'adjust', 'adjustable', 'adjustment', 'admire', 'adopter', 'adult', 'advanced', 'advancement', 'advantage', 'advertise', 'advertisedinstallation', 'advertisedthe', 'advice', 'advise', 'affect', 'affected', 'affordable', 'after', 'afyer', 'again', 'agency', 'agent', 'ago', 'agra', 'agree', 'agreement', 'ahead', 'aince', 'air', 'aise', 'all', 'allergy', 'allocate', 'allow', 'almost', 'alone', 'along', 'alot', 'already', 'alright', 'also', 'although', 'always', 'amaze', 'amazen', 'amazing', 'amazingcompare', 'amazingthe', 'amazingtoooooo', 'amazon', 'amazon1', 'amazon5wash', 'amazonbosch', 'amazonin', 'amazoninstallation', 'amazonn', 'amazonone', 'amazonrun', 'amazonthank', 'amazonthe', 'amazontill', 'amc', 'amcalso', 'among', 'amount', 'analyse', 'and', 'andthe', 'andworke', 'angular', 'another', 'answer', 'answersgot', 'anti', 'anyone', 'anything', 'anything3', 'anywhere', 'apart', 'apartment', 'apologize', 'appear', 'appearance', 'appliance', 'appliances', 'i', 'applicable', 'apply', 'appointment', 'appreciate', 'approach', 'approx', 'april', 'area', 'ariel', 'arise', 'around', 'arrange', 'arrangement', 'arival', 'arrive', 'arrogant', 'articleblognet', 'as', 'asap', 'ashina', 'ask', 'asking', 'aspect', 'assess', 'assessment', 'assistance', 'assume', 'assure', 'astoundinge']
```

```
print(reviewscv.toarray()[150:300])
```

```
[[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
```

```
cvngramrange = CountVectorizer(ngram_range=(1,3),analyzer = 'word',max_features=100)
bowmatrixngram = cvngramrange.fit_transform(lemmas)
```

```
print(cvngramrange.get_feature_names())
print(bowmatrixngram.toarray())
```

```
[ 'also', 'amazon', 'awesome', 'bad', 'be', 'bosch', 'but', 'buy', 'call', 'clean', 'clothe', 'come', 'cost', 'customer', 'damage', 'day', 'deliver', 'delivery', 'demo', 'do', 'drum', 'easy', 'engineer', 'even', 'excellent', 'experience', 'far', 'fine', 'first', 'front', 'get', 'give', 'go', 'good', 'great', 'happy', 'have', 'high', 'installation', 'issue', 'less', 'level', 'like', 'load', 'look', 'lot', 'low', 'machine', 'make', 'mode', 'money', 'month', 'much', 'need', 'nice', 'no', 'noise', 'not', 'one', 'option', 'part', 'perfect', 'performance', 'person', 'price', 'problem', 'product', 'pron', 'purchase', 'quality', 'really', 'receive', 'recommend', 'review', 'satisfied', 'say', 'service', 'silent', 'since', 'so', 'still', 'take', 'technician', 'this', 'till', 'time', 'top', 'use', 'value', 'very', 'vibration', 'wash', 'washing', 'water', 'week', 'well', 'work', 'worth', 'would', 'year' ]
[[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
```

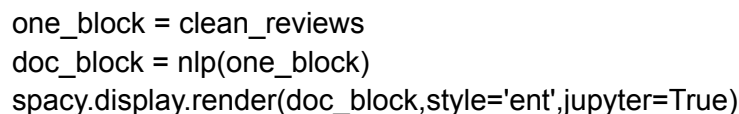
```
tfidfvingrammaxfeatures = TfidfVectorizer(ngram_range=(1,3),analyzer =
'word',max_features=500)
tfidfmatrixngram = tfidfvingrammaxfeatures.fit_transform(lemmas)
```

```
print(tfidfvingrammaxfeatures.get_feature_names())
print(tfidfmatrixngram.toarray())
```

```
[ '10', '1200', '15', '18', '2018', '23', '24', '2nd', '30', '40', '45', '48', 'able', 'absolutely', 'accessory', 'after', 'ago', 'all', 'allow', 'almost', 'already', 'also', 'although', 'always', 'amazing', 'amazon', 'amc', 'and', 'another', 'anyone', 'appliance', 'area', 'around', 'arrive', 'as', 'ask', 'aug', 'automatic', 'available', 'awesome', 'back', 'bad', 'base', 'be', 'because', 'believe', 'besides', 'big', 'bit', 'body', 'book', 'bosch', 'bottom', 'box', 'brand', 'break', 'bring', 'browser', 'build', 'but', 'button', 'buy', 'buying', 'call', 'can', 'care', 'case', 'center', 'change', 'charge', 'charm', 'check', 'choice', 'choose', 'class', 'clean', 'cleaning', 'close', 'cloth', 'clothe', 'colour', 'come', 'comment', 'company', 'compare', 'complain', 'complaint', 'complete', 'completely', 'connection', 'consumption', 'contact', 'control', 'cost', 'costly', 'could', 'couple', 'cover', 'customer', 'customize', 'cycle', 'daily', 'damage', 'damaged', 'date', 'day', 'deal', 'decent', 'defect', 'defective', 'degree', 'delay', 'deliver', 'delivery', 'demo', 'dent', 'descale', 'design', 'detergent', 'different', 'directly', 'disappoint', 'discount', 'display', 'do', 'door', 'doubt', 'drain', 'drum', 'dry', 'due', 'early', 'ease', 'easy', 'efficient', 'electricity', 'elegant', 'end', 'engineer', 'enough', 'etc', 'even', 'ever', 'everything', 'excellent', 'expect', 'expectation', 'expensive', 'experience', 'explain', 'extra', 'extremely', 'face', 'family', 'fantastic', 'fast', 'feature', 'feel', 'filter', 'finally', 'find', 'fine', 'first', 'fit', 'fix', 'floor', 'follow', 'for', 'four', 'free', 'friend', 'friendly', 'from', 'front', 'full', 'fully', 'function', 'functionality', 'german', 'get', 'give', 'go', 'good', 'great', 'ground', 'guy', 'hand', 'happen', 'hard', 'have', 'heavy', 'help', 'helpful', 'high', 'highly', 'home', 'hope', 'hour', 'house', 'however', 'hrs', 'html5', 'if', 'ifb', 'important', 'in', 'include', 'india', 'indian', 'inlet', 'inside', 'instal', 'install', 'installation', 'instead', 'issue', 'item', 'job', 'just', 'keep', 'kg', 'know', 'last', 'laundry', 'leakage', 'least', 'leave', 'less', 'level', 'lg', 'life', 'lift', 'like', 'line', 'little', 'load', 'loader', 'loading', 'local', 'long', 'look', 'lot', 'love', 'low', 'machine', 'maintain', 'maintenance', 'make', 'manual', 'many', 'mark', 'market', 'may', 'meet', 'member', 'mention', 'min', 'minimal', 'minimum', 'minute', 'miss', 'mode', 'model', 'mom', 'money', 'month', 'motor', 'move', 'much', 'must', 'need', 'neither', 'never', 'new', 'next', 'nice', 'no', 'noise', 'non', 'normal', 'not', 'nothing', 'notice', 'now', 'observe', 'oct', 'offer', 'ok', 'old', 'one', 'online', 'only', 'open', 'operate', 'operation', 'option', 'order', 'other', 'outlet', 'overall', 'package', 'parent', 'part', 'past', 'pathetic', 'pay', 'pcb', 'people', 'per', 'perfect', 'perfectly', 'performance', 'person', 'piece', 'pipe', 'place', 'plastic', 'please', 'plus', 'point', 'poor', 'powder', 'power', 'premium', 'pressure', 'pretty', 'previous', 'price', 'problem', 'process', 'product', 'program', 'promise', 'prompt', 'pron', 'proper', 'properly', 'provide', 'pump', 'purchase', 'put', 'quality', 'question', 'quick', 'quiet', 'quite', 'raise', 'rating', 'reach', 'read', 'ready', 'really', 'receive', 'recommend', 'reduce', 'regard', 'remain', 'remove', 'repair', 'replace', 'replacement', 'request', 'require', 'research', 'respond', 'response', 'result', 'return', 'review', 'right', 'rpm', 'rs', 'run', 'sale', 'samsung', 'satisfied', 'satisfy', 'save', 'say', 'schedule', 'second', 'see', 'select', 'sell', 'seller', 'send', 'sept', 'seriously', 'service', 'set', 'setting', 'shift', 'show', 'side', 'siemens', 'silent', 'simple', 'simply', 'since', 'single', 'size', 'small', 'smooth', 'so', 'some', 'something', 'sound', 'spare', 'speed', 'spend', 'spin', 'stable', 'stain', 'stand', 'star', 'start', 'still', 'stop', 'strong', 'suggest', 'super', 'superb', 'support', 'sure', 'system', 'take', 'tap', 'team', 'technician', 'technology', 'tel', 'temperature', 'term', 'thank', 'that', 'there', 'thing', 'think', 'this', 'though', 'thought', 'three', 'till', 'time', 'timely', 'top', 'totally',
```

```
def plot_cloud(wordcloud):
    plt.figure(figsize=(40,30))
    plt.imshow(wordcloud)
```

```
STOPWORDS.add('Pron')
wordcloud =
WordCloud(width=3000,height=2000,background_color='white',max_words=100,colormap='set2',stopwords=STOPWORDS)
plot_cloud(wordcloud)
```

```
for token in doc_block[100,200]:
    print(token,token.pos_)
```

```

helpful ADJ
though PART
try VERB
sell NOUN
stand NOUN
machine NOUN
cover NOUN
etc X
etcnow X
machine NOUN
quite ADV
looker NUM
nice ADJ
design NOUN
brush PROPN
chrome PROPN
go VERB
stand VERB
keep VERB
level NOUN
surface NOUN
do AUX
not PART
need VERB
move VERB
. ---

```

```
nounverbs = [token.text for token in doc_block if token.pos_ in ('NOUN','VERB')]
```

```
print(nounverbs[100:200])
```

```

['installer', 'gasket', 'cost', 'tax', 'installation', 'consist', 'charge', 'part', 'can', 'remember', 'think', 'cover', 'cost', 'piece', 'technol
'work', 'make', 'life', 'would', 'recommend', 'one', 'love', 'member', 'family', 'part', 'product', 'use', 'love', 'structure', 'color', 'design',
uct', 'month', '-PRON-', 'use', 'machine', 'seenuse', 'date', 'noise', 'vibration', 'use', 'stand', 'wash', 'quality', 'consumption', 'water', 're
'product', 'would', 'say', 'use', 'noise', 'purchase', 'bosch', 'installation', 'work', 'day', 'wait', 'installation', 'send', 'guy', 'installatio
now', 'machine', 'come', 'choose', 'time', 'slot', 'pick', 'call', 'follow', 'hour', 'could', 'give', 'demo', 'let', 'installation', 'everytime',
w', 'tell', 'person', 'come', 'installation', 'hour', 'mention', 'body', 'turn', 'week', 'purchase', 'response', 'bother', 'decide', 'purchase', '
e', 'relv', 'service', 'month', 'buy', 'happy', 'move']

```

```
cv = CountVectorizer()
```

```
x = cv.fit_transform(nounverbs)
```

```
sumwords = x.sum(axis=0)
```

```
wordfreq = [(word.sumwords[0,idx]) for word, idx in cv.vocabulary_.items()]
```

```
wordfreq = sorted(wordfreq, key=lambda [x]:x[1],reverse=True)
```

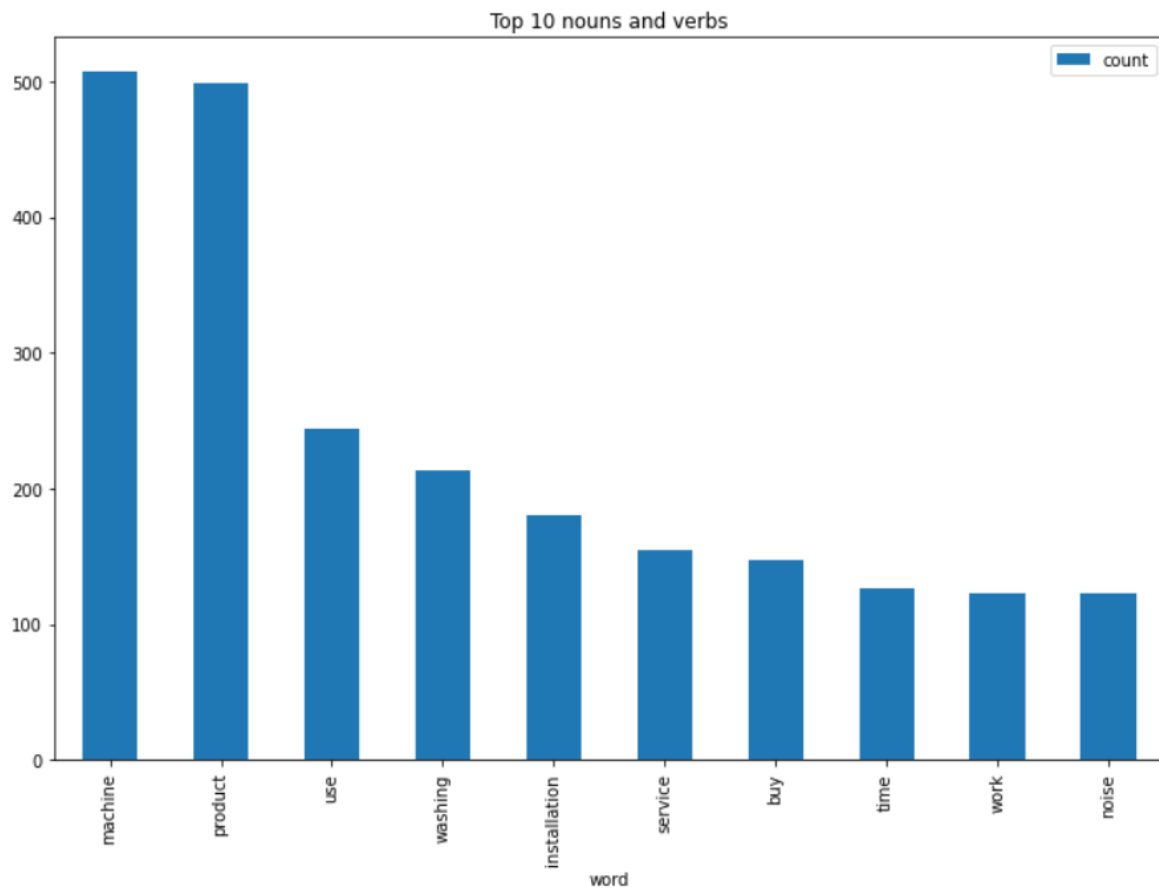
```
wddf = pd.DataFrame(wordfreq)
```

```
wddf.columns=['word','count']
```

```
wddf[0:10]
```


0	machine	507
1	product	498
2	use	244
3	washing	213
4	installation	180
5	service	155
6	buy	147
7	time	126
8	work	123
9	noise	123

```
wddf[0:10].plot.bar(x='word',figsize=(12,8),title='Top 10 nouns and verbs')
```



```
sentences = tokenize.sent_tokenize("".join(reviews))
sentences
```

```
[ 'I am totally disappointed with the product. There was no call from the bosch for installation & Demo and parts were broken while transit & bosch technician claim for replacement of parts but there was no call from bosch regarding replacement.',
  'Worst service ever I came across in the entire purchase history of Amazon. Bosch Hyd service center as well as technicians lie about dead lines multiple times.',
  "You wait for them wasting your time and the technicians don't pick up your phone for days. Product may be good but it's incomplete without service support.",
  "That's why people prefer Samsung for everything for their swift and sophisticated service network.",
  'I am writing this review after nearly an year of use and I do have experience of using a Samsung FL which my parents have.',
  'After discount, I paid, 26,990 which I think was quite a bargain and also I got around 2.5k for my old machine. Delivery was as expected from Amazon. Assembled free and on time.',
  'The installation happened the next day.',
  'Person from Bosch was quite courteous and helpful.',
  'Though he did try to sell his own stand, machine cover etc etc. Now the machine itself is quite a looker, nice design in brushed chrome.',
  "I did not go for stand as I am keeping it on a level surface and I don't need to move it around.",
  'The washes are as expected.',
  'The major pros:- You can set temperature for any wash mode and upto 90 degrees Celsius.',
  'It's a boon for my wife who has dust allergies- My water consumption has reduced by at least 15 - 20 percent- Very less quantity of detergent required less than even half by what is prescribed by the detergent company- Can take real heavy loads which was never possible in my previous top load 1- Very easy to operate, you can stop the wash cycle to put in things you may have forgotten- I have not faced any issue whatsoever in the last 1 year- The filter is really helpful but should be cleaned periodically There are negatives also:- Good amount of sound is there, it is not at all silent.',
  "During spin it creates quite a ruckus- I have heard Bosch service is costly and was told by the installer that the door gasket costs 3.5k + taxes- Installation consisted of a mandatory charge of ~300 for a part which I can't remember now.",
  'I think should have been covered within the cost of the machine This is a fantastic piece of technology and it works in making my life much easier and comfortable.',
  'Would highly recommend Good one.',
  'Really loved a new member in my family.',
  'Super cool and smooth, Best part of this product is there is no noise... amazing bosch.',
  'Very easy to use.',
  "I loved the structure color and design... Just wow... Really worth product... Its been a month I'm using it..",
  'Thank you bosch and amazon The best washing machine ever/used till date ' ]
```

```
sentdf = pd.DataFrame(sentences,columns=['sentences'])
sentdf
```

0	I am totally disappointed with the product.The...
1	Worst service ever I came across in the entire...
2	You wait for them wasting your time and the te...
3	That's why people prefer Samsung for everythin...
4	I am writing this review after nearly an year ...
...	...
1874	Exclusive service Good Good product It's silen...
1875	Nice product I am not satisfied this item, thi...
1876	Very good Good Nice product with no issue Rece...
1877	Very good Best performance Very Good Product V...
1878	Nice to received Very good product and working...

1879 rows × 1 columns

```
affin = pd.read_csv('Downloads/Afinn.csv')
affin
```

	word	value
0	abandon	-2
1	abandoned	-2
2	abandons	-2
3	abducted	-2
4	abduction	-2
...
2472	yucky	-2
2473	yummy	3
2474	zealot	-2

```
affinityscores = affin.set_index('word')['value'].to_dict()
affinityscores
```

```
{ 'abandon': -2,
  'abandoned': -2,
  'abandons': -2,
  'abducted': -2,
  'abduction': -2,
  'abductions': -2,
  'abhor': -3,
  'abhorred': -3,
  'abhorrent': -3,
  'abhors': -3,
  'abilities': 2,
  'ability': 2,
  'aboard': 1,
  'absentee': -1,
  'absentees': -1,
  'absolve': 2,
  'absolved': 2,
```

```
sentimentlexicon = affinityscores
def calculate_sentiment(text:str=None):
    sentscore=0
    if text:
        sentence = nlp(text)
        for word in sentence:
            sentscore+= sentimentlexicon.get(word.lemma_.0)
        return sentscore
```

```
calculate_sentiment(text='good service')
3
```

```
sentdf['sentiment_value']=sentdf['sentence'].apply(calculate_sentiment)
sentdf['sentiment_value']
```

```
0      -4
1      -6
2       4
3       4
4       0
..
1874    15
1875     5
1876    12
1877     9
1878    14
Name: sentiment_value, Length: 1879, dtype: int64
```

```
sentdf['word_count']=sentdf['sentence'].str.split().apply(len)
sentdf['word_count']
```

```

0      40
1      26
2      27
3      14
4      25
..
1874   19
1875   27
1876   26
1877   10
1878   13
Name: word_count, Length: 1879, dtype: int64

```

```
sentdf.sort_values(by='sentiment_value')
```

	sentence	sentiment_value	word_count
1	Worst service ever I came across in the entire...	-6	26
1671	Delivery was so bad product was totally damage...	-6	12
465	It appears the package was badly handled since...	-6	14
485	Item got damaged in transit, had cracks and de...	-6	30
1522	Damaged received and no response from anyone (...)	-6	26
...
1521	Good product, good service, fast delivery, great...	5	12

```
sentdf['sentiment_value'].describe()
```

```

count    1879.000000
mean      1.94678
std       3.86174
min       -6.00000
25%       0.00000
50%       1.00000
75%       3.00000
max       55.00000
Name: sentiment_value, dtype: float64

```

```
sentdf[sentdf['sentiment_value']<=0]
```


	sentence	sentiment_value	word_count
0	I am totally disappointed with the product.The...	-4	40
1	Worst service ever I came across in the entire...	-6	26
4	I am writing this review after nearly an year ...	0	25
6	The installation happened the next day.	0	6
9	I did not go for stand as I am keeping it on a...	0	23
...
1856	Go for it.	0	3
1864	Four stars to the product.	0	5
1865	Zero to amazon.	0	3
1870	If u r looking for a washing machine don't was...	-1	14
1873	Fully damaged inside and outside No body yet c...	-1	18

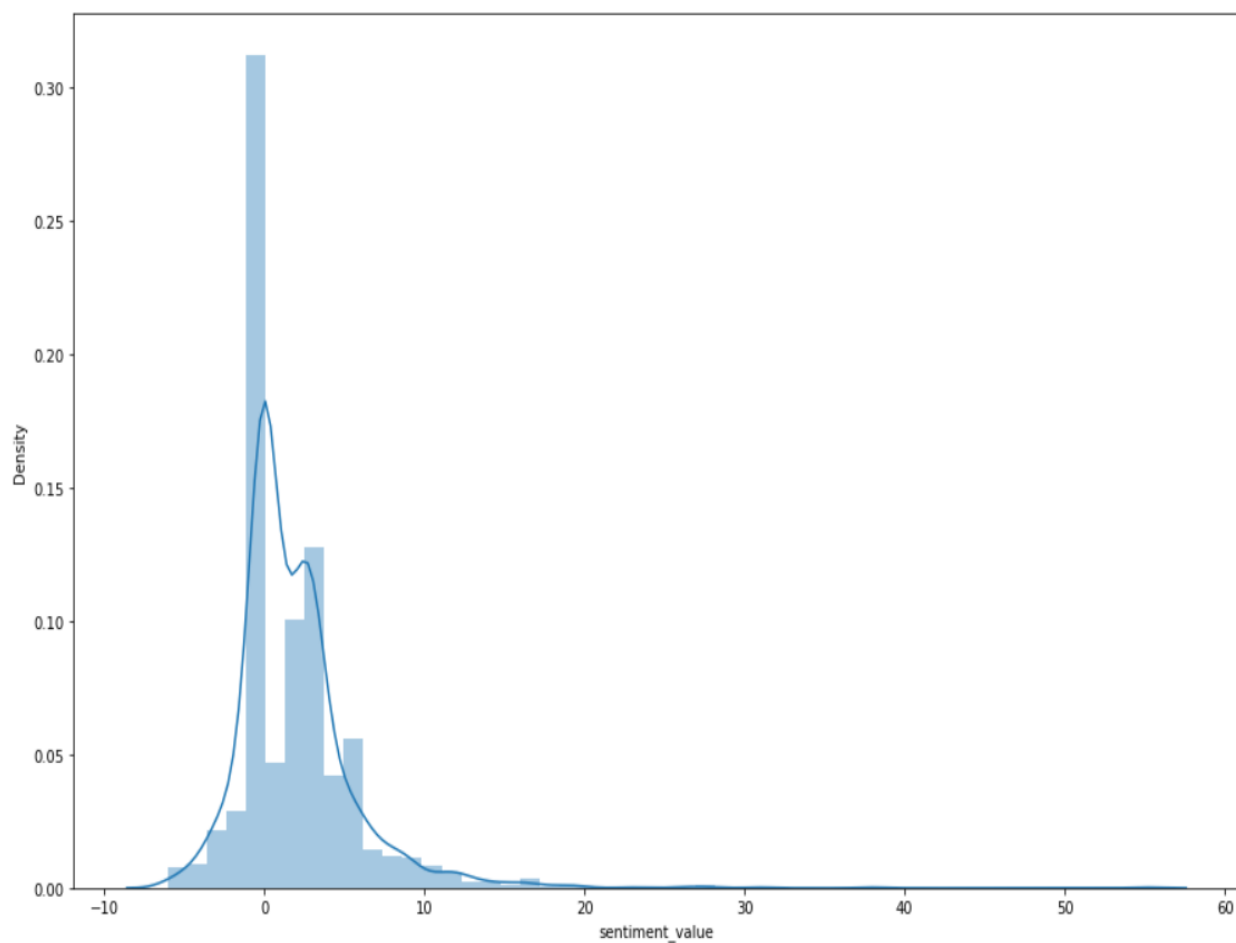
sentdf[sentdf['sentiment_value']>0]

	sentence	sentiment_value	word_count
2	You wait for them wasting your time and the te...	4	27
3	That's why people prefer Samsung for everythin...	4	14
5	After discount, I paid, 26,990 which I think w...	2	32
7	Person from Bosch was quite courteous and help...	4	8
8	Though he did try to sell his own stand, machi...	3	25
...
1874	Exclusive service Good Good product It's silen...	15	19
1875	Nice product I am not satisfied this item, thi...	5	27
1876	Very good Good Nice product with no issue Rece...	12	26
1877	Very good Best performance Very Good Product V...	9	10
1878	Nice to received Verv good product and working...	14	13

sentdf['index']=range(0,len(sentdf))
sentdf

	sentence	sentiment_value	word_count	index
0	I am totally disappointed with the product.The...	-4	40	0
1	Worst service ever I came across in the entire...	-6	26	1
2	You wait for them wasting your time and the te...	4	27	2
3	That's why people prefer Samsung for everythin...	4	14	3
4	I am writing this review after nearly an year ...	0	25	4
...
1874	Exclusive service Good Good product It's silen...	15	19	1874
1875	Nice product I am not satisfied this item, thi...	5	27	1875
1876	Very good Good Nice product with no issue Rece...	12	26	1876

```
sns.distplot(sentdf['sentiment_value'])
plt.figure(figsize=(16,8))
```



```
sns.lineplot(y='sentiment_value',x='index',data=sentdf)
plt.figure(figsize=(16,8))
```

