In [1]:
```python
import nltk
```

In [2]:
```python
nltk.download('stopwords')
```

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

Out[2]:
```
True
```

In [4]:
```python
import numpy as np
import pandas as pd
import string
import nltk
from nltk.corpus import stopwords
from nltk import PorterStemmer
import string
import re
import matplotlib.pyplot as plt
import seaborn as sns
```

In [6]:
```python
df=pd.read_csv('C:\\Users\\pedur\\OneDrive\\Tweets.csv')
df
```

Out[6]:

	tweet_id	airline_sentiment	airline_sentiment_confidence	negativereason	negativereason_confidence	airline	airline_sentiment_gold	name	negativereason_gc
0	570306133677760513	neutral	1.0000	NaN	NaN	Virgin America	NaN	cairdin	Na
1	570301130888122368	positive	0.3486	NaN	0.0000	Virgin America	NaN	jnardino	Na
2	570301083672813571	neutral	0.6837	NaN	NaN	Virgin America	NaN	yvonnalynn	Na
3	570301031407624196	negative	1.0000	Bad Flight	0.7033	Virgin America	NaN	jnardino	Na
4	570300817074462722	negative	1.0000	Can't Tell	1.0000	Virgin America	NaN	jnardino	Na
...	...	...	...	...	...	...	...	...	
14635	569587686496825344	positive	0.3487	NaN	0.0000	American	NaN	KristenReenders	Na
14636	569587371693355008	negative	1.0000	Customer Service Issue	1.0000	American	NaN	itsropes	Na
14637	569587242672398336	neutral	1.0000	NaN	NaN	American	NaN	sanyabun	Na
14638	569587188687634433	negative	1.0000	Customer Service Issue	0.6659	American	NaN	SraJackson	Na
14639	569587140490866689	neutral	0.6771	NaN	0.0000	American	NaN	daviddtwu	Na

14640 rows × 15 columns

In [7]:
```python
df.head(10)
```

Out[7]:

	tweet_id	airline_sentiment	airline_sentiment_confidence	negativereason	negativereason_confidence	airline	airline_sentiment_gold	name	negativereason_gold	retwee
0	570306133677760513	neutral	1.0000	NaN	NaN	Virgin America	NaN	cairdin	NaN	
1	570301130888122368	positive	0.3486	NaN	0.0000	Virgin America	NaN	jnardino	NaN	
2	570301083672813571	neutral	0.6837	NaN	NaN	Virgin America	NaN	yvonnalynn	NaN	
3	570301031407624196	negative	1.0000	Bad Flight	0.7033	Virgin America	NaN	jnardino	NaN	
4	570300817074462722	negative	1.0000	Can't Tell	1.0000	Virgin America	NaN	jnardino	NaN	
5	570300767074181121	negative	1.0000	Can't Tell	0.6842	Virgin America	NaN	jnardino	NaN	
6	570300616901320704	positive	0.6745	NaN	0.0000	Virgin America	NaN	cjmcginnis	NaN	
7	570300248553349120	neutral	0.6340	NaN	NaN	Virgin America	NaN	pilot	NaN	
8	570299953286942721	positive	0.6559	NaN	NaN	Virgin America	NaN	dhepburn	NaN	
9	570295459631263746	positive	1.0000	NaN	NaN	Virgin America	NaN	YupitsTate	NaN	

In [8]:
```python
df.columns
```

Out[8]:
```
Index(['tweet_id', 'airline_sentiment', 'airline_sentiment_confidence',
       'negativereason', 'negativereason_confidence', 'airline',
       'airline_sentiment_gold', 'name', 'negativereason_gold',
       'retweet_count', 'text', 'tweet_coord', 'tweet_created',
       'tweet_location', 'user_timezone'],
      dtype='object')
```

In [9]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14640 entries, 0 to 14639
Data columns (total 15 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   tweet_id                      14640 non-null  int64
 1   airline_sentiment             14640 non-null  object
 2   airline_sentiment_confidence  14640 non-null  float64
 3   negativereason                9178 non-null   object
 4   negativereason_confidence     10522 non-null  float64
 5   airline                       14640 non-null  object
 6   airline_sentiment_gold        40 non-null     object
 7   name                          14640 non-null  object
 8   negativereason_gold           32 non-null     object
 9   retweet_count                 14640 non-null  int64
 10  text                          14640 non-null  object
 11  tweet_coord                   1019 non-null   object
 12  tweet_created                 14640 non-null  object
 13  tweet_location                9907 non-null   object
 14  user_timezone                 9820 non-null   object
dtypes: float64(2), int64(2), object(11)
memory usage: 1.7+ MB
```

In [10]:
```python
df.dtypes
```

Out[10]:
```
tweet_id                          int64
airline_sentiment                object
airline_sentiment_confidence    float64
negativereason                   object
negativereason_confidence       float64
airline                          object
airline_sentiment_gold           object
name                             object
negativereason_gold              object
retweet_count                     int64
text                             object
tweet_coord                      object
tweet_created                    object
tweet_location                   object
user_timezone                    object
dtype: object
```

In [11]:
```python
df.shape
```

Out[11]:
```
(14640, 15)
```

In [12]:
```python
df.isnull().sum()
```

Out[12]:
```
tweet_id                            0
airline_sentiment                   0
airline_sentiment_confidence        0
negativereason                   5462
negativereason_confidence        4118
airline                             0
airline_sentiment_gold          14600
name                                0
negativereason_gold             14608
retweet_count                       0
text                                0
tweet_coord                     13621
tweet_created                       0
tweet_location                   4733
user_timezone                    4820
dtype: int64
```

In [13]:
```python
df['airline_sentiment_gold'].unique()
```

Out[13]:
```
array([nan, 'negative', 'neutral', 'positive'], dtype=object)
```

In [14]:
```python
df['negativereason'].unique()
```

Out[14]:
```
array([nan, 'Bad Flight', "Can't Tell", 'Late Flight',
       'Customer Service Issue', 'Flight Booking Problems',
       'Lost Luggage', 'Flight Attendant Complaints', 'Cancelled Flight',
       'Damaged Luggage', 'longlines'], dtype=object)
```

In [15]:
```python
df.drop('negativereason',axis=1,inplace=True)
```

In [16]:
```python
cols=['airline_sentiment_gold','tweet_coord','negativereason_confidence']
df.drop(cols,axis=1,inplace=True)
```

In [17]:
```python
df
```

Out[17]:

	tweet_id	airline_sentiment	airline_sentiment_confidence	airline	name	negativereason_gold	retweet_count	text	tweet_created	tweet_location	u
0	570306133677760513	neutral	1.0000	Virgin America	cairdin	NaN	0	@VirginAmerica What @dhepburn said.	2015-02-24 11:35:52 -0800	NaN	(
1	570301130888122368	positive	0.3486	Virgin America	jnardino	NaN	0	@VirginAmerica plus you've added commercials t...	2015-02-24 11:15:59 -0800	NaN	(
2	570301083672813571	neutral	0.6837	Virgin America	yvonnalynn	NaN	0	@VirginAmerica I didn't today... Must mean I n...	2015-02-24 11:15:48 -0800	Lets Play	(
3	570301031407624196	negative	1.0000	Virgin America	jnardino	NaN	0	@VirginAmerica it's really aggressive to blast...	2015-02-24 11:15:36 -0800	NaN	(
4	570300817074462722	negative	1.0000	Virgin America	jnardino	NaN	0	@VirginAmerica and it's a really big bad thing...	2015-02-24 11:14:45 -0800	NaN	(
...	...	...	...	...	...	...	...	...	...	...	
14635	569587686496825344	positive	0.3487	American	KristenReenders	NaN	0	@AmericanAir thank you we got on a different f...	2015-02-22 12:01:01 -0800	NaN	
14636	569587371693355008	negative	1.0000	American	itsropes	NaN	0	@AmericanAir leaving over 20 minutes Late Flig...	2015-02-22 11:59:46 -0800	Texas	
14637	569587242672398336	neutral	1.0000	American	sanyabun	NaN	0	@AmericanAir Please bring American Airlines to...	2015-02-22 11:59:15 -0800	Nigeria,lagos	
14638	569587188687634433	negative	1.0000	American	SraJackson	NaN	0	@AmericanAir you have my money, you change my ...	2015-02-22 11:59:02 -0800	New Jersey	(
14639	569587140490866689	neutral	0.6771	American	daviddtwu	NaN	0	@AmericanAir we have 8 ppl so we need 2 know h...	2015-02-22 11:58:51 -0800	dallas, TX	

14640 rows × 11 columns

In [18]:
```python
df.isnull().sum()
```

Out[18]:
```
tweet_id                            0
airline_sentiment                   0
airline_sentiment_confidence        0
airline                             0
name                                0
negativereason_gold             14608
retweet_count                       0
text                                0
tweet_created                       0
tweet_location                   4733
user_timezone                    4820
dtype: int64
```

In [19]:
```python
df.drop('negativereason_gold',axis=1,inplace=True)
```

In [20]:
```python
cols1=['tweet_location','user_timezone']
df.drop(cols1,axis=1,inplace=True)
```

In [21]:
```python
df.isnull().sum()
```

Out[21]:
```
tweet_id                        0
airline_sentiment               0
airline_sentiment_confidence    0
airline                         0
name                            0
retweet_count                   0
text                            0
tweet_created                   0
dtype: int64
```

In [22]:
```python
display(df.shape)
display(df.info())
```

```
(14640, 8)
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 14640 entries, 0 to 14639
Data columns (total 8 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   tweet_id                      14640 non-null  int64
 1   airline_sentiment             14640 non-null  object
 2   airline_sentiment_confidence  14640 non-null  float64
 3   airline                       14640 non-null  object
 4   name                          14640 non-null  object
 5   retweet_count                 14640 non-null  int64
 6   text                          14640 non-null  object
 7   tweet_created                 14640 non-null  object
dtypes: float64(1), int64(2), object(5)
memory usage: 915.1+ KB
None
```

In [23]:
```python
df = df[['airline_sentiment','text']]
df
```

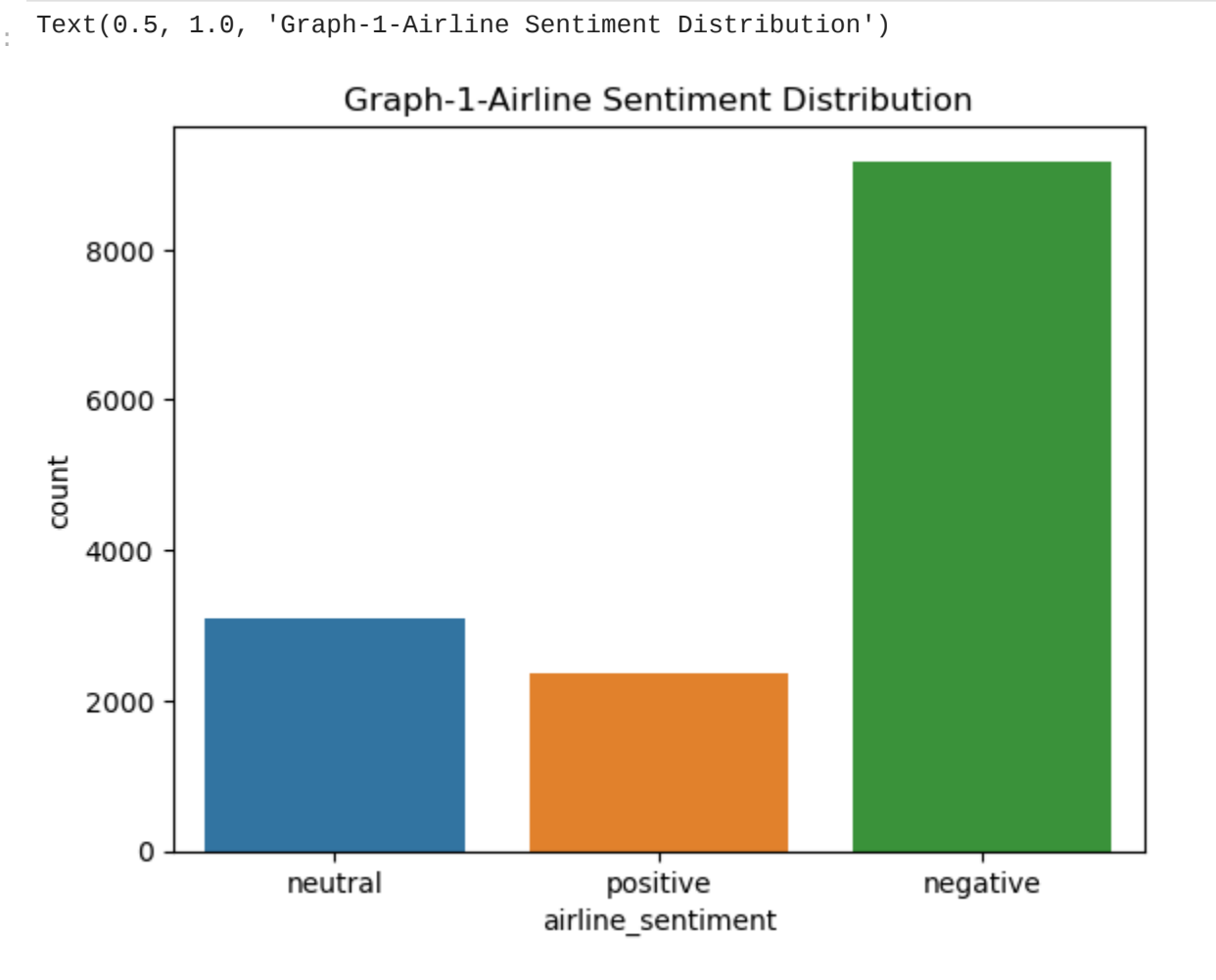
Out[23]:

	airline_sentiment	text
0	neutral	@VirginAmerica What @dhepburn said.
1	positive	@VirginAmerica plus you've added commercials t...
2	neutral	@VirginAmerica I didn't today... Must mean I n...
3	negative	@VirginAmerica it's really aggressive to blast...
4	negative	@VirginAmerica and it's a really big bad thing...
...	...	...
14635	positive	@AmericanAir thank you we got on a different f...
14636	negative	@AmericanAir leaving over 20 minutes Late Flig...
14637	neutral	@AmericanAir Please bring American Airlines to...
14638	negative	@AmericanAir you have my money, you change my ...
14639	neutral	@AmericanAir we have 8 ppl so we need 2 know h...

14640 rows × 2 columns

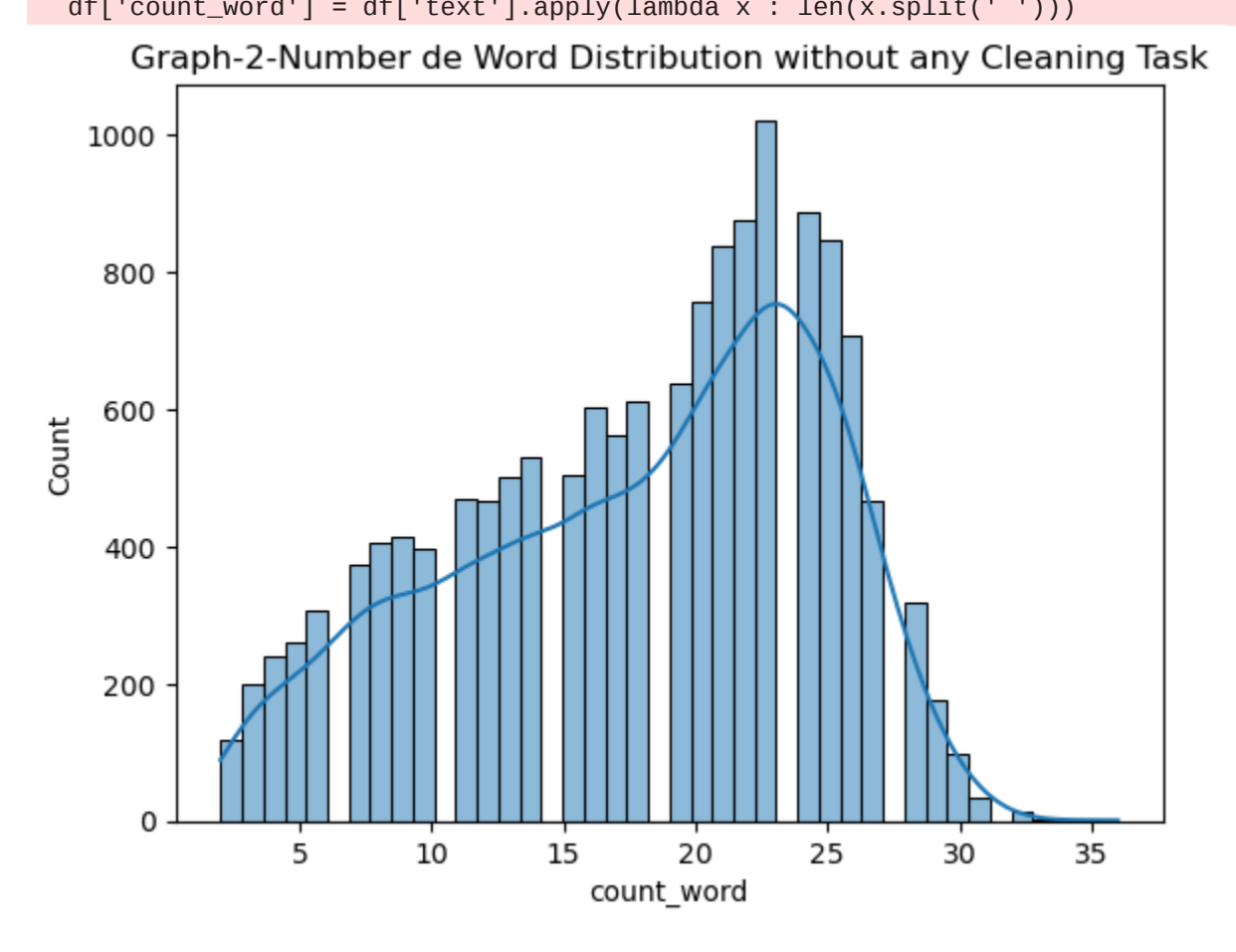
In [24]:
```python
sns.countplot(data=df,x='airline_sentiment')
plt.title('Graph-1-Airline Sentiment Distribution')
```

Out[24]:
```
Text(0.5, 1.0, 'Graph-1-Airline Sentiment Distribution')
```

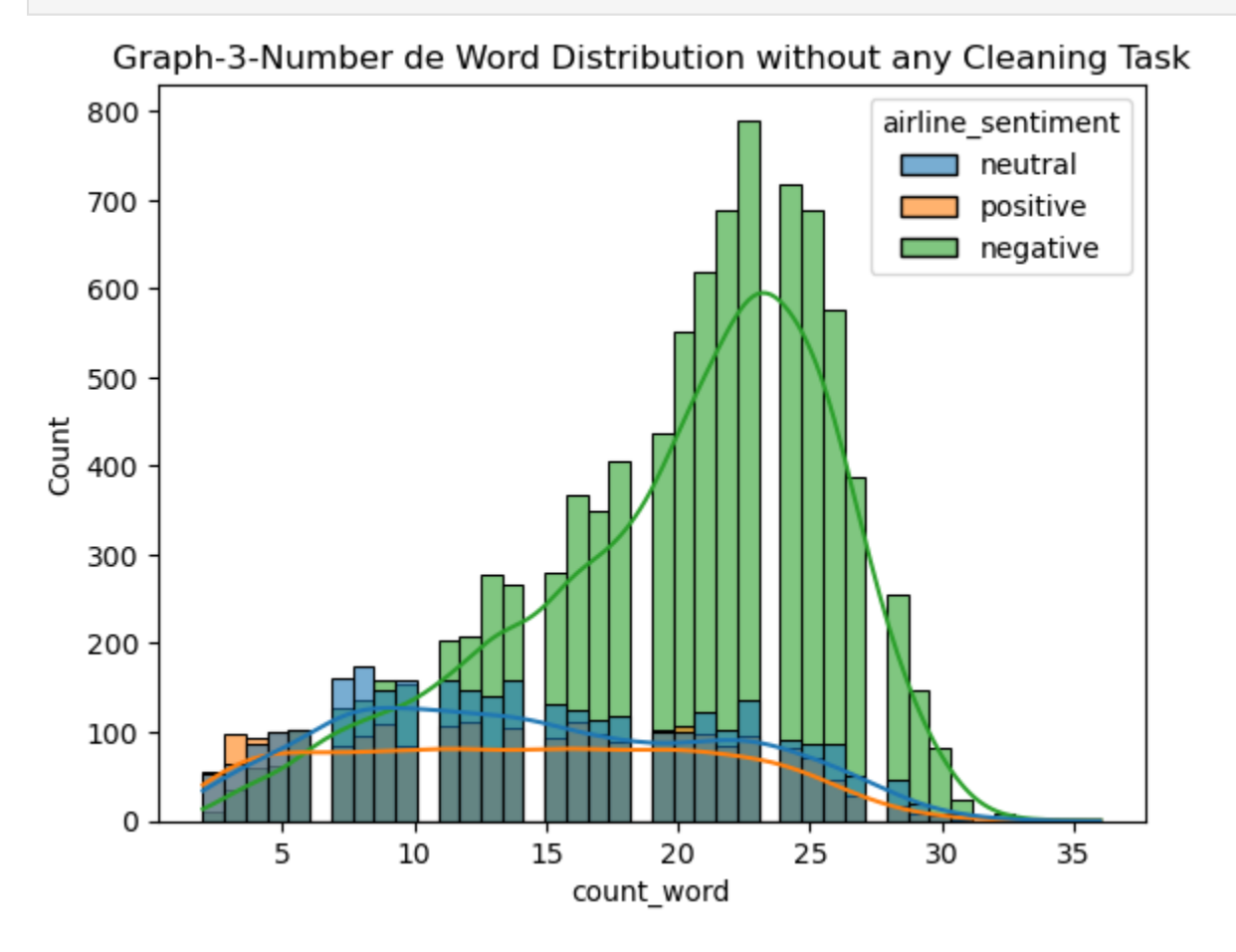


In [25]:
```python
df['count_word'] = df['text'].apply(lambda x : len(x.split(' ')))
sns.histplot(data = df , x='count_word',kde=True)
plt.title('Graph-2-Number de Word Distribution without any Cleaning Task')
plt.show()
```

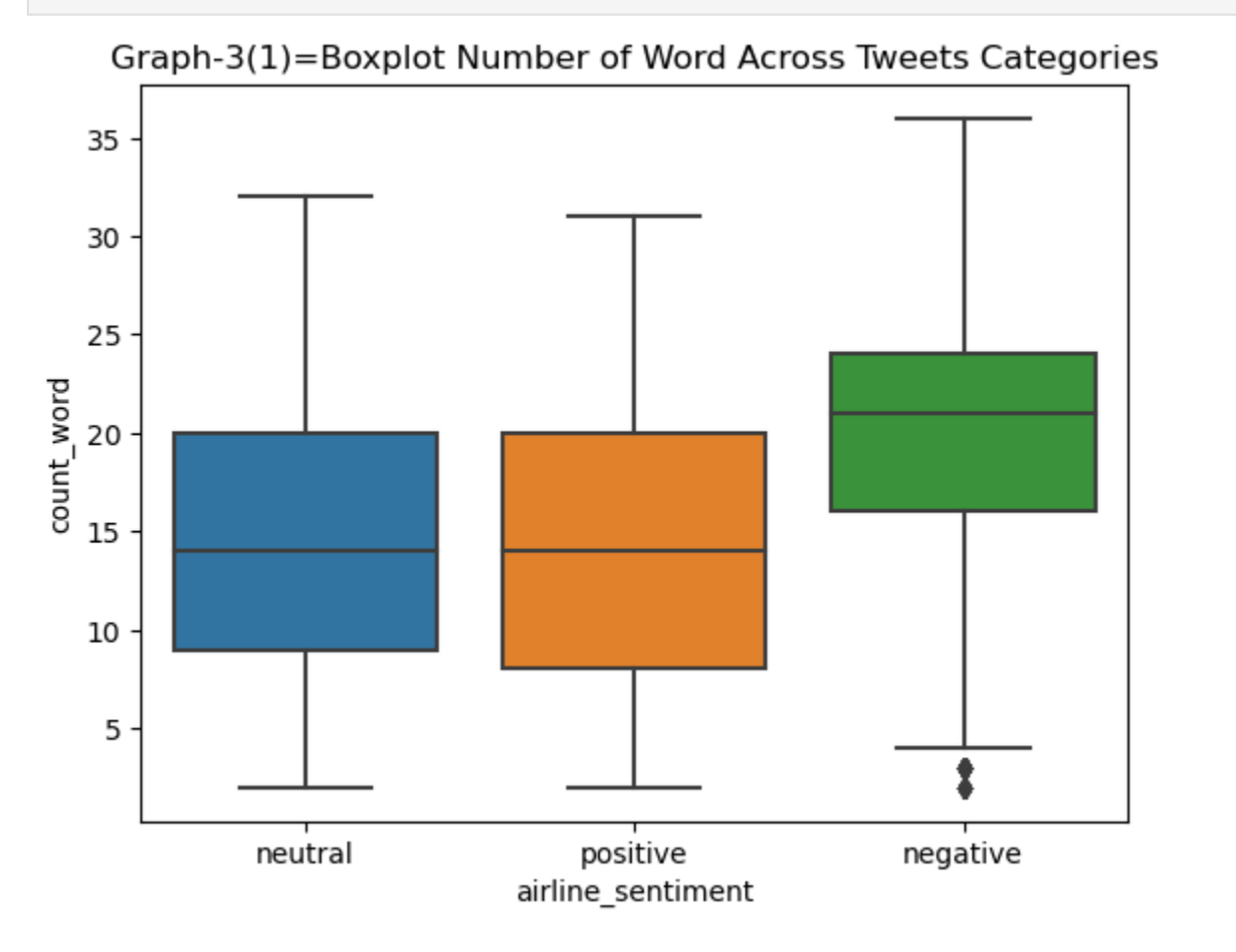
```
C:\Users\pedur\AppData\Local\Temp\ipykernel_15704\4046151189.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  df['count_word'] = df['text'].apply(lambda x : len(x.split(' ')))
```



In [26]:
```python
sns.histplot(data = df , x='count_word',hue='airline_sentiment',alpha=0.6,kde=True)
plt.title('Graph-3-Number de Word Distribution without any Cleaning Task')
plt.show()
```



In [27]:
```python
sns.boxplot(data = df , y='count_word',x='airline_sentiment')
plt.title('Graph-3(1)=Boxplot Number of Word Across Tweets Categories')
plt.show()
```



In [28]:
```python
df.loc[np.logical_or(df['count_word']>35,df['count_word']<=5),:]
```

Out[28]:

	airline_sentiment	text	count_word
0	neutral	@VirginAmerica What @dhepburn said.	4
14	positive	@VirginAmerica Thanks!	2
18	positive	I ❤️ flying @VirginAmerica. ☺👍	5
46	neutral	@VirginAmerica DREAM http://t.co/oA2dRfAoQ2 h...	5
58	neutral	@VirginAmerica @ladygaga @carrieunderwood - Ca...	5
...	...	...	...
14312	positive	@AmericanAir awesome! Thx	3
14314	negative	@AmericanAir yes, and rebooked incorrectly.	5
14443	neutral	@AmericanAir hi how are you	5
14600	neutral	http://t.co/Elw2sYb8Fu roberts&s=1 @Americ...	3
14630	positive	@AmericanAir Thanks! He is.	4

817 rows × 3 columns

In [34]:
```python
df.loc[np.logical_or(df['count_word']>35,df['count_word']<=5),:]
```

Out[34]:

	airline_sentiment	text	count_word
0	neutral	@VirginAmerica What @dhepburn said.	4
14	positive	@VirginAmerica Thanks!	2
18	positive	I ❤️ flying @VirginAmerica. ☺👍	5
46	neutral	@VirginAmerica DREAM http://t.co/oA2dRfAoQ2 h...	5
58	neutral	@VirginAmerica @ladygaga @carrieunderwood - Ca...	5
...	...	...	...
14312	positive	@AmericanAir awesome! Thx	3
14314	negative	@AmericanAir yes, and rebooked incorrectly.	5
14443	neutral	@AmericanAir hi how are you	5
14600	neutral	http://t.co/Elw2sYb8Fu roberts&s=1 @Americ...	3
14630	positive	@AmericanAir Thanks! He is.	4

817 rows × 3 columns

In [36]:
```python
import re
from nltk.corpus import stopwords
from nltk.stem import PorterStemmer
from nltk.tokenize import word_tokenize
```

In [37]:
```python
# punctuation Removal
def remove_punctuation(text):
    return re.sub(r'[^\w\s]','',text)
#stopword removal
def remove_stopwords(text):
    stop_words = set(stopwords.words('english'))
    tokens = word_tokenize(text)
    filter_tokens = [word for word in tokens if word.lower() not in stop_words]
    return " ".join(filter_tokens)
#remove numeric
def remove_numeric(text):
    return re.sub(r'\d+','',text)
#Stemming
def apply_stemming(text):
    stemmer = PorterStemmer()
    tokens = word_tokenize(text)
    stemmed_tokens = [stemmer.stem(word) for word in tokens]
    return " ".join(stemmed_tokens)
def remove_mentions(text):
    return re.sub(r'@\w+','',text)
```

In [38]:
```python
import nltk
nltk.download('punkt')
from nltk.tokenize import word_tokenize
from nltk.stem import PorterStemmer
def apply_stemming(text):
    stemmer = PorterStemmer()
    tokens = word_tokenize(text)
    stemmed_tokens = [stemmer.stem(word) for word in tokens]
    return " ".join(stemmed_tokens)
input_text = "walking throw the street, a passenger walked toward me, talking_about a walked chicken on the streets"
stemmed_text = apply_stemming(input_text)
print(stemmed_text)
```

```
walk throw the street , a passeng walk toward me , talking_about a walk chicken on the street
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\pedur\AppData\Roaming\nltk_data...
[nltk_data]   Package punkt is already up-to-date!
```

In [39]:
```python
apply_stemming('walking throw the street , a passenger walked toward me talking about a walked chicken on the streets')
```

Out[39]:
```
'walk throw the street , a passeng walk toward me talk about a walk chicken on the street'
```

In [40]:
```python
def text_preprocessing(text):
    sentence = remove_mentions(text)
    sentence = remove_punctuation(sentence)
    sentence = remove_stopwords(sentence)
    sentence = remove_numeric(sentence)
    sentence = apply_stemming(sentence)
    return sentence
```

In [41]:
```python
text_preprocessing('walking throw the street , a passenger walked toward me␣,talking about a walked chicken on the streets')
```

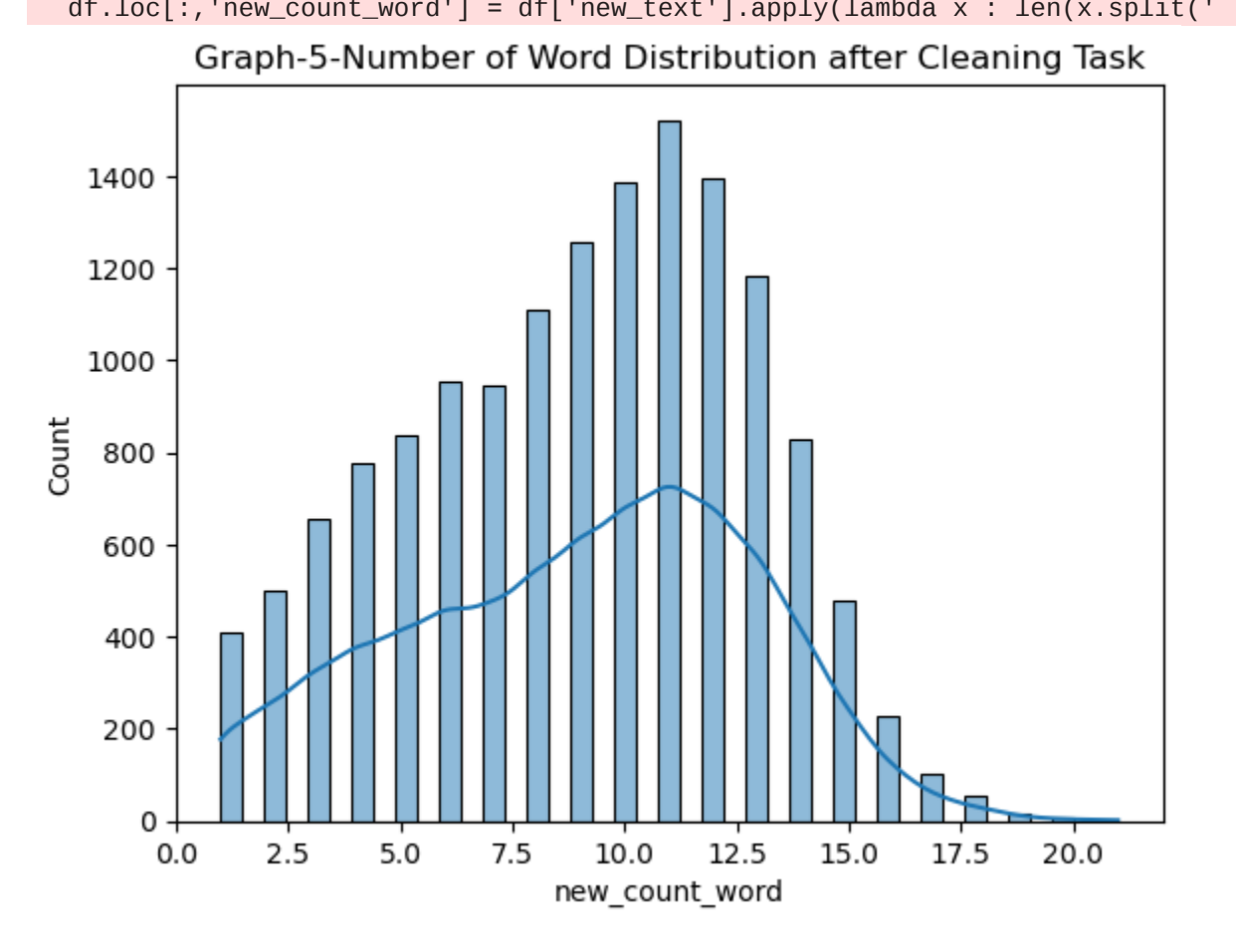
Out[41]:
```
'walk throw street passeng walk toward metalk walk chicken street'
```

In [42]:
```python
df.loc[:,'new_text'] = df['text'].apply(lambda x : text_preprocessing(x))
```

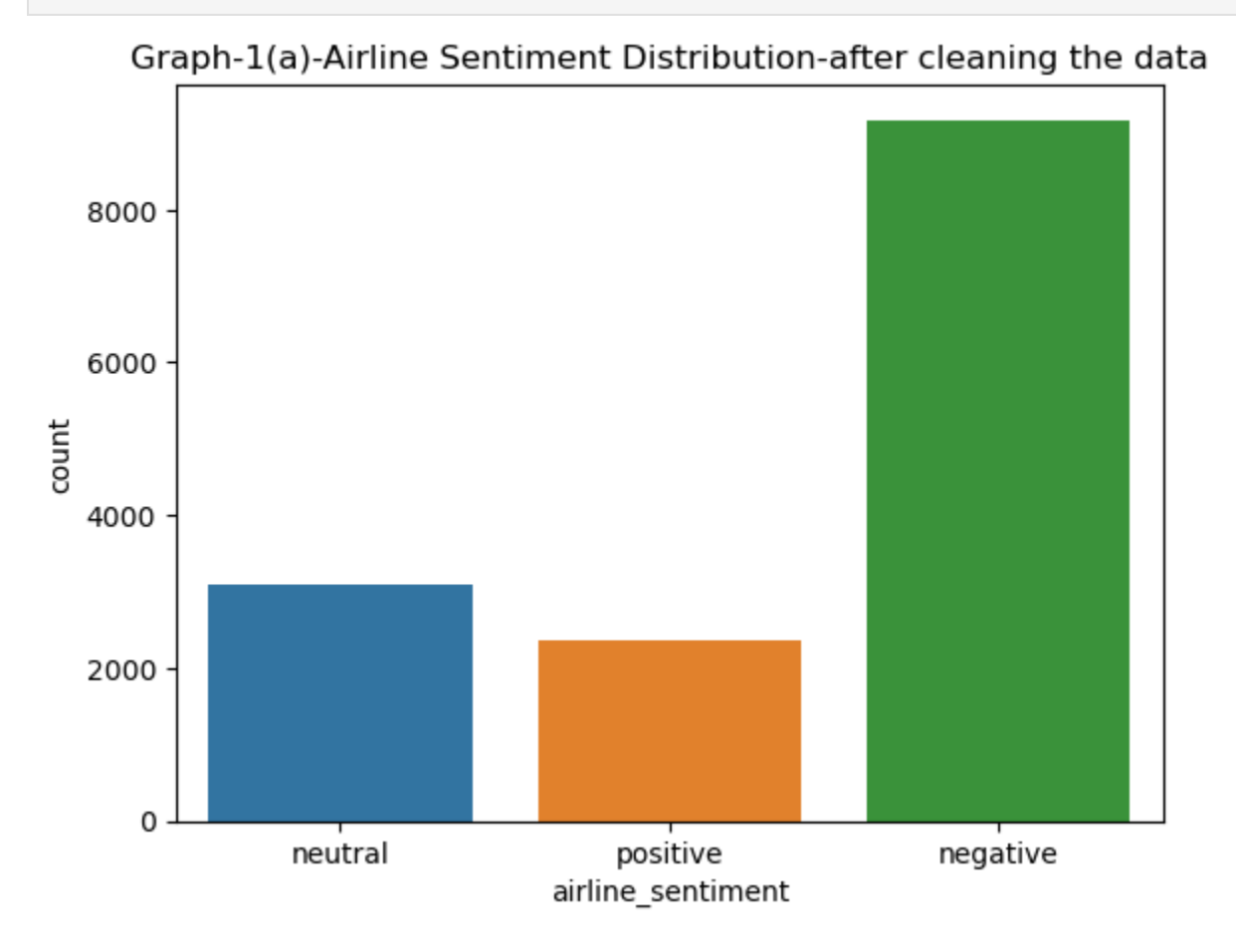
```
C:\Users\pedur\AppData\Local\Temp\ipykernel_15704\3410990210.py:1: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  df.loc[:,'new_text'] = df['text'].apply(lambda x : text_preprocessing(x))
```

In [43]:
```python
df.loc[:,'new_count_word'] = df['new_text'].apply(lambda x : len(x.split(' ')))
sns.histplot(data = df , x='new_count_word',kde=True)
plt.title('Graph-5-Number of Word Distribution after Cleaning Task')
plt.show()
```

```
C:\Users\pedur\AppData\Local\Temp\ipykernel_15704\1052658891.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
  df.loc[:,'new_count_word'] = df['new_text'].apply(lambda x : len(x.split(' ')))
```



In [44]:
```python
sns.countplot(data=df,x='airline_sentiment')
plt.title('Graph-1(a)-Airline Sentiment Distribution-after cleaning the data')
plt.show()
```



In [ ]:

In [ ]: