Sentiment analysis NLP NLTK HUGGING FACE

May 11, 2023

[2]:
```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

plt.style.use('ggplot')

import nltk
```

[2]:
```
import nltk
nltk.download('averaged_perceptron_tagger')
```

```
[nltk_data] Downloading package averaged_perceptron_tagger to
[nltk_data]     C:\Users\Rakesh\AppData\Roaming\nltk_data…
[nltk_data]   Unzipping taggers\averaged_perceptron_tagger.zip.
```

[2]:
```
True
```

[3]:
```
df = pd.read_csv(r'C:\Users\Rakesh\Downloads\Amazon-food-Reviews.csv')
```

[4]:
```
print(df.shape)
df=df.head(500)
print(df.shape)
```

```
(568454, 10)
(500, 10)
```

[5]:
```
df.head(2)
```

[5]:

	Id	ProductId	UserId	ProfileName	HelpfulnessNumerator	HelpfulnessDenominator	Score	Time	Summary	Text
0	1	B001E4KFG0	A3SGXH7AUHU8GW	delmartian	1	1	5	1303862400	Good Quality Dog Food	I have bought several of the Vitality canned d…
1	2	B00813GRG4	A1D87F6ZCVE5NK	dll pa	0	0	1	1346976000	Not as Advertised	

```
1  Product arrived labeled as Jumbo Salted Peanut…
```

0.0.1 Quick EDA

[6]:
```
df['Score'].value_counts()
```

[6]:
```
5    339
4     70
3     37
1     36
2     18
Name: Score, dtype: int64
```

[7]:
```
df['Score'].value_counts().sort_index()
```

[7]:
```
1     36
2     18
3     37
4     70
5    339
Name: Score, dtype: int64
```

[8]:
```
ax = df['Score'].value_counts().sort_index() \
                        .plot(kind='bar' ,
                        title='Count of review by start',
                              figsize=(5, 5))


ax.set_xlabel('Review Stars')
plt.show()
```

0.0.2 Basic NLTK

[9]:
```
example = df['Text'] [50]
example
```

[9]:
```
"This oatmeal is not good. Its mushy, soft, I don't like it. Quaker Oats is the way to go."
```

[ ]:
```
```

[10]:
```
tokens = nltk.word_tokenize(example)
tokens[:10]
```

[10]:
```
['This', 'oatmeal', 'is', 'not', 'good', '.', 'Its', 'mushy', ',', 'soft']
```

[11]:
```
part_speech = nltk.pos_tag(tokens)
part_speech[:10]  #part speech like  eg noun
```

[11]:
```
[('This', 'DT'),
 ('oatmeal', 'NN'),
 ('is', 'VBZ'),
 ('not', 'RB'),
 ('good', 'JJ'),
 ('.', '.'),
 ('Its', 'PRP$'),
 ('mushy', 'NN'),
 (',', ','),
 ('soft', 'JJ')]
```

[12]:
```
entities = nltk.ne_chunk(part_speech)
entities
```

```
---------------------------------------------------------------------------
LookupError                               Traceback (most recent call last)
Input In [12], in <cell line: 1>()
----> 1 entities = nltk.ne_chunk(part_speech)
      2 entities

File ~\anaconda3\lib\site-packages\nltk\chunk\__init__.py:183, in␣
 ↪ne_chunk(tagged_tokens, binary)
    181 else:
    182     chunker_pickle = _MULTICLASS_NE_CHUNKER
--> 183 chunker = load(chunker_pickle)
    184 return chunker.parse(tagged_tokens)

File ~\anaconda3\lib\site-packages\nltk\data.py:750, in load(resource_url,␣
 ↪format, cache, verbose, logic_parser, fstruct_reader, encoding)
    747     print(f"<<Loading {resource_url}>>")
    749 # Load the resource.
--> 750 opened_resource = _open(resource_url)
    752 if format == "raw":
    753     resource_val = opened_resource.read()

File ~\anaconda3\lib\site-packages\nltk\data.py:876, in _open(resource_url)
    873 protocol, path_ = split_resource_url(resource_url)
    875 if protocol is None or protocol.lower() == "nltk":
--> 876     return find(path_, path + [""]).open()
    877 elif protocol.lower() == "file":
    878     # urllib might not use mode='rb', so handle this one ourselves:
    879     return find(path_, [""]).open()

File ~\anaconda3\lib\site-packages\nltk\data.py:583, in find(resource_name,␣
 ↪paths)
    581 sep = "*" * 70
    582 resource_not_found = f"\n{sep}\n{msg}\n{sep}\n"
```

```
--> 583 raise LookupError(resource_not_found)

LookupError:
**********************************************************************
  Resource maxent_ne_chunker not found.
  Please use the NLTK Downloader to obtain the resource:

  >>> import nltk
  >>> nltk.download('maxent_ne_chunker')

  For more information see: https://www.nltk.org/data.html

  Attempted to load chunkers/maxent_ne_chunker/english_ace_multiclass.pickle

  Searched in:
    - 'C:\\Users\\Rakesh/nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\share\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\lib\\nltk_data'
    - 'C:\\Users\\Rakesh\\AppData\\Roaming\\nltk_data'
    - 'C:\\nltk_data'
    - 'D:\\nltk_data'
    - 'E:\\nltk_data'
    - ''
**********************************************************************
```

[13]:
```
nltk.download('maxent_ne_chunker')
```

```
[nltk_data] Downloading package maxent_ne_chunker to
[nltk_data]     C:\Users\Rakesh\AppData\Roaming\nltk_data…
[nltk_data]   Unzipping chunkers\maxent_ne_chunker.zip.
```

[13]: True

[14]:
```
entities = nltk.ne_chunk(part_speech)
entities
```

```
---------------------------------------------------------------------------
LookupError                               Traceback (most recent call last)
File ~\anaconda3\lib\site-packages\nltk\corpus\util.py:84, in LazyCorpusLoader.
 ↪__load(self)
     83 try:
---> 84     root = nltk.data.find(f"{self.subdir}/{zip_name}")
     85 except LookupError:
```

```
File ~\anaconda3\lib\site-packages\nltk\data.py:583, in find(resource_name,␣
 ↪paths)
    582 resource_not_found = f"\n{sep}\n{msg}\n{sep}\n"
--> 583 raise LookupError(resource_not_found)

LookupError:
**********************************************************************
  Resource words not found.
  Please use the NLTK Downloader to obtain the resource:

  >>> import nltk
  >>> nltk.download('words')

  For more information see: https://www.nltk.org/data.html

  Attempted to load corpora/words.zip/words/

  Searched in:
    - 'C:\\Users\\Rakesh/nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\share\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\lib\\nltk_data'
    - 'C:\\Users\\Rakesh\\AppData\\Roaming\\nltk_data'
    - 'C:\\nltk_data'
    - 'D:\\nltk_data'
    - 'E:\\nltk_data'
**********************************************************************


During handling of the above exception, another exception occurred:

LookupError                               Traceback (most recent call last)
Input In [14], in <cell line: 1>()
----> 1 entities = nltk.ne_chunk(part_speech)
      2 entities

File ~\anaconda3\lib\site-packages\nltk\chunk\__init__.py:184, in␣
 ↪ne_chunk(tagged_tokens, binary)
    182     chunker_pickle = _MULTICLASS_NE_CHUNKER
    183 chunker = load(chunker_pickle)
--> 184 return chunker.parse(tagged_tokens)

File ~\anaconda3\lib\site-packages\nltk\chunk\named_entity.py:127, in␣
 ↪NEChunkParser.parse(self, tokens)
    123 def parse(self, tokens):
    124     """
    125     Each token should be a pos-tagged word
```

```
    126     """
--> 127     tagged = self._tagger.tag(tokens)
    128     tree = self._tagged_to_parse(tagged)
    129     return tree

File ~\anaconda3\lib\site-packages\nltk\tag\sequential.py:61, in␣
 ↪SequentialBackoffTagger.tag(self, tokens)
     59 tags = []
     60 for i in range(len(tokens)):
---> 61     tags.append(self.tag_one(tokens, i, tags))
     62 return list(zip(tokens, tags))

File ~\anaconda3\lib\site-packages\nltk\tag\sequential.py:81, in␣
 ↪SequentialBackoffTagger.tag_one(self, tokens, index, history)
     79 tag = None
     80 for tagger in self._taggers:
---> 81     tag = tagger.choose_tag(tokens, index, history)
     82     if tag is not None:
     83         break

File ~\anaconda3\lib\site-packages\nltk\tag\sequential.py:647, in␣
 ↪ClassifierBasedTagger.choose_tag(self, tokens, index, history)
    645 def choose_tag(self, tokens, index, history):
    646     # Use our feature detector to get the featureset.
--> 647     featureset = self.feature_detector(tokens, index, history)
    649     # Use the classifier to pick a tag.  If a cutoff probability
    650     # was specified, then check that the tag's probability is
    651     # higher than that cutoff first; otherwise, return None.
    652     if self._cutoff_prob is None:

File ~\anaconda3\lib\site-packages\nltk\tag\sequential.py:694, in␣
 ↪ClassifierBasedTagger.feature_detector(self, tokens, index, history)
    684 def feature_detector(self, tokens, index, history):
    685     """
    686     Return the feature detector that this tagger uses to generate
    687     featuresets for its classifier.  The feature detector is a
   (…)
    692     See ``classifier()``
    693     """
--> 694     return self._feature_detector(tokens, index, history)

File ~\anaconda3\lib\site-packages\nltk\chunk\named_entity.py:101, in␣
 ↪NEChunkParserTagger._feature_detector(self, tokens, index, history)
     90     nextnextpos = tokens[index + 2][1].lower()
     92 # 89.6
     93 features = {
     94     "bias": True,
     95     "shape": shape(word),
```

```
     96     "wordlen": len(word),
     97     "prefix3": word[:3].lower(),
     98     "suffix3": word[-3:].lower(),
     99     "pos": pos,
    100     "word": word,
--> 101     "en-wordlist": (word in self._english_wordlist()),
    102     "prevtag": prevtag,
    103     "prevpos": prevpos,
    104     "nextpos": nextpos,
    105     "prevword": prevword,
    106     "nextword": nextword,
    107     "word+nextpos": f"{word.lower()}+{nextpos}",
    108     "pos+prevtag": f"{pos}+{prevtag}",
    109     "shape+prevtag": f"{prevshape}+{prevtag}",
    110 }
    112 return features

File ~\anaconda3\lib\site-packages\nltk\chunk\named_entity.py:52, in␣
 ↪NEChunkParserTagger._english_wordlist(self)
     49 except AttributeError:
     50     from nltk.corpus import words
---> 52     self._en_wordlist = set(words.words("en-basic"))
     53     wl = self._en_wordlist
     54 return wl

File ~\anaconda3\lib\site-packages\nltk\corpus\util.py:121, in LazyCorpusLoader
 ↪__getattr__(self, attr)
    118 if attr == "__bases__":
    119     raise AttributeError("LazyCorpusLoader object has no attribute␣
 ↪'__bases__'")
--> 121 self.__load()
    122 # This looks circular, but its not, since __load() changes our
    123 # __class__ to something new:
    124 return getattr(self, attr)

File ~\anaconda3\lib\site-packages\nltk\corpus\util.py:86, in LazyCorpusLoader.
 ↪__load(self)
     84             root = nltk.data.find(f"{self.subdir}/{zip_name}")
     85         except LookupError:
---> 86             raise e
     88 # Load the corpus.
     89 corpus = self.__reader_cls(root, *self.__args, **self.__kwargs)

File ~\anaconda3\lib\site-packages\nltk\corpus\util.py:81, in LazyCorpusLoader.
 ↪__load(self)
     79 else:
     80     try:
---> 81         root = nltk.data.find(f"{self.subdir}/{self.__name}")
```

```
     82     except LookupError as e:
     83         try:

File ~\anaconda3\lib\site-packages\nltk\data.py:583, in find(resource_name,␣
 ↪paths)
    581 sep = "*" * 70
    582 resource_not_found = f"\n{sep}\n{msg}\n{sep}\n"
--> 583 raise LookupError(resource_not_found)

LookupError:
**********************************************************************
  Resource words not found.
  Please use the NLTK Downloader to obtain the resource:

  >>> import nltk
  >>> nltk.download('words')

  For more information see: https://www.nltk.org/data.html

  Attempted to load corpora/words

  Searched in:
    - 'C:\\Users\\Rakesh/nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\share\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\lib\\nltk_data'
    - 'C:\\Users\\Rakesh\\AppData\\Roaming\\nltk_data'
    - 'C:\\nltk_data'
    - 'D:\\nltk_data'
    - 'E:\\nltk_data'
**********************************************************************
```

[15]:
```
nltk.download('words')
```

```
[nltk_data] Downloading package words to
[nltk_data]     C:\Users\Rakesh\AppData\Roaming\nltk_data…
[nltk_data]   Unzipping corpora\words.zip.
```

[15]: True

[12]:
```
entities = nltk.ne_chunk(part_speech)
entities
```

```
---------------------------------------------------------------------------
ModuleNotFoundError                       Traceback (most recent call last)
```

```
File ~\anaconda3\lib\site-packages\IPython\core\formatters.py:343, in␣
 ↪BaseFormatter.__call__(self, obj)
    341     method = get_real_method(obj, self.print_method)
    342     if method is not None:
--> 343         return method()
    344     return None
    345 else:

File ~\anaconda3\lib\site-packages\nltk\tree\tree.py:783, in Tree.
 ↪_repr_svg_(self)
    782 def _repr_svg_(self):
--> 783     from svgling import draw_tree
    785     return draw_tree(self)._repr_svg_()

ModuleNotFoundError: No module named 'svgling'
```

[12]:
```
Tree('S', [('This', 'DT'), ('oatmeal', 'NN'), ('is', 'VBZ'), ('not', 'RB'),
('good', 'JJ'), ('.', '.'), ('Its', 'PRP$'), ('mushy', 'NN'), (',', ','),
('soft', 'JJ'), (',', ','), ('I', 'PRP'), ('do', 'VBP'), ("n't", 'RB'), ('like',
'VB'), ('it', 'PRP'), ('.', '.'), Tree('ORGANIZATION', [('Quaker', 'NNP'),
('Oats', 'NNPS')]), ('is', 'VBZ'), ('the', 'DT'), ('way', 'NN'), ('to', 'TO'),
('go', 'VB'), ('.', '.')])
```

[13]:
```
entities.pprint()
```

```
(S
  This/DT
  oatmeal/NN
  is/VBZ
  not/RB
  good/JJ
  ./.
  Its/PRP$
  mushy/NN
  ,/,
  soft/JJ
  ,/,
  I/PRP
  do/VBP
  n't/RB
  like/VB
  it/PRP
  ./.
  (ORGANIZATION Quaker/NNP Oats/NNPS)
  is/VBZ
  the/DT
  way/NN
```

```
to/TO
go/VB
./.)
```

0.1 Step 1. VADER Seniment Scoring

We will use NLTK's SentimentIntensityAnalyzer to get the neg/neu/pos scores of the text.

This uses a "bag of words" approach: Stop words are removed each word is scored and combined to a total score.

[24]:
```
from nltk.sentiment import SentimentIntensityAnalyzer
from tqdm.notebook import tqdm
sia = SentimentIntensityAnalyzer()
```

```
---------------------------------------------------------------------------
LookupError                               Traceback (most recent call last)
Input In [24], in <cell line: 3>()
      1 from nltk.sentiment import SentimentIntensityAnalyzer
      2 from tqdm.notebook import tqdm
----> 3 sia = SentimentIntensityAnalyzer()

File ~\anaconda3\lib\site-packages\nltk\sentiment\vader.py:340, in␣
 ↪SentimentIntensityAnalyzer.__init__(self, lexicon_file)
    336 def __init__(
    337     self,
    338     lexicon_file="sentiment/vader_lexicon.zip/vader_lexicon/
 ↪vader_lexicon.txt",
    339 ):
--> 340     self.lexicon_file = nltk.data.load(lexicon_file)
    341     self.lexicon = self.make_lex_dict()
    342     self.constants = VaderConstants()

File ~\anaconda3\lib\site-packages\nltk\data.py:750, in load(resource_url,␣
 ↪format, cache, verbose, logic_parser, fstruct_reader, encoding)
    747     print(f"<<Loading {resource_url}>>")
    749 # Load the resource.
--> 750 opened_resource = _open(resource_url)
    752 if format == "raw":
    753     resource_val = opened_resource.read()

File ~\anaconda3\lib\site-packages\nltk\data.py:876, in _open(resource_url)
    873 protocol, path_ = split_resource_url(resource_url)
    875 if protocol is None or protocol.lower() == "nltk":
--> 876     return find(path_, path + [""]).open()
    877 elif protocol.lower() == "file":
    878     # urllib might not use mode='rb', so handle this one ourselves:
    879     return find(path_, [""]).open()
```

```
File ~\anaconda3\lib\site-packages\nltk\data.py:583, in find(resource_name,␣
 ↪paths)
    581 sep = "*" * 70
    582 resource_not_found = f"\n{sep}\n{msg}\n{sep}\n"
--> 583 raise LookupError(resource_not_found)

LookupError:
**********************************************************************
  Resource vader_lexicon not found.
  Please use the NLTK Downloader to obtain the resource:

  >>> import nltk
  >>> nltk.download('vader_lexicon')

  For more information see: https://www.nltk.org/data.html

  Attempted to load sentiment/vader_lexicon.zip/vader_lexicon/vader_lexicon.txt

  Searched in:
    - 'C:\\Users\\Rakesh/nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\share\\nltk_data'
    - 'C:\\Users\\Rakesh\\anaconda3\\lib\\nltk_data'
    - 'C:\\Users\\Rakesh\\AppData\\Roaming\\nltk_data'
    - 'C:\\nltk_data'
    - 'D:\\nltk_data'
    - 'E:\\nltk_data'
    - ''
**********************************************************************
```

[19]:

```
Requirement already satisfied: tqdm in c:\users\rakesh\anaconda3\lib\site-
packages (4.64.0)
Requirement already satisfied: colorama in c:\users\rakesh\anaconda3\lib\site-
packages (from tqdm) (0.4.4)
```

[25]:
```
nltk.download('vader_lexicon')
```

```
[nltk_data] Downloading package vader_lexicon to
[nltk_data]     C:\Users\Rakesh\AppData\Roaming\nltk_data…
```

[25]: True

[14]:
```
from nltk.sentiment import SentimentIntensityAnalyzer
from tqdm.notebook import tqdm
sia = SentimentIntensityAnalyzer()
```

[15]:
```
sia.polarity_scores(" i am so exited")
```

[15]:
```
{'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0}
```

[16]:
```
sia.polarity_scores(" i am so happy")
```

[16]:
```
{'neg': 0.0, 'neu': 0.334, 'pos': 0.666, 'compound': 0.6115}
```

[17]:
```
sia.polarity_scores(example)
```

[17]:
```
{'neg': 0.22, 'neu': 0.78, 'pos': 0.0, 'compound': -0.5448}
```

[18]:
```
result={}
for i , row in tqdm(df.iterrows() , total=len(df)):
    text_from_data = row['Text']
    myid=row['Id']
    result[myid] = sia.polarity_scores(text_from_data)
```

```
  0%|          | 0/500 [00:00<?, ?it/s]
```

[19]:
```
result
```

[19]:
```
{1: {'neg': 0.0, 'neu': 0.695, 'pos': 0.305, 'compound': 0.9441},
 2: {'neg': 0.138, 'neu': 0.862, 'pos': 0.0, 'compound': -0.5664},
 3: {'neg': 0.091, 'neu': 0.754, 'pos': 0.155, 'compound': 0.8265},
 4: {'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0},
 5: {'neg': 0.0, 'neu': 0.552, 'pos': 0.448, 'compound': 0.9468},
 6: {'neg': 0.029, 'neu': 0.809, 'pos': 0.163, 'compound': 0.883},
 7: {'neg': 0.034, 'neu': 0.693, 'pos': 0.273, 'compound': 0.9346},
 8: {'neg': 0.0, 'neu': 0.52, 'pos': 0.48, 'compound': 0.9487},
 9: {'neg': 0.0, 'neu': 0.851, 'pos': 0.149, 'compound': 0.6369},
 10: {'neg': 0.0, 'neu': 0.705, 'pos': 0.295, 'compound': 0.8313},
 11: {'neg': 0.017, 'neu': 0.846, 'pos': 0.137, 'compound': 0.9746},
 12: {'neg': 0.113, 'neu': 0.887, 'pos': 0.0, 'compound': -0.7579},
 13: {'neg': 0.031, 'neu': 0.923, 'pos': 0.046, 'compound': 0.296},
 14: {'neg': 0.0, 'neu': 0.355, 'pos': 0.645, 'compound': 0.9466},
 15: {'neg': 0.104, 'neu': 0.632, 'pos': 0.264, 'compound': 0.6486},
 16: {'neg': 0.0, 'neu': 0.861, 'pos': 0.139, 'compound': 0.5719},
 17: {'neg': 0.097, 'neu': 0.694, 'pos': 0.209, 'compound': 0.7481},
 18: {'neg': 0.0, 'neu': 0.61, 'pos': 0.39, 'compound': 0.8883},
 19: {'neg': 0.012, 'neu': 0.885, 'pos': 0.103, 'compound': 0.8957},
 20: {'neg': 0.0, 'neu': 0.863, 'pos': 0.137, 'compound': 0.6077},
```

21: {'neg': 0.0, 'neu': 0.865, 'pos': 0.135, 'compound': 0.6249},
22: {'neg': 0.0, 'neu': 0.739, 'pos': 0.261, 'compound': 0.9153},
23: {'neg': 0.0, 'neu': 0.768, 'pos': 0.232, 'compound': 0.7687},
24: {'neg': 0.085, 'neu': 0.771, 'pos': 0.143, 'compound': 0.2617},
25: {'neg': 0.038, 'neu': 0.895, 'pos': 0.068, 'compound': 0.3939},
26: {'neg': 0.0, 'neu': 1.0, 'pos': 0.0, 'compound': 0.0},
27: {'neg': 0.128, 'neu': 0.872, 'pos': 0.0, 'compound': -0.296},
28: {'neg': 0.04, 'neu': 0.808, 'pos': 0.152, 'compound': 0.5956},
29: {'neg': 0.022, 'neu': 0.669, 'pos': 0.309, 'compound': 0.9913},
30: {'neg': 0.017, 'neu': 0.846, 'pos': 0.137, 'compound': 0.9746},
31: {'neg': 0.041, 'neu': 0.692, 'pos': 0.267, 'compound': 0.9713},
32: {'neg': 0.0, 'neu': 0.484, 'pos': 0.516, 'compound': 0.9153},
33: {'neg': 0.069, 'neu': 0.839, 'pos': 0.092, 'compound': 0.7103},
34: {'neg': 0.024, 'neu': 0.72, 'pos': 0.256, 'compound': 0.9779},
35: {'neg': 0.0, 'neu': 0.874, 'pos': 0.126, 'compound': 0.9091},
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 493: {'neg': 0.056, 'neu': 0.855, 'pos': 0.089, 'compound': 0.5976},
 494: {'neg': 0.1, 'neu': 0.645, 'pos': 0.254, 'compound': 0.6486},
 495: {'neg': 0.0, 'neu': 0.788, 'pos': 0.212, 'compound': 0.9743},
 496: {'neg': 0.0, 'neu': 0.554, 'pos': 0.446, 'compound': 0.9725},
 497: {'neg': 0.059, 'neu': 0.799, 'pos': 0.142, 'compound': 0.7833},
 498: {'neg': 0.025, 'neu': 0.762, 'pos': 0.212, 'compound': 0.9848},
 499: {'neg': 0.041, 'neu': 0.904, 'pos': 0.055, 'compound': 0.128},
 500: {'neg': 0.0, 'neu': 0.678, 'pos': 0.322, 'compound': 0.9811}}
```

[20]:
```
pd.DataFrame(result) #store the above in pandas dictionary
```

[20]:
```
                1       2       3    4       5      6       7       8       9    \
neg        0.0000  0.1380  0.0910  0.0  0.0000  0.029  0.0340  0.0000  0.0000
neu        0.6950  0.8620  0.7540  1.0  0.5520  0.809  0.6930  0.5200  0.8510
pos        0.3050  0.0000  0.1550  0.0  0.4480  0.163  0.2730  0.4800  0.1490
compound   0.9441 -0.5664  0.8265  0.0  0.9468  0.883  0.9346  0.9487  0.6369

                10   …     491     492     493     494     495     496     497  \
neg        0.0000   …  0.0550  0.0000  0.0560  0.1000  0.0000  0.0000  0.0590
neu        0.7050   …  0.7040  0.7170  0.8550  0.6450  0.7880  0.5540  0.7990
pos        0.2950   …  0.2410  0.2830  0.0890  0.2540  0.2120  0.4460  0.1420
compound   0.8313   …  0.9287  0.9367  0.5976  0.6486  0.9743  0.9725  0.7833

                498    499     500
neg        0.0250  0.041  0.0000
neu        0.7620  0.904  0.6780
pos        0.2120  0.055  0.3220
compound   0.9848  0.128  0.9811

[4 rows x 500 columns]
```

[21]:
```
pd.DataFrame(result).T
```

[21]:
```
       neg    neu    pos  compound
1    0.000  0.695  0.305    0.9441
2    0.138  0.862  0.000   -0.5664
3    0.091  0.754  0.155    0.8265
4    0.000  1.000  0.000    0.0000
5    0.000  0.552  0.448    0.9468
..     …    …    …       …
496  0.000  0.554  0.446    0.9725
497  0.059  0.799  0.142    0.7833
498  0.025  0.762  0.212    0.9848
499  0.041  0.904  0.055    0.1280
500  0.000  0.678  0.322    0.9811
```

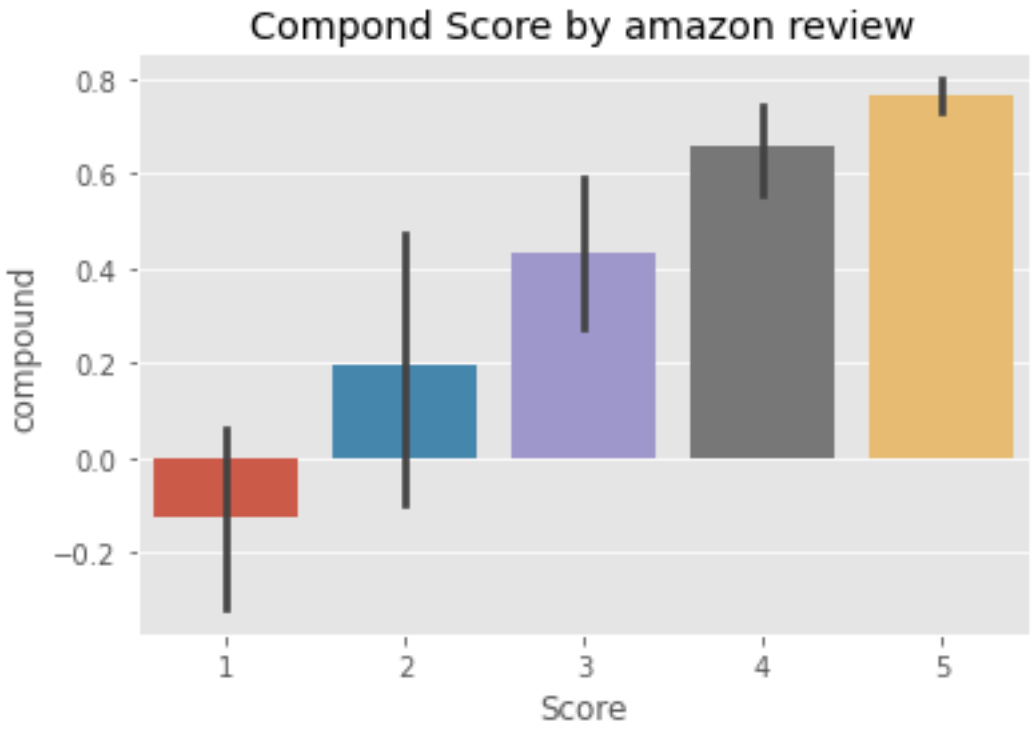
```
[500 rows x 4 columns]
```

[23]:
```
vaders = pd.DataFrame(result).T
vaders = vaders.reset_index().rename(columns = {'index' : 'Id'})
vaders = vaders.merge(df , how='left')
vaders.head(3)
```

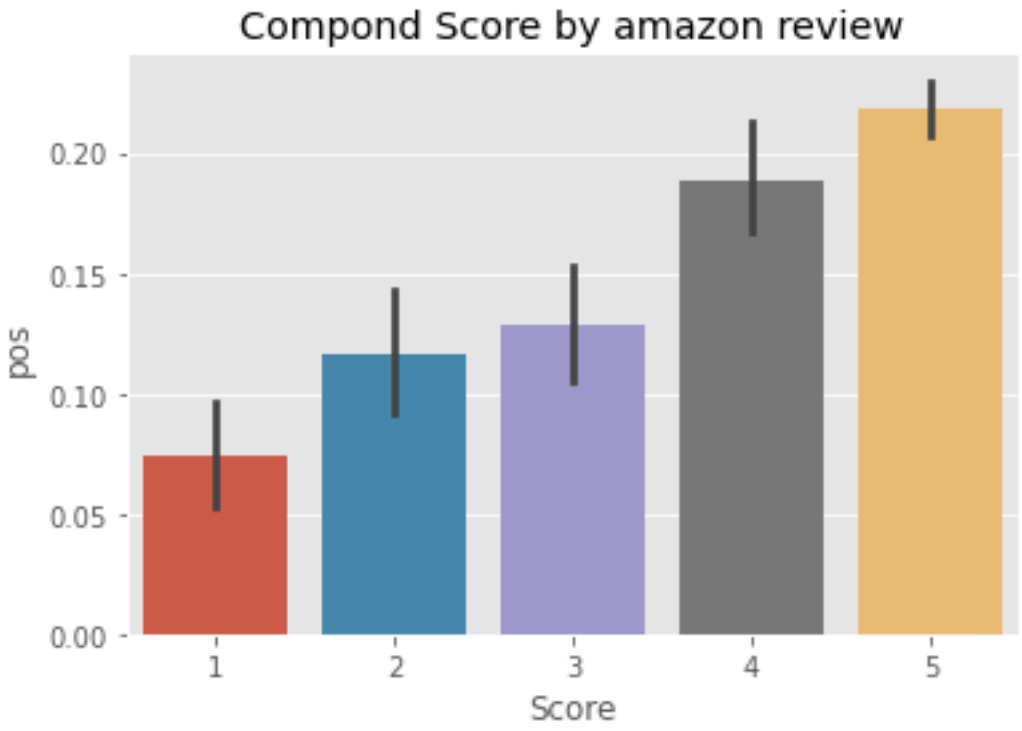
[23]:

	Id	neg	neu	pos	compound	ProductId	UserId	ProfileName	HelpfulnessNumerator	HelpfulnessDenominator	Score	Time	Summary	Text
0	1	0.000	0.695	0.305	0.9441	B001E4KFG0	A3SGXH7AUHU8GW	delmartian	1	1	5	1303862400	Good Quality Dog Food	I have bought several of the Vitality canned d…
1	2	0.138	0.862	0.000	-0.5664	B00813GRG4	A1D87F6ZCVE5NK	dll pa	0	0	1	1346976000	Not as Advertised	Product arrived labeled as Jumbo Salted Peanut…
2	3	0.091	0.754	0.155	0.8265	B000LQOCH0	ABXLMWJIXXAIN	Natalia Corres "Natalia Corres"	1	1	4	1219017600	"Delight" says it all	This is a confection that has been around a fe…

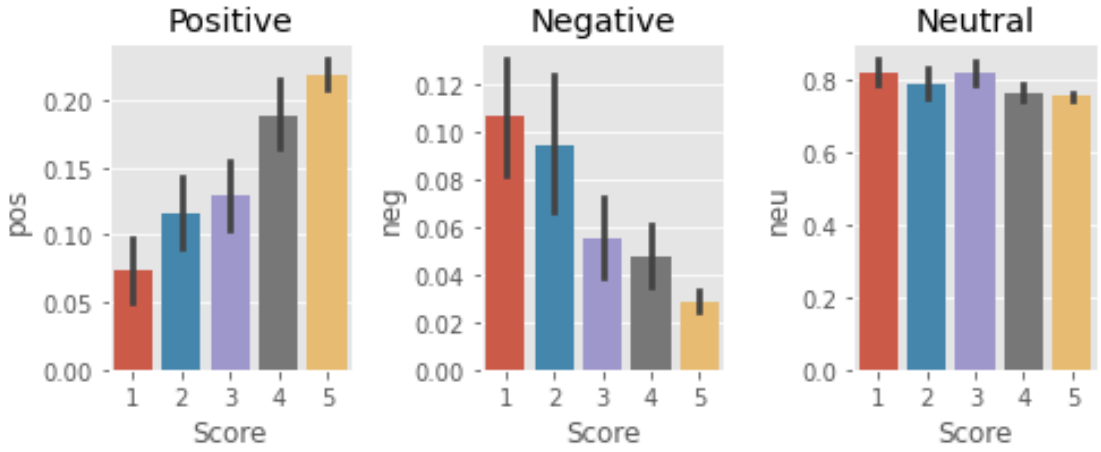
[24]:
```
ax = sns.barplot(data=vaders, x='Score' , y ='compound')
ax.set_title('Compond Score by amazon review')
plt.show()
```



[25]:
```
ax = sns.barplot(data=vaders, x='Score' , y ='pos')
ax.set_title('Compond Score by amazon review')
plt.show()
```



[26]:
```
fig , axs= plt.subplots(1,3,figsize=(7,3))
sns.barplot(data=vaders, x='Score' , y ='pos' , ax=axs[0])
sns.barplot(data=vaders, x='Score' , y ='neg' , ax=axs[1])
sns.barplot(data=vaders, x='Score' , y ='neu' , ax=axs[2])
axs[0].set_title('Positive')
axs[1].set_title('Negative')
axs[2].set_title('Neutral')
plt.tight_layout()
plt.show()
```



0.1.1 Roberta Pretrained Model Hugging Face

Use a model trained of a large corpus of data. Transformer model accounts for the words but also the context related to other words.

[55]:
```
!pip install transformers
```

```
Collecting transformers
  Downloading transformers-4.28.1-py3-none-any.whl (7.0 MB)
Requirement already satisfied: regex!=2019.12.17 in
c:\users\rakesh\anaconda3\lib\site-packages (from transformers) (2022.3.15)
Requirement already satisfied: filelock in c:\users\rakesh\anaconda3\lib\site-
packages (from transformers) (3.6.0)
Requirement already satisfied: tqdm>=4.27 in c:\users\rakesh\anaconda3\lib\site-
packages (from transformers) (4.64.0)
Collecting tokenizers!=0.11.3,<0.14,>=0.11.1
  Downloading tokenizers-0.13.3-cp39-cp39-win_amd64.whl (3.5 MB)
Requirement already satisfied: numpy>=1.17 in
c:\users\rakesh\anaconda3\lib\site-packages (from transformers) (1.21.5)
Requirement already satisfied: requests in c:\users\rakesh\anaconda3\lib\site-
packages (from transformers) (2.27.1)
Requirement already satisfied: packaging>=20.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from transformers) (21.3)
Collecting huggingface-hub<1.0,>=0.11.0
  Downloading huggingface_hub-0.13.4-py3-none-any.whl (200 kB)
Requirement already satisfied: pyyaml>=5.1 in
c:\users\rakesh\anaconda3\lib\site-packages (from transformers) (6.0)
Requirement already satisfied: typing-extensions>=3.7.4.3 in
c:\users\rakesh\anaconda3\lib\site-packages (from huggingface-
hub<1.0,>=0.11.0->transformers) (4.1.1)
Requirement already satisfied: pyparsing!=3.0.5,>=2.0.2 in
c:\users\rakesh\anaconda3\lib\site-packages (from packaging>=20.0->transformers)
(3.0.4)
Requirement already satisfied: colorama in c:\users\rakesh\anaconda3\lib\site-
packages (from tqdm>=4.27->transformers) (0.4.4)
Requirement already satisfied: charset-normalizer~=2.0.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->transformers)
(2.0.4)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->transformers)
(1.26.9)
Requirement already satisfied: idna<4,>=2.5 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->transformers) (3.3)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->transformers)
```

```
(2021.10.8)
Installing collected packages: tokenizers, huggingface-hub, transformers
Successfully installed huggingface-hub-0.13.4 tokenizers-0.13.3
transformers-4.28.1
```

[57]:
```
!pip install scipy
```

```
Requirement already satisfied: scipy in c:\users\rakesh\anaconda3\lib\site-
packages (1.7.3)
Requirement already satisfied: numpy<1.23.0,>=1.16.5 in
c:\users\rakesh\anaconda3\lib\site-packages (from scipy) (1.21.5)
```

[27]:
```
from transformers import AutoTokenizer
from transformers import AutoModelForSequenceClassification
from scipy.special import softmax
```

[28]:
```
MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
tokenizer = AutoTokenizer.from_pretrained(MODEL)
model = AutoModelForSequenceClassification.from_pretrained(MODEL)
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
Input In [28], in <cell line: 3>()
      1 MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
      2 tokenizer = AutoTokenizer.from_pretrained(MODEL)
----> 3 model = AutoModelForSequenceClassification.from_pretrained(MODEL)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1086, in␣
 ↪DummyObject.__getattribute__(cls, key)
   1084 if key.startswith("_") and key != "_from_config":
   1085     return super().__getattribute__(key)
-> 1086 requires_backends(cls, cls._backends)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1065, in␣
 ↪requires_backends(obj, backends)
   1063 # Raise an error for users who might not realize that classes without␣
 ↪"TF" are torch-only
   1064 if "torch" in backends and "tf" not in backends and not␣
 ↪is_torch_available() and is_tf_available():
-> 1065     raise ImportError(PYTORCH_IMPORT_ERROR_WITH_TF.format(name))
   1067 # Raise the inverse error for PyTorch users trying to load TF classes
   1068 if "tf" in backends and "torch" not in backends and is_torch_available(␣
 ↪and not is_tf_available():

ImportError:
AutoModelForSequenceClassification requires the PyTorch library but it was not␣
 ↪found in your environment.
However, we were able to find a TensorFlow installation. TensorFlow classes beg n
```

```
with "TF", but are otherwise identically named to our PyTorch classes. This
means that the TF equivalent of the class you tried to import would be␣
 ↪"TFAutoModelForSequenceClassification".
If you want to use TensorFlow, please use TF classes instead!

If you really do want to use PyTorch please go to
https://pytorch.org/get-started/locally/ and follow the instructions that
match your environment.
```

[29]:
```
!pip3 install torch torchvision torchaudio --index-url https://download.pytorch.
 ↪org/whl/cu117
```

```
Looking in indexes: https://download.pytorch.org/whl/cu117
Collecting torch
  Downloading https://download.pytorch.org/whl/cu117/torch-2.0.0%2Bcu117-cp39-cp
39-win_amd64.whl (2343.7 MB)
Collecting torchvision
  Downloading https://download.pytorch.org/whl/cu117/torchvision-0.15.1%2Bcu117-
cp39-cp39-win_amd64.whl (4.9 MB)
Collecting torchaudio
  Downloading https://download.pytorch.org/whl/cu117/torchaudio-2.0.1%2Bcu117-cp
39-cp39-win_amd64.whl (2.5 MB)
Requirement already satisfied: typing-extensions in
c:\users\rakesh\anaconda3\lib\site-packages (from torch) (4.1.1)
Requirement already satisfied: sympy in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (1.10.1)
Requirement already satisfied: jinja2 in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (2.11.3)
Requirement already satisfied: filelock in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (3.6.0)
Requirement already satisfied: networkx in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (2.7.1)
Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from torchvision) (9.0.1)
Requirement already satisfied: numpy in c:\users\rakesh\anaconda3\lib\site-
packages (from torchvision) (1.21.5)
Requirement already satisfied: requests in c:\users\rakesh\anaconda3\lib\site-
packages (from torchvision) (2.27.1)
Requirement already satisfied: MarkupSafe>=0.23 in
c:\users\rakesh\anaconda3\lib\site-packages (from jinja2->torch) (2.0.1)
Requirement already satisfied: idna<4,>=2.5 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision) (3.3)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision)
(2021.10.8)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
```

```
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision)
(1.26.9)
Requirement already satisfied: charset-normalizer~=2.0.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision) (2.0.4)
Requirement already satisfied: mpmath>=0.19 in
c:\users\rakesh\anaconda3\lib\site-packages (from sympy->torch) (1.2.1)
Installing collected packages: torch, torchvision, torchaudio
Successfully installed torch-2.0.0+cu117 torchaudio-2.0.1+cu117
torchvision-0.15.1+cu117
```

[30]:
```
MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
tokenizer = AutoTokenizer.from_pretrained(MODEL)
model = AutoModelForSequenceClassification.from_pretrained(MODEL)
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
Input In [30], in <cell line: 3>()
      1 MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
      2 tokenizer = AutoTokenizer.from_pretrained(MODEL)
----> 3 model = AutoModelForSequenceClassification.from_pretrained(MODEL)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1086, in␣
 ↪DummyObject.__getattribute__(cls, key)
   1084 if key.startswith("_") and key != "_from_config":
   1085     return super().__getattribute__(key)
-> 1086 requires_backends(cls, cls._backends)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1065, in␣
 ↪requires_backends(obj, backends)
   1063 # Raise an error for users who might not realize that classes without␣
 ↪"TF" are torch-only
   1064 if "torch" in backends and "tf" not in backends and not␣
 ↪is_torch_available() and is_tf_available():
-> 1065     raise ImportError(PYTORCH_IMPORT_ERROR_WITH_TF.format(name))
   1067 # Raise the inverse error for PyTorch users trying to load TF classes
   1068 if "tf" in backends and "torch" not in backends and is_torch_available( ␣
 ↪and not is_tf_available():

ImportError:
AutoModelForSequenceClassification requires the PyTorch library but it was not␣
 ↪found in your environment.
However, we were able to find a TensorFlow installation. TensorFlow classes beg n
with "TF", but are otherwise identically named to our PyTorch classes. This
means that the TF equivalent of the class you tried to import would be␣
 ↪"TFAutoModelForSequenceClassification".
If you want to use TensorFlow, please use TF classes instead!
```

```
If you really do want to use PyTorch please go to
https://pytorch.org/get-started/locally/ and follow the instructions that
match your environment.
```

[31]:
```
MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
tokenizer = AutoTokenizer.from_pretrained(MODEL)
model = AutoModelForSequenceClassification.from_pretrained(MODEL)
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
Input In [31], in <cell line: 3>()
      1 MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
      2 tokenizer = AutoTokenizer.from_pretrained(MODEL)
----> 3 model = AutoModelForSequenceClassification.from_pretrained(MODEL)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1086, in␣
 ↪DummyObject.__getattribute__(cls, key)
   1084 if key.startswith("_") and key != "_from_config":
   1085     return super().__getattribute__(key)
-> 1086 requires_backends(cls, cls._backends)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1065, in␣
 ↪requires_backends(obj, backends)
   1063 # Raise an error for users who might not realize that classes without␣
 ↪"TF" are torch-only
   1064 if "torch" in backends and "tf" not in backends and not␣
 ↪is_torch_available() and is_tf_available():
-> 1065     raise ImportError(PYTORCH_IMPORT_ERROR_WITH_TF.format(name))
   1067 # Raise the inverse error for PyTorch users trying to load TF classes
   1068 if "tf" in backends and "torch" not in backends and is_torch_available( ␣
 ↪and not is_tf_available():

ImportError:
AutoModelForSequenceClassification requires the PyTorch library but it was not␣
 ↪found in your environment.
However, we were able to find a TensorFlow installation. TensorFlow classes beg n
with "TF", but are otherwise identically named to our PyTorch classes. This
means that the TF equivalent of the class you tried to import would be␣
 ↪"TFAutoModelForSequenceClassification".
If you want to use TensorFlow, please use TF classes instead!

If you really do want to use PyTorch please go to
https://pytorch.org/get-started/locally/ and follow the instructions that
match your environment.
```

[32]:
```
import torch
```

[39]:
```
MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
tokenizer = AutoTokenizer.from_pretrained(MODEL)
model = AutoModelForSequenceClassification.from_pretrained(MODEL)
```

```
---------------------------------------------------------------------------
ImportError                               Traceback (most recent call last)
Input In [39], in <cell line: 3>()
      1 MODEL = f"cardiffnlp/twitter-roberta-base-sentiment"
      2 tokenizer = AutoTokenizer.from_pretrained(MODEL)
----> 3 model = AutoModelForSequenceClassification.from_pretrained(MODEL)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1086, in␣
 ↪DummyObject.__getattribute__(cls, key)
   1084 if key.startswith("_") and key != "_from_config":
   1085     return super().__getattribute__(key)
-> 1086 requires_backends(cls, cls._backends)

File ~\anaconda3\lib\site-packages\transformers\utils\import_utils.py:1065, in␣
 ↪requires_backends(obj, backends)
   1063 # Raise an error for users who might not realize that classes without␣
 ↪"TF" are torch-only
   1064 if "torch" in backends and "tf" not in backends and not␣
 ↪is_torch_available() and is_tf_available():
-> 1065     raise ImportError(PYTORCH_IMPORT_ERROR_WITH_TF.format(name))
   1067 # Raise the inverse error for PyTorch users trying to load TF classes
   1068 if "tf" in backends and "torch" not in backends and is_torch_available( ␣
 ↪and not is_tf_available():

ImportError:
AutoModelForSequenceClassification requires the PyTorch library but it was not␣
 ↪found in your environment.
However, we were able to find a TensorFlow installation. TensorFlow classes beg n
with "TF", but are otherwise identically named to our PyTorch classes. This
means that the TF equivalent of the class you tried to import would be␣
 ↪"TFAutoModelForSequenceClassification".
If you want to use TensorFlow, please use TF classes instead!

If you really do want to use PyTorch please go to
https://pytorch.org/get-started/locally/ and follow the instructions that
match your environment.
```

[34]:
```
torch.cuda.is_available()
```

[34]: False

[36]:
```
!pip3 install torch torchvision torchaudio
```

```
Requirement already satisfied: torch in c:\users\rakesh\anaconda3\lib\site-
packages (2.0.0+cu117)
Requirement already satisfied: torchvision in
c:\users\rakesh\anaconda3\lib\site-packages (0.15.1+cu117)
Requirement already satisfied: torchaudio in c:\users\rakesh\anaconda3\lib\site-
packages (2.0.1+cu117)
Requirement already satisfied: typing-extensions in
c:\users\rakesh\anaconda3\lib\site-packages (from torch) (4.1.1)
Requirement already satisfied: filelock in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (3.6.0)
Requirement already satisfied: networkx in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (2.7.1)
Requirement already satisfied: jinja2 in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (2.11.3)
Requirement already satisfied: sympy in c:\users\rakesh\anaconda3\lib\site-
packages (from torch) (1.10.1)
Requirement already satisfied: numpy in c:\users\rakesh\anaconda3\lib\site-
packages (from torchvision) (1.21.5)
Requirement already satisfied: pillow!=8.3.*,>=5.3.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from torchvision) (9.0.1)
Requirement already satisfied: requests in c:\users\rakesh\anaconda3\lib\site-
packages (from torchvision) (2.27.1)
Requirement already satisfied: MarkupSafe>=0.23 in
c:\users\rakesh\anaconda3\lib\site-packages (from jinja2->torch) (2.0.1)
Requirement already satisfied: charset-normalizer~=2.0.0 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision) (2.0.4)
Requirement already satisfied: certifi>=2017.4.17 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision)
(2021.10.8)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision)
(1.26.9)
Requirement already satisfied: idna<4,>=2.5 in
c:\users\rakesh\anaconda3\lib\site-packages (from requests->torchvision) (3.3)
Requirement already satisfied: mpmath>=0.19 in
c:\users\rakesh\anaconda3\lib\site-packages (from sympy->torch) (1.2.1)
```

[38]:
```
import torch
```

1 since could not use py torch and TF both at a time use kaagle ↑

2 Transformer Pipeline ↓

[40]:
```
from transformers import pipeline
```

[41]:
```
sentiment =pipeline("sentiment-analysis")
```

```
No model was supplied, defaulted to distilbert-base-uncased-finetuned-
sst-2-english and revision af0f99b (https://huggingface.co/distilbert-base-
uncased-finetuned-sst-2-english).
Using a pipeline without specifying a model name and revision in production is
not recommended.
```

```
Downloading (…)lve/main/config.json:   0%|          | 0.00/629 [00:00<?, ?B/s]
```

```
C:\Users\Rakesh\anaconda3\lib\site-
packages\huggingface_hub\file_download.py:133: UserWarning: `huggingface_hub`
cache-system uses symlinks by default to efficiently store duplicated files but
your machine does not support them in C:\Users\Rakesh\.cache\huggingface\hub.
Caching files will still work but in a degraded version that might require more
space on your disk. This warning can be disabled by setting the
`HF_HUB_DISABLE_SYMLINKS_WARNING` environment variable. For more details, see
https://huggingface.co/docs/huggingface_hub/how-to-cache#limitations.
To support symlinks on Windows, you either need to activate Developer Mode or to
run Python as an administrator. In order to see activate developer mode, see
this article: https://docs.microsoft.com/en-us/windows/apps/get-started/enable-
your-device-for-development
  warnings.warn(message)
```

```
Downloading tf_model.h5:   0%|          | 0.00/268M [00:00<?, ?B/s]
```

```
All model checkpoint layers were used when initializing
TFDistilBertForSequenceClassification.


All the layers of TFDistilBertForSequenceClassification were initialized from
the model checkpoint at distilbert-base-uncased-finetuned-sst-2-english.
If your task is similar to the task the model of the checkpoint was trained on,
you can already use TFDistilBertForSequenceClassification for predictions
without further training.
```

```
Downloading (…)okenizer_config.json:   0%|          | 0.00/48.0 [00:00<?, ?B/s]
```

```
Downloading (…)solve/main/vocab.txt:   0%|          | 0.00/232k [00:00<?, ?B/s]
```

[43]:
```
sentiment('i love programing')
```

[43]:
```
[{'label': 'POSITIVE', 'score': 0.99981290102005}]
```

[44]:
```
sentiment('you are chines')
```

[44]:
```
[{'label': 'POSITIVE', 'score': 0.9925854802131653}]
```

[ ]:
```
sentiment('you are chine')
```