# Building an NLP Sentiment Analysis Pipeline In Python

Reference:https://www.linkedin.com/advice/0/how-do-you-design-implement-nlp-pipelines#:~:text=An%20NLP%20pipeline%20is%20a,entity%20recognition%2C%20or%20sentiment%20analysis.

2.https://www.geeksforgeeks.org/natural-language-processing-nlp-pipeline/

1.Data Acquisition

2.Text Cleaning

Unicode normalisation:Symbols,Emojis,Special Characters Regex:String pattern based removal of email,Phine number,URL Spellingm Correction:Web scraped data - Create a corpus or dictionary of misspelled word

3.Text Preprocessing

Words to be separated at the minimum level Tokenization Lowercasing Stop words removal Stemming/Lemmatization POS tagging - Assign Parts of speech to each word in the text(NER,Sentimental Analysis& Machine translation)

4.Feature Engineering

Text vectorization/Representation Classical approach: One hot encoding Bag of words Bag of n-grams TF-TDF Neural approach or Word Embedding: To understand the contextual meaning Continous Bag of word Skip gram Pre trained word embedding - Use large corpus --Import Gensim or hugging face Word2Vec by Google,GloVe by stanford

5.Building Model

6.Evaluation

## Data Acquisition - https://www.kaggle.com/datasets/abhi8923shriv/sentiment-analysis-dataset

## Import necessary Libraries

```
import pandas as pd
import re
import nltk
import numpy as np
```

Load dataset

```
data_reference  = pd.read_csv(r"E:\NLP\Lab\dataset\
train.csv",encoding='latin1')
```

```
data_reference.head(5)
```

```
       textID                                                text  \
0  cb774db0d1                I`d have responded, if I were going
1  549e992a42      Sooo SAD I will miss you here in San Diego!!!
2  088c60f138                          my boss is bullying me...
3  9642c003ef                     what interview! leave me alone
4  358bd9e861   Sons of ****, why couldn`t they put them on t...

                        selected_text sentiment Time of Tweet Age of
User  \
0  I`d have responded, if I were going   neutral       morning
0-20
1                            Sooo SAD  negative          noon
21-30
2                      bullying me  negative         night
31-45
3                     leave me alone  negative       morning
46-60
4                      Sons of ****,  negative          noon
60-70

       Country  Population -2020  Land Area (Km²)  Density (P/Km²)
0  Afghanistan          38928346         652860.0               60
1      Albania           2877797          27400.0              105
2      Algeria          43851044        2381740.0               18
3      Andorra             77265            470.0              164
4       Angola          32866272        1246700.0               26
```

```
def load_dataset(file):
        data = pd.read_csv(file,encoding='latin1')
        data.drop_duplicates(inplace=True)
        data.dropna(inplace=True)
        selected_colums=['text','sentiment']
        data=data[selected_colums]
        data=pd.DataFrame(data)
        return data

train_data = load_dataset(r"E:\NLP\Lab\dataset\train.csv")
test_data =load_dataset(r"E:\NLP\Lab\dataset\test.csv")

train_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 27480 entries, 0 to 27480
Data columns (total 2 columns):
 #   Column     Non-Null Count  Dtype
---  ------     --------------  -----
 0   text       27480 non-null  object
 1   sentiment  27480 non-null  object
```

```
dtypes: object(2)
memory usage: 644.1+ KB
```

```
type(train_data)
```

```
pandas.core.frame.DataFrame
```

```
train_data
```

```
                                                      text sentiment
0                     I`d have responded, if I were going   neutral
1          Sooo SAD I will miss you here in San Diego!!!  negative
2                              my boss is bullying me...  negative
3                         what interview! leave me alone  negative
4       Sons of ****, why couldn`t they put them on t...  negative
...                                                  ...       ...
27476   wish we could come see u on Denver  husband l...  negative
27477   I`ve wondered about rake to.  The client has ...  negative
27478   Yay good for both of you. Enjoy the break - y...  positive
27479                          But it was worth it  ****.  positive
27480     All this flirting going on - The ATG smiles...   neutral

[27480 rows x 2 columns]
```

```
test_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 3534 entries, 0 to 3533
Data columns (total 2 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   text       3534 non-null   object
 1   sentiment  3534 non-null   object
dtypes: object(2)
memory usage: 82.8+ KB
```

```
data_reference = data_reference.iloc[:,:4]
```

```
data_reference
```

```
           textID
text  \
0      cb774db0d1                I`d have responded, if I were going

1      549e992a42      Sooo SAD I will miss you here in San Diego!!!

2      088c60f138                          my boss is bullying me...

3      9642c003ef                     what interview! leave me alone

4      358bd9e861   Sons of ****, why couldn`t they put them on t...
```

```
...          ...                                                  ...

27476  4eac33d1c0   wish we could come see u on Denver  husband l...

27477  4f4c4fc327   I`ve wondered about rake to.  The client has ...

27478  f67aae2310   Yay good for both of you. Enjoy the break - y...

27479  ed167662a5                          But it was worth it  ****.

27480  6f7127d9d7     All this flirting going on - The ATG smiles...


                                          selected_text sentiment
0                    I`d have responded, if I were going   neutral
1                                              Sooo SAD  negative
2                                         bullying me  negative
3                                       leave me alone  negative
4                                        Sons of ****,  negative
...                                                ...       ...
27476                                          d lost  negative
27477                                   , don`t force  negative
27478                          Yay good for both of you.  positive
27479                         But it was worth it  ****.  positive
27480  All this flirting going on - The ATG smiles. Y...   neutral

[27481 rows x 4 columns]

data_reference =
data_reference.drop(['textID','selected_text'],axis=1)

data_reference

                                                    text sentiment
0                    I`d have responded, if I were going   neutral
1          Sooo SAD I will miss you here in San Diego!!!  negative
2                              my boss is bullying me...  negative
3                         what interview! leave me alone  negative
4       Sons of ****, why couldn`t they put them on t...  negative
...                                                  ...       ...
27476   wish we could come see u on Denver  husband l...  negative
27477   I`ve wondered about rake to.  The client has ...  negative
27478   Yay good for both of you. Enjoy the break - y...  positive
27479                          But it was worth it  ****.  positive
27480     All this flirting going on - The ATG smiles...   neutral

[27481 rows x 2 columns]
```

Label Encoding for the o/p columns - +ve , -ve and zero

```
from sklearn.preprocessing import LabelEncoder
le = LabelEncoder()
y_train = le.fit_transform(train_data['sentiment'])
y_test = le.transform(test_data['sentiment'])

y_train.shape
```

```
(27480,)
```

```
y_test
```

```
array([1, 2, 0, ..., 0, 2, 2])
```

## Text Cleaning

```
def preprocessing_1(data:str):
    data = data.strip()#Remove leading white spaces
    data = data.lower()#Convert to lower case
    url_pattern = re.compile(r"https?://\S+|www\.\S+")
    data = re.sub(url_pattern, "", data)
    username_pattern = re.compile(r"@\w+")
    data = re.sub(username_pattern, "", data)
    hashtag_pattern = re.compile(r"#\w+")
    data = re.sub(hashtag_pattern, "", data)
    data = re.sub(r"([a-zA-Z])\1{2,}", r'\1', data)
    data = re.sub(r'[^a-zA-Z\s]',"",data)#Remove special characters
    return data

train_data['preprocess_1']=train_data['text'].apply(preprocessing_1)
test_data['preprocess_1']=test_data['text'].apply(preprocessing_1)

train_data['preprocess_1']=train_data['text'].apply(preprocessing_1)

train_data
```

```
                                                    text sentiment  \
0                    I`d have responded, if I were going   neutral
1          Sooo SAD I will miss you here in San Diego!!!  negative
2                              my boss is bullying me...  negative
3                         what interview! leave me alone  negative
4       Sons of ****, why couldn`t they put them on t...  negative
...                                                   ...       ...
27476   wish we could come see u on Denver  husband l...  negative
27477   I`ve wondered about rake to.  The client has ...  negative
27478   Yay good for both of you. Enjoy the break - y...  positive
27479                          But it was worth it  ****.  positive
27480     All this flirting going on - The ATG smiles...   neutral

                                           preprocess_1
0                    id have responded if i were going
```

```
1               so sad i will miss you here in san diego
2                                 my boss is bullying me
3                            what interview leave me alone
4      sons of  why couldnt they put them on the rele...
...                                                  ...
27476  wish we could come see u on denver  husband lo...
27477  ive wondered about rake to  the client has mad...
27478  yay good for both of you enjoy the break  you ...
27479                                but it was worth it
27480  all this flirting going on  the atg smiles yay...

[27480 rows x 3 columns]
```

```
test_data
```

```
                                                   text sentiment  \
0     Last session of the day  http://twitpic.com/67ezh   neutral
1      Shanghai is also really exciting (precisely -...  positive
2     Recession hit Veronique Branquinho, she has to...  negative
3                                             happy bday!  positive
4                  http://twitpic.com/4w75p - I like it!!  positive
...                                                  ...       ...
3529  its at 3 am, im very tired but i can`t sleep  ...  negative
3530  All alone in this old house again.  Thanks for...  positive
3531   I know what you mean. My little dog is sinkin...  negative
3532  _sutra what is your next youtube video gonna b...  positive
3533   http://twitpic.com/4woj2 - omgssh  ang cute n...  positive

                                          preprocess_1
0                             last session of the day
1     shanghai is also really exciting precisely  sk...
2     recession hit veronique branquinho she has to ...
3                                             happy bday
4                                              i like it
...                                                  ...
3529  its at  am im very tired but i cant sleep  but...
3530  all alone in this old house again  thanks for ...
3531  i know what you mean my little dog is sinking ...
3532  sutra what is your next youtube video gonna be...
3533                              omgssh  ang cute ng bby

[3534 rows x 3 columns]
```

```
nltk.download('averaged_perceptron_tagger')
```

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

True
```

```
def preprocessing_2(data:str):
    data = nltk.word_tokenize(data)
    def get_pos(word):
        tag = nltk.pos_tag([word])[0][1].upper()
        tag_dict = {"N":"n","V":"v","R":"r","J":"a"}
        return tag_dict.get(tag,"n")
    lemma = nltk.stem.WordNetLemmatizer()
    data = [lemma.lemmatize(word,pos=get_pos(word))for word in data]
    return data

train_data['preprocess_2']=train_data["preprocess_1"].apply(preprocess
ing_2)

test_data['preprocess_2']=test_data["preprocess_1"].apply(preprocessin
g_2)

train_data
```

```
                                                    text sentiment  \
0                    I`d have responded, if I were going   neutral
1          Sooo SAD I will miss you here in San Diego!!!  negative
2                              my boss is bullying me...  negative
3                         what interview! leave me alone  negative
4       Sons of ****, why couldn`t they put them on t...  negative
...                                                   ...       ...
27476   wish we could come see u on Denver  husband l...  negative
27477   I`ve wondered about rake to.  The client has ...  negative
27478   Yay good for both of you. Enjoy the break - y...  positive
27479                           But it was worth it  ****.  positive
27480     All this flirting going on - The ATG smiles...   neutral

                                              preprocess_1  \
0                      id have responded if i were going
1                so sad i will miss you here in san diego
2                                my boss is bullying me
3                           what interview leave me alone
4      sons of  why couldnt they put them on the rele...
...                                                   ...
27476  wish we could come see u on denver  husband lo...
27477  ive wondered about rake to  the client has mad...
27478  yay good for both of you enjoy the break  you ...
27479                                but it was worth it
27480  all this flirting going on  the atg smiles yay...

                                              preprocess_2
0                [id, have, responded, if, i, were, going]
1      [so, sad, i, will, miss, you, here, in, san, d...
2                              [my, bos, is, bullying, me]
3                    [what, interview, leave, me, alone]
4      [son, of, why, couldnt, they, put, them, on, t...
```

```
...                                                          ...
27476  [wish, we, could, come, see, u, on, denver, hu...
27477  [ive, wondered, about, rake, to, the, client, ...
27478  [yay, good, for, both, of, you, enjoy, the, br...
27479                            [but, it, wa, worth, it]
27480  [all, this, flirting, going, on, the, atg, smi...

[27480 rows x 4 columns]
```

```
test_data.head(5)
```

```
                                                  text sentiment  \
0  Last session of the day  http://twitpic.com/67ezh   neutral
1   Shanghai is also really exciting (precisely -...  positive
2  Recession hit Veronique Branquinho, she has to...  negative
3                                        happy bday!  positive
4            http://twitpic.com/4w75p - I like it!!  positive

                                       preprocess_1  \
0                          last session of the day
1  shanghai is also really exciting precisely  sk...
2  recession hit veronique branquinho she has to ...
3                                        happy bday
4                                         i like it

                                       preprocess_2
0                      [last, session, of, the, day]
1  [shanghai, is, also, really, exciting, precise...
2  [recession, hit, veronique, branquinho, she, h...
3                                      [happy, bday]
4                                      [i, like, it]
```

```
train_data["documents"] = train_data["preprocess_2"].apply(lambda x :
" ".join(x))
test_data["documents"] = test_data["preprocess_2"].apply(lambda x : "
".join(x))
```

```
train_data.head(5)
```

```
                                                  text sentiment  \
0                I`d have responded, if I were going   neutral
1      Sooo SAD I will miss you here in San Diego!!!  negative
2                          my boss is bullying me...  negative
3                     what interview! leave me alone  negative
4   Sons of ****, why couldn`t they put them on t...  negative

                                       preprocess_1  \
0                   id have responded if i were going
1           so sad i will miss you here in san diego
2                             my boss is bullying me
3                      what interview leave me alone
```

```
4  sons of  why couldnt they put them on the rele...

                                          preprocess_2  \
0          [id, have, responded, if, i, were, going]
1  [so, sad, i, will, miss, you, here, in, san, d...
2                        [my, bos, is, bullying, me]
3                [what, interview, leave, me, alone]
4  [son, of, why, couldnt, they, put, them, on, t...

                                           documents
0                 id have responded if i were going
1          so sad i will miss you here in san diego
2                              my bos is bullying me
3                     what interview leave me alone
4  son of why couldnt they put them on the releas...
```

```
test_data.head(5)
```

```
                                                 text sentiment  \
0  Last session of the day  http://twitpic.com/67ezh   neutral
1   Shanghai is also really exciting (precisely -...  positive
2  Recession hit Veronique Branquinho, she has to...  negative
3                                       happy bday!  positive
4            http://twitpic.com/4w75p - I like it!!  positive

                                          preprocess_1  \
0                         last session of the day
1  shanghai is also really exciting precisely  sk...
2  recession hit veronique branquinho she has to ...
3                                        happy bday
4                                         i like it

                                          preprocess_2  \
0                      [last, session, of, the, day]
1  [shanghai, is, also, really, exciting, precise...
2  [recession, hit, veronique, branquinho, she, h...
3                                     [happy, bday]
4                                     [i, like, it]

                                           documents
0                           last session of the day
1  shanghai is also really exciting precisely sky...
2  recession hit veronique branquinho she ha to q...
3                                        happy bday
4                                         i like it
```

```
res_1 = preprocessing_1(" Hellooooo I'ammmm keerthan@gmail.com #NLP is niceeeee")
```

```
res_1
```

```
'hello iam keerthancom  is nice'

preprocessing_2(res_1)

['hello', 'iam', 'keerthancom', 'is', 'nice']
```

## Creating a vocabulary from the unique words in the text - set()

```
vocab = set()
for words in train_data['preprocess_2']:
    for word in words:
        vocab.add(word)
print("Vocabulary Size:",len(vocab))

Vocabulary Size: 23462
```

Vectorization

## Bag of words

```
from sklearn.feature_extraction.text import CountVectorizer
bow = CountVectorizer()
train_bow = bow.fit_transform(train_data['documents'])
test_bow = bow.transform(test_data['documents'])

bow

CountVectorizer()

from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_bow, y_train)


from sklearn.metrics import classification_report, accuracy_score

predict = model.predict(test_bow)
print("Accuracy Score :", accuracy_score(y_test, predict), end='\n\n')
print(classification_report(y_true = y_test, y_pred = predict))

Accuracy Score : 0.6983588002263724

              precision    recall  f1-score   support

           0       0.71      0.64      0.67      1001
           1       0.64      0.73      0.68      1430
           2       0.79      0.71      0.75      1103

    accuracy                           0.70      3534
   macro avg       0.71      0.69      0.70      3534
```

```
weighted avg       0.71      0.70      0.70      3534
```

## TF-IDF

```
from sklearn.feature_extraction.text import TfidfVectorizer
td_idf = TfidfVectorizer()


train_idf = td_idf.fit_transform(train_data['documents'])
test_idf = td_idf.transform(test_data['documents'])

test_idf.shape
```

```
(3534, 23436)
```

```
from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_idf, y_train)

from sklearn.metrics import classification_report, accuracy_score

predict = model.predict(test_idf)
print("Accuracy Score :", accuracy_score(y_test, predict), end='\n\n')
print(classification_report(y_true = y_test, y_pred = predict))
```

```
Accuracy Score : 0.7085455574419921

              precision    recall  f1-score   support

           0       0.73      0.64      0.68      1001
           1       0.64      0.76      0.69      1430
           2       0.81      0.71      0.76      1103

    accuracy                           0.71      3534
   macro avg       0.73      0.70      0.71      3534
weighted avg       0.72      0.71      0.71      3534
```

## Continous Bag of words

```
from gensim.models import Word2Vec
g_model = Word2Vec(sentences =
train_data['preprocess_2'],vector_size=200,window=5, workers=5,
epochs=500)

def in_vocab(word_l):
    for word in word_l:
        if word not in g_model.wv:
            return False
```

```
    else:
        return True

train_vec = [g_model.wv[x].sum(axis = 0) if len(x) and in_vocab(x)
else np.zeros((200)) for x in train_data['preprocess_2']]
test_vec  = [g_model.wv[x].sum(axis = 0) if len(x) and in_vocab(x)
else np.zeros((200)) for x in test_data['preprocess_2']]

from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_vec, y_train)

from sklearn.metrics import classification_report, accuracy_score

predict = model.predict(test_vec)
print("Accuracy Score :", accuracy_score(y_test, predict), end='\n\n')
print(classification_report(y_true = y_test, y_pred = predict))
```

```
Accuracy Score : 0.5070741369552915

              precision    recall  f1-score   support

           0       0.64      0.26      0.37      1001
           1       0.45      0.85      0.59      1430
           2       0.72      0.28      0.41      1103

    accuracy                           0.51      3534
   macro avg       0.60      0.47      0.46      3534
weighted avg       0.59      0.51      0.47      3534
```

## Skipgram

```
from gensim.models import Word2Vec

g_model = Word2Vec(sentences=train_data['preprocess_2'],
vector_size=200, window=5, workers=5, sg=1, epochs=500)

def in_vocab(word_l):
    for word in word_l:
        if word not in g_model.wv:
            return False
    else:
        return True

train_vec = [g_model.wv[x].sum(axis = 0) if len(x) and in_vocab(x)
else np.zeros((200)) for x in train_data["preprocess_2"]]
test_vec  = [g_model.wv[x].sum(axis = 0) if len(x) and in_vocab(x)
else np.zeros((200)) for x in test_data["preprocess_2"]]
```

```
from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_vec, y_train)

from sklearn.metrics import classification_report, accuracy_score

predict = model.predict(test_vec)
print("Accuracy Score :", accuracy_score(y_test, predict), end='\n\n')
print(classification_report(y_true = y_test, y_pred = predict))
```

```
Accuracy Score : 0.5079230333899264

              precision    recall  f1-score   support

           0       0.65      0.26      0.37      1001
           1       0.46      0.86      0.59      1430
           2       0.70      0.28      0.40      1103

    accuracy                           0.51      3534
   macro avg       0.60      0.47      0.46      3534
weighted avg       0.59      0.51      0.47      3534
```

## WORD2VEC using GloVe of twitter

```
import gensim.downloader as api

model = api.load("glove-twitter-200")

shape_n = 200

def in_vocab(word_l):
    for word in word_l:
        if word not in model:
            return False
    else:
        return True

train_vec = [model[x].sum(axis = 0) if len(x) and in_vocab(x) else
np.zeros((shape_n)) for x in train_data['preprocess_2']]
test_vec  = [model[x].sum(axis = 0) if len(x) and in_vocab(x) else
np.zeros((shape_n)) for x in test_data['preprocess_2']]
```

```
[==================================================] 100.0%
758.5/758.5MB downloaded
```

```
from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_vec, y_train)
```

```
from sklearn.metrics import classification_report, accuracy_score

predict = model.predict(test_vec)
print("Accuracy Score :", accuracy_score(y_test, predict), end='\n\n')
print(classification_report(y_true = y_test, y_pred = predict))
```

```
Accuracy Score : 0.642331635540464

              precision    recall  f1-score   support

           0       0.71      0.56      0.62      1001
           1       0.56      0.73      0.64      1430
           2       0.74      0.60      0.67      1103

    accuracy                           0.64      3534
   macro avg       0.67      0.63      0.64      3534
weighted avg       0.66      0.64      0.64      3534
```

## Classification using TF-IDF

```
text = """What is not to like about this product.
Not bad.
Not an issue.
Not buggy.
Not happy.
Not user-friendly.
Not good.
Is it any good?
I do not dislike horror movies.
Disliking horror movies is not uncommon.
Sometimes I really hate the show.
I love having to wait two months for the next series to come out!
The final episode was surprising with a terrible twist at the end.
The film was easy to watch but I would not recommend it to my friends.

I LOL'd at the end of the cake scene."""

input_text = text.split("\n")
input_text = [" ".join(preprocessing_2(string)) for string in
input_text]

from sklearn.feature_extraction.text import TfidfVectorizer

tf_idf = TfidfVectorizer()

train_idf = tf_idf.fit_transform(train_data["documents"])
pred_idf = tf_idf.transform(input_text)
```

```
from sklearn.linear_model import LogisticRegression

model = LogisticRegression(max_iter = 1000)
model.fit(train_idf, y_train)

predict = model.predict(pred_idf)
predict = le.inverse_transform(predict)

for index, text in enumerate(text.split("\n")):
    print(text, " : ", predict[index])
```

```
What is not to like about this product.  :  negative
Not bad.  :  negative
Not an issue.  :  negative
Not buggy.  :  neutral
Not happy.  :  positive
Not user-friendly.  :  neutral
Not good.  :  positive
Is it any good?  :  positive
I do not dislike horror movies.   :  negative
Disliking horror movies is not uncommon.   :  negative
Sometimes I really hate the show.   :  negative
I love having to wait two months for the next series to come out!   :
positive
The final episode was surprising with a terrible twist at the end.  :
neutral
The film was easy to watch but I would not recommend it to my friends.
:  neutral
I LOL'd at the end of the cake scene.  :  neutral
```

```
pip install nbconvert
```

```
Requirement already satisfied: nbconvert in c:\users\keerthana\
miniconda3\lib\site-packages (6.5.4)
Requirement already satisfied: lxml in c:\users\keerthana\miniconda3\
lib\site-packages (from nbconvert) (4.9.1)
Requirement already satisfied: beautifulsoup4 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (4.11.1)
Requirement already satisfied: bleach in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (4.1.0)
Requirement already satisfied: defusedxml in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (0.7.1)
Requirement already satisfied: entrypoints>=0.2.2 in c:\users\
keerthana\miniconda3\lib\site-packages (from nbconvert) (0.4)
Requirement already satisfied: jinja2>=3.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (3.1.3)
Requirement already satisfied: jupyter-core>=4.7 in c:\users\
keerthana\miniconda3\lib\site-packages (from nbconvert) (5.2.0)
Requirement already satisfied: jupyterlab-pygments in c:\users\
keerthana\miniconda3\lib\site-packages (from nbconvert) (0.1.2)
```

```
Requirement already satisfied: MarkupSafe>=2.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (2.1.4)
Requirement already satisfied: mistune<2,>=0.8.1 in c:\users\
keerthana\miniconda3\lib\site-packages (from nbconvert) (0.8.4)
Requirement already satisfied: nbclient>=0.5.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (0.5.13)
Requirement already satisfied: nbformat>=5.1 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (5.7.0)
Requirement already satisfied: packaging in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (23.0)
Requirement already satisfied: pandocfilters>=1.4.1 in c:\users\
keerthana\miniconda3\lib\site-packages (from nbconvert) (1.5.0)
Requirement already satisfied: pygments>=2.4.1 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (2.17.2)
Requirement already satisfied: tinycss2 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (1.2.1)
Requirement already satisfied: traitlets>=5.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbconvert) (5.7.1)
Requirement already satisfied: platformdirs>=2.5 in c:\users\
keerthana\miniconda3\lib\site-packages (from jupyter-core>=4.7-
>nbconvert) (2.5.2)
Requirement already satisfied: pywin32>=1.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from jupyter-core>=4.7->nbconvert)
(305.1)
Requirement already satisfied: jupyter-client>=6.1.5 in c:\users\
keerthana\miniconda3\lib\site-packages (from nbclient>=0.5.0-
>nbconvert) (7.4.9)
Requirement already satisfied: nest-asyncio in c:\users\keerthana\
miniconda3\lib\site-packages (from nbclient>=0.5.0->nbconvert) (1.5.6)
Requirement already satisfied: fastjsonschema in c:\users\keerthana\
miniconda3\lib\site-packages (from nbformat>=5.1->nbconvert) (2.16.2)
Requirement already satisfied: jsonschema>=2.6 in c:\users\keerthana\
miniconda3\lib\site-packages (from nbformat>=5.1->nbconvert) (4.17.3)
Requirement already satisfied: soupsieve>1.2 in c:\users\keerthana\
miniconda3\lib\site-packages (from beautifulsoup4->nbconvert)
(2.3.2.post1)
Requirement already satisfied: six>=1.9.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from bleach->nbconvert) (1.16.0)
Requirement already satisfied: webencodings in c:\users\keerthana\
miniconda3\lib\site-packages (from bleach->nbconvert) (0.5.1)
Requirement already satisfied: attrs>=17.4.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from jsonschema>=2.6->nbformat>=5.1-
>nbconvert) (22.1.0)
Requirement already satisfied: pyrsistent!=0.17.0,!=0.17.1,!
=0.17.2,>=0.14.0 in c:\users\keerthana\miniconda3\lib\site-packages
(from jsonschema>=2.6->nbformat>=5.1->nbconvert) (0.18.0)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\
keerthana\miniconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (2.8.2)
```

```
Requirement already satisfied: pyzmq>=23.0 in c:\users\keerthana\
miniconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (23.2.0)
Requirement already satisfied: tornado>=6.2 in c:\users\keerthana\
miniconda3\lib\site-packages (from jupyter-client>=6.1.5-
>nbclient>=0.5.0->nbconvert) (6.2)
Note: you may need to restart the kernel to use updated packages.

WARNING: Error parsing requirements for torch: [Errno 2] No such file
or directory: 'c:\\users\\keerthana\\miniconda3\\lib\\site-packages\\
torch-2.0.0.dist-info\\METADATA'
```