THỰC HÀNH BUỔI 3

(Data Collection and Preprocessing)

Bài 1. Sinh viên tham khảo đường link bên dưới và thực hành theo các phần trong website hướng dẫn với các hàm, ghi nhận lại kết quả:

Link: https://www.crummy.com/software/BeautifulSoup/bs4/doc/

```
soup.title

soup.title.name

soup.title.string

soup.title.parent.name

soup.p

soup.p['class']

soup.a

soup.find_all('a')

soup.find(id="link3")

print(soup.get_text())
```

Bài 2: Thực hiện crawler dữ liệu từ website https://www.ayush.nz/ với 2 loại *technology, video-games.*

Gợi ý:

1. Import thư viện

```
import requests
from bs4 import BeautifulSoup
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import os
```

2. Khởi tạo 2 đường dẫn (link cho 2 loại):

```
seed_urls = ['https://notes.ayushsharma.in/technology',
             'https://www.ayush.nz/video-games']
```

3. Xây dựng hàm **build_dataset(seed_urls)** để lấy dữ liệu với các thuộc tính dữ liệu là: **'title', 'excerpt', 'pub_date', 'category'.** Sử dụng **DataFrame** để đưa dữ liệu về dạng bảng dữ liệu.

```
def build_dataset(seed_urls):
    news_data = []
    for url in seed_urls:
        news_category = url.split('/')[-1]
        data = requests.get(url)
        soup = BeautifulSoup(data.text, 'html.parser')

        (#Sinh viên thực hiện code tiếp vào đây)

    return df
```

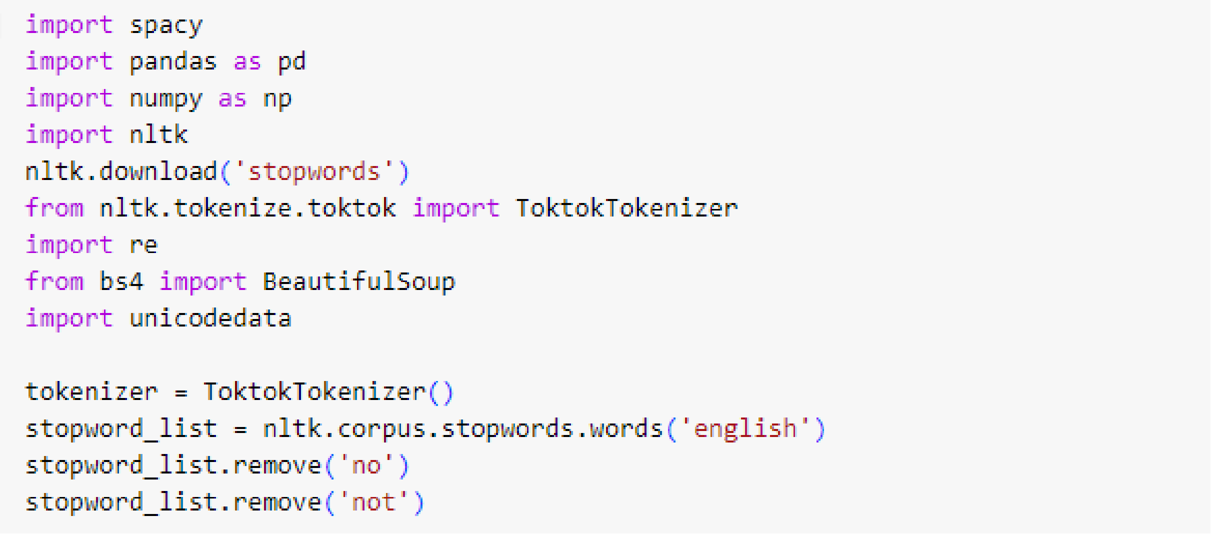
4. Thực hiện lưu file với định dạng mở rộng **.csv** có tên file **dataset.csv**

Bài 3: Text processing (sử dụng tập dữ liệu ở bài 2)

Dữ liệu hỗ trợ: Sinh viên copy past vào file project sau đó thực thi (google colab) hoặc tạo file .py nếu sử dụng các công cụ khác hỗ trợ lập trình (pycharm….)

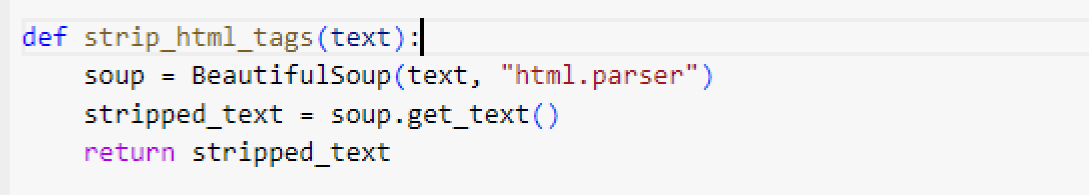
```
CONTRACTION_MAP = {
"ain't": "is not",
"aren't": "are not",
"can't": "cannot",
"can't've": "cannot have",
"'cause": "because",
"could've": "could have",
"couldn't": "could not",
"couldn't've": "could not have",
"didn't": "did not",
"doesn't": "does not",
"don't": "do not",
"hadn't": "had not",
"hadn't've": "had not have",
"hasn't": "has not",
"haven't": "have not",
"he'd": "he would",
"he'd've": "he would have",
"he'll": "he will",
"he'll've": "he he will have",
"he's": "he is",
"how'd": "how did",
"how'd'y": "how do you",
"how'll": "how will",
"how's": "how is",
"I'd": "I would",
"I'd've": "I would have",
"I'll": "I will",
"I'll've": "I will have",
"I'm": "I am",
"I've": "I have",
"i'd": "i would",
"i'd've": "i would have",
"i'll": "i will",
"i'll've": "i will have",
"i'm": "i am",
"i've": "i have",
"isn't": "is not",
"it'd": "it would",
"it'd've": "it would have",
"it'll": "it will",
"it'll've": "it will have",
"it's": "it is",
"let's": "let us",
"ma'am": "madam",
"mayn't": "may not",
"might've": "might have",
"mightn't": "might not",
"mightn't've": "might not have",
"must've": "must have",
"mustn't": "must not",
"mustn't've": "must not have",
"needn't": "need not",
"needn't've": "need not have",
"o'clock": "of the clock",
"oughtn't": "ought not",
"oughtn't've": "ought not have",
"shan't": "shall not",
"sha'n't": "shall not",
"shan't've": "shall not have",
"she'd": "she would",
"she'd've": "she would have",
"she'll": "she will",
"she'll've": "she will have",
"she's": "she is",
"should've": "should have",
"shouldn't": "should not",
"shouldn't've": "should not have",
"so've": "so have",
"so's": "so as",
"that'd": "that would",
"that'd've": "that would have",
"that's": "that is",
"there'd": "there would",
"there'd've": "there would have",
"there's": "there is",
"they'd": "they would",
"they'd've": "they would have",
"they'll": "they will",
"they'll've": "they will have",
"they're": "they are",
"they've": "they have",
"to've": "to have",
"wasn't": "was not",
"we'd": "we would",
"we'd've": "we would have",
"we'll": "we will",
"we'll've": "we will have",
"we're": "we are",
"we've": "we have",
"weren't": "were not",
"what'll": "what will",
"what'll've": "what will have",
"what're": "what are",
"what's": "what is",
"what've": "what have",
"when's": "when is",
"when've": "when have",
"where'd": "where did",
"where's": "where is",
"where've": "where have",
"who'll": "who will",
"who'll've": "who will have",
"who's": "who is",
"who've": "who have",
"why's": "why is",
"why've": "why have",
"will've": "will have",
"won't": "will not",
"won't've": "will not have",
"would've": "would have",
"wouldn't": "would not",
"wouldn't've": "would not have",
"y'all": "you all",
"y'all'd": "you all would",
"y'all'd've": "you all would have",
"y'all're": "you all are",
"y'all've": "you all have",
"you'd": "you would",
"you'd've": "you would have",
"you'll": "you will",
"you'll've": "you will have",
"you're": "you are",
"you've": "you have"
}
```

1) Text Wrangling and Pre-processing



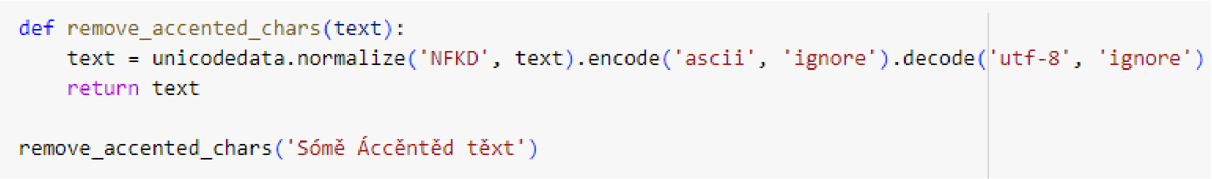
```
import spacy
import pandas as pd
import numpy as np
import nltk
nltk.download('stopwords')
from nltk.tokenize.toktok import ToktokTokenizer
import re
from bs4 import BeautifulSoup
import unicodedata

tokenizer = ToktokTokenizer()
stopword_list = nltk.corpus.stopwords.words('english')
stopword_list.remove('no')
stopword_list.remove('not')
```

2) Remove HTML tags



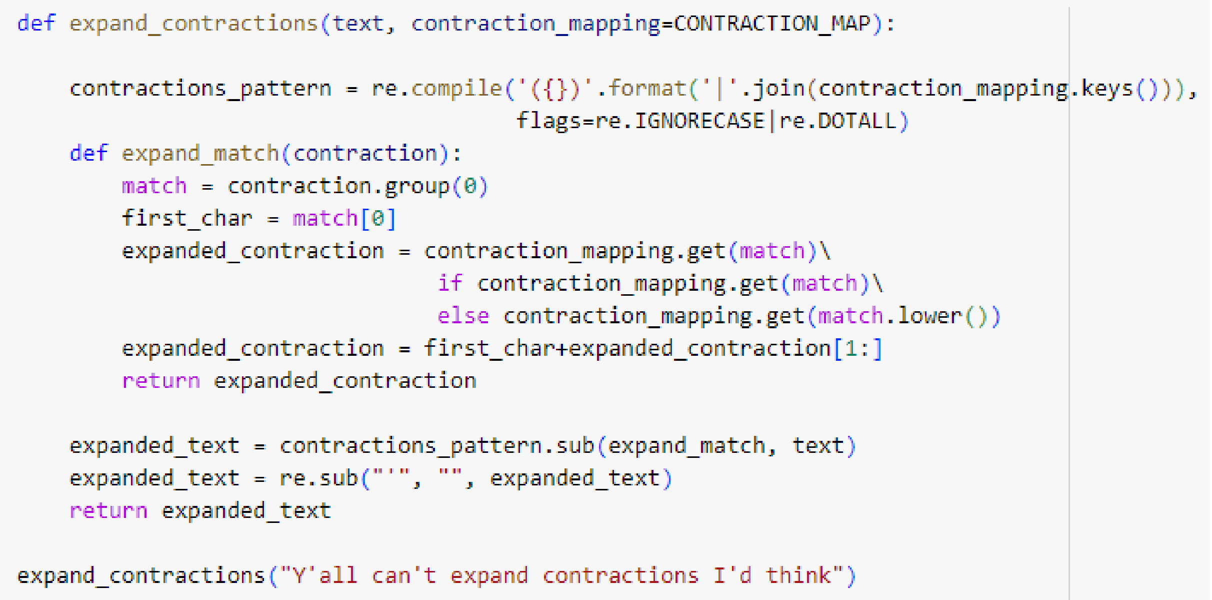
```
def strip_html_tags(text):
    soup = BeautifulSoup(text, "html.parser")
    stripped_text = soup.get_text()
    return stripped_text
```

3) Loại bỏ ký tự có dấu



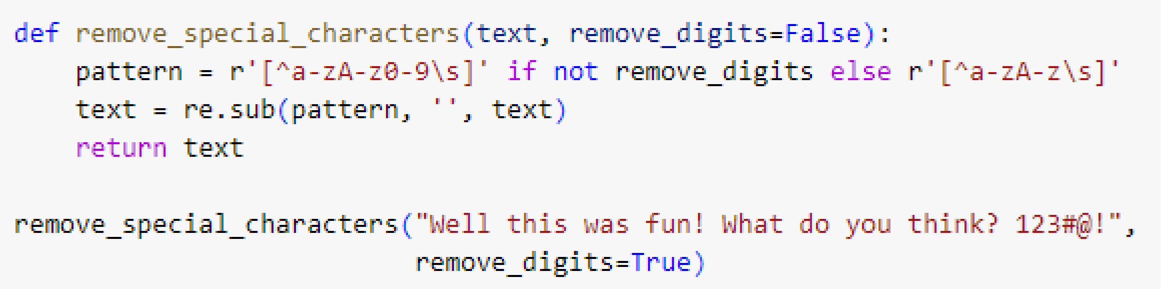
```
def remove_accented_chars(text):
    text = unicodedata.normalize('NFKD', text).encode('ascii', 'ignore').decode('utf-8', 'ignore')
    return text

remove_accented_chars('Sómě Áccěntěd těxt')
```

4) Expand contractions



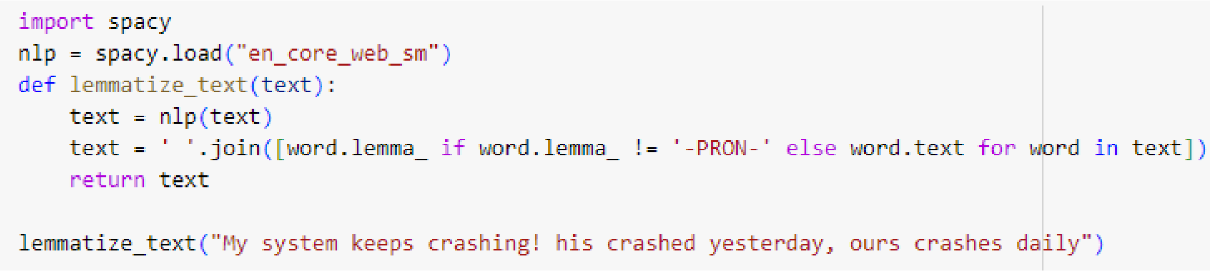
```
def expand_contractions(text, contraction_mapping=CONTRACTION_MAP):

    contractions_pattern = re.compile('({})'.format('|'.join(contraction_mapping.keys())),
                                      flags=re.IGNORECASE|re.DOTALL)
    def expand_match(contraction):
        match = contraction.group(0)
        first_char = match[0]
        expanded_contraction = contraction_mapping.get(match)\
                               if contraction_mapping.get(match)\
                               else contraction_mapping.get(match.lower())
        expanded_contraction = first_char+expanded_contraction[1:]
        return expanded_contraction

    expanded_text = contractions_pattern.sub(expand_match, text)
    expanded_text = re.sub("'", "", expanded_text)
    return expanded_text

expand_contractions("Y'all can't expand contractions I'd think")
```

5) Remove special characters



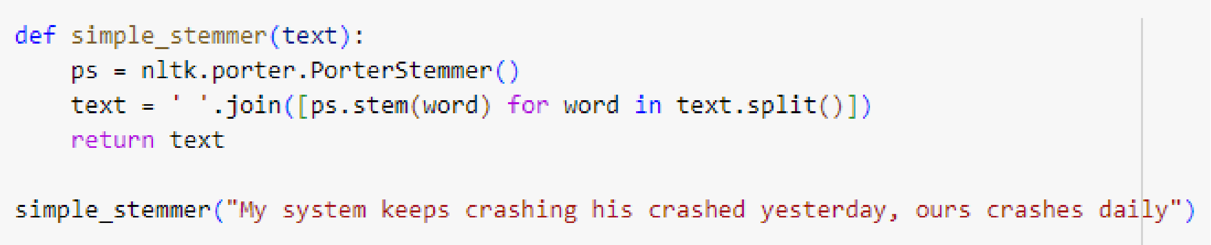
```
def remove_special_characters(text, remove_digits=False):
    pattern = r'[^a-zA-z0-9\s]' if not remove_digits else r'[^a-zA-z\s]'
    text = re.sub(pattern, '', text)
    return text

remove_special_characters("Well this was fun! What do you think? 123#@!",
                          remove_digits=True)
```

6) Text lemmatization



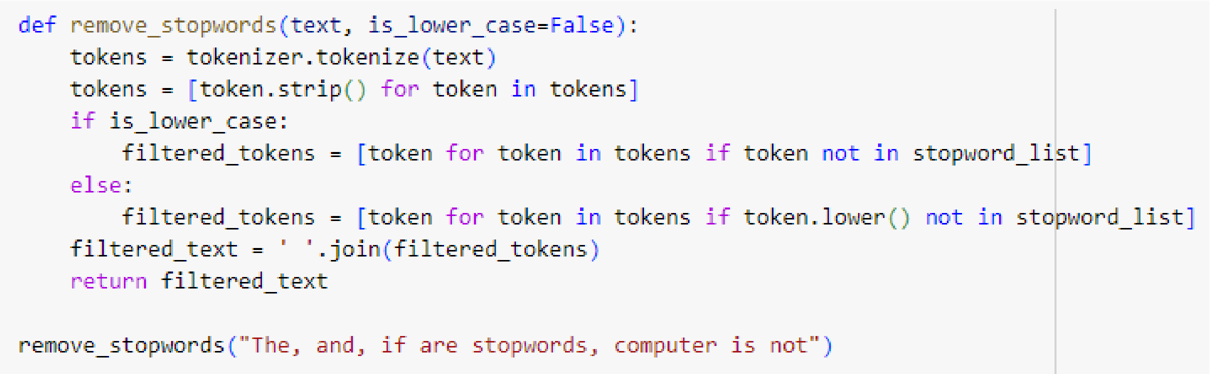
```
import spacy
nlp = spacy.load("en_core_web_sm")
def lemmatize_text(text):
    text = nlp(text)
    text = ' '.join([word.lemma_ if word.lemma_ != '-PRON-' else word.text for word in text])
    return text

lemmatize_text("My system keeps crashing! his crashed yesterday, ours crashes daily")
```

7) Text stemming



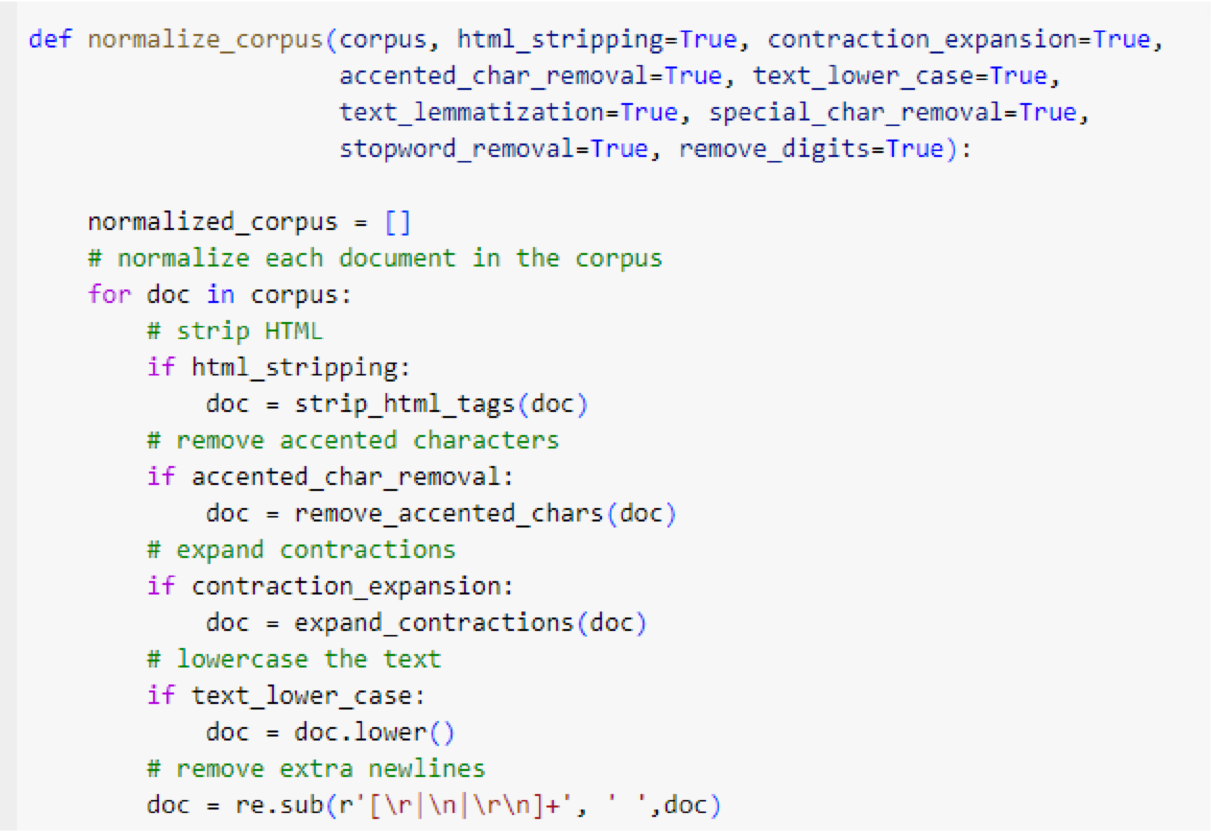
```
def simple_stemmer(text):
    ps = nltk.porter.PorterStemmer()
    text = ' '.join([ps.stem(word) for word in text.split()])
    return text

simple_stemmer("My system keeps crashing his crashed yesterday, ours crashes daily")
```

8) Remove stopwords

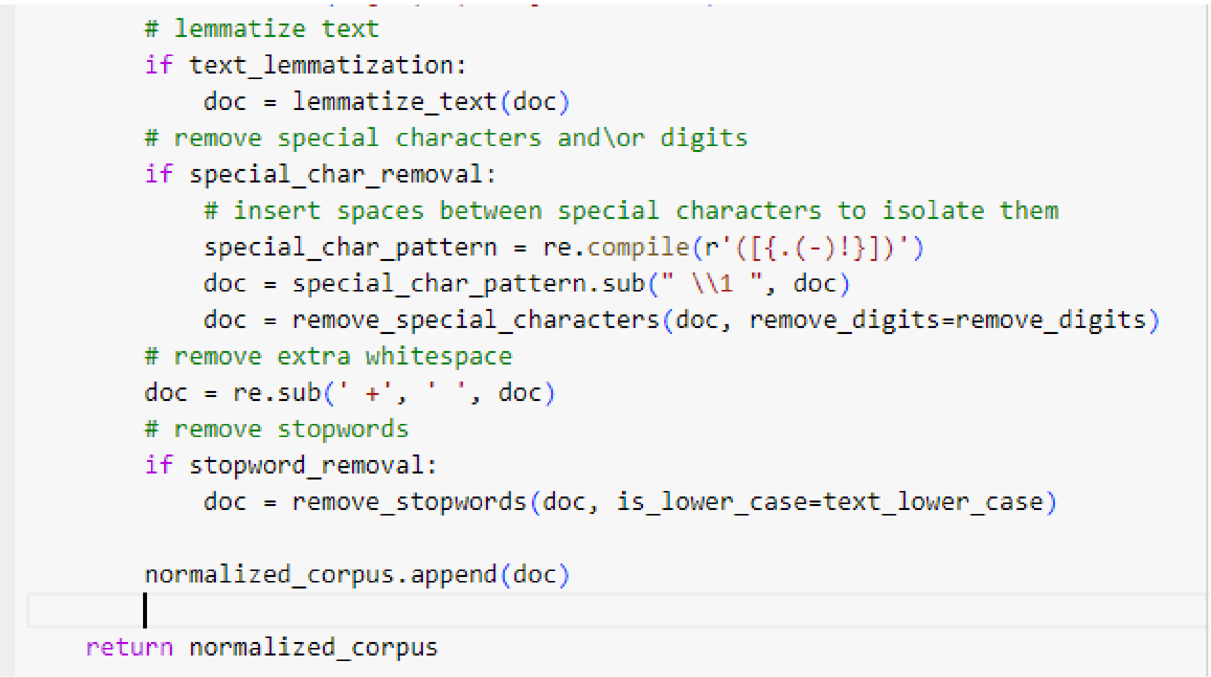


```
def remove_stopwords(text, is_lower_case=False):
    tokens = tokenizer.tokenize(text)
    tokens = [token.strip() for token in tokens]
    if is_lower_case:
        filtered_tokens = [token for token in tokens if token not in stopword_list]
    else:
        filtered_tokens = [token for token in tokens if token.lower() not in stopword_list]
    filtered_text = ' '.join(filtered_tokens)
    return filtered_text

remove_stopwords("The, and, if are stopwords, computer is not")
```

9) Building a text normalizer

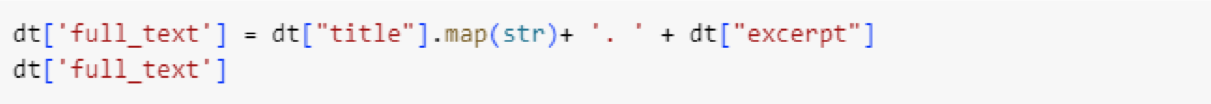


```
def normalize_corpus(corpus, html_stripping=True, contraction_expansion=True,
                     accented_char_removal=True, text_lower_case=True,
                     text_lemmatization=True, special_char_removal=True,
                     stopword_removal=True, remove_digits=True):

    normalized_corpus = []
    # normalize each document in the corpus
    for doc in corpus:
        # strip HTML
        if html_stripping:
            doc = strip_html_tags(doc)
        # remove accented characters
        if accented_char_removal:
            doc = remove_accented_chars(doc)
        # expand contractions
        if contraction_expansion:
            doc = expand_contractions(doc)
        # lowercase the text
        if text_lower_case:
            doc = doc.lower()
        # remove extra newlines
        doc = re.sub(r'[\r|\n|\r\n]+', ' ',doc)
```

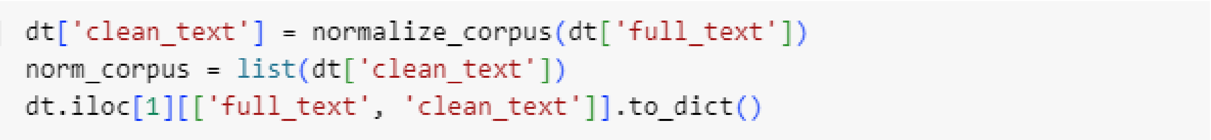


```
        # lemmatize text
        if text_lemmatization:
            doc = lemmatize_text(doc)
        # remove special characters and\or digits
        if special_char_removal:
            # insert spaces between special characters to isolate them
            special_char_pattern = re.compile(r'([{.(-)!}])')
            doc = special_char_pattern.sub(" \\1 ", doc)
            doc = remove_special_characters(doc, remove_digits=remove_digits)
        # remove extra whitespace
        doc = re.sub(' +', ' ', doc)
        # remove stopwords
        if stopword_removal:
            doc = remove_stopwords(doc, is_lower_case=text_lower_case)

        normalized_corpus.append(doc)

    return normalized_corpus
```

10) Pre-process and normalize data news



```
dt['full_text'] = dt["title"].map(str)+ '. ' + dt["excerpt"]
dt['full_text']
```



```
dt['clean_text'] = normalize_corpus(dt['full_text'])
norm_corpus = list(dt['clean_text'])
dt.iloc[1][['full_text', 'clean_text']].to_dict()
```

11) Save the news data

```
dt.to_csv('news.csv', index=False, encoding='utf-8')
```

12) Sinh viên nghiên cứu thực hành Bag of Words Model, TF-IDF