Basic_text_processing

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1.1 Text Analysis and Generation

Chapter 12 from Think Python

These are some very basic ideas about analyzing text

It is a sort of nice illustration of a bunch of Python functions

[6]:
```
# this file is 'The Strange Case of Dr. Jeckyll and Mr. Hyde' by Robert Louis
# Stevenson.   I got a copy of it from the Gutenburg Project

filename = 'dr_jeckyl.txt'
```

[8]:
```
#finding the unique words in the book

# create an empty dictionary

unique_words = {}

# open a file, and read one line at a time and process it

for line in open(filename, encoding="utf-8"):
    seq = line.split()                              #split each line into words

    for word in seq:                                # for each word, put 1 in the␣
 ↪dictionary, indexed by the word
        unique_words[word] = 1

# how many values are there in the dictionary?

len(unique_words)
```

[8]:
```
6741
```

[10]:
```
# sort the words in the dictionary by their length
# kind of a cool move to be able to do this
```

```
sorted(unique_words, key=len)[-10:]
```

[10]:
```
['coolness-frightened',
 'gentleman-something',
 'pocket-handkerchief.',
 '(www.gutenberg.org),',
 'extraordinary-looking',
 'continually-impending',
 '(trademark/copyright)',
 'www.gutenberg.org/contact',
 'www.gutenberg.org/donate.',
 'www.gutenberg.org/license.']
```

We have a number of "words" that are actually hyphenations

We want to remove the hyphenations

Create a line splitting function

[13]:
```
def split_line(line):
    return line.replace('-', ' ').split()
```

This function strips out all punctuation based on a list of punctuation taken from the document

It also converts all the words to lower case, which should reduce the word count as well

[16]:
```
def clean_word(word):
    return word.strip(punctuation).lower()
```

This bit of code looks at each character in the file and determines its unicode category

[19]:
```
# find all the punctuation

import unicodedata


punc_marks = {}
for line in open(filename,encoding="utf-8"):
    for char in line:
        category = unicodedata.category(char)
        if category.startswith('P'):
            punc_marks[char] = 1
```

[21]:
```
punctuation = ''.join(punc_marks)
print(punctuation)
```

```
.,-:[#]*’;""?-‘()…!_/•%
```

[23]:
```
# Side Quest-  looking at unicode categories

import unicodedata
```

```
print(unicodedata.category('A'))
print(unicodedata.category('a'))
print(unicodedata.category('\n'))
print(unicodedata.category('1'))
print(unicodedata.category(':'))
```

```
Lu
Ll
Cc
Nd
Po
```

Recount the words, removing punctuation and hyphens, and converting all words to lower cases

[26]:
```
unique_words2 = {}
for line in open(filename,encoding="utf-8"):
    for word in split_line(line):
        word = clean_word(word)
        unique_words2[word] = 1

len(unique_words2)
```

[26]:
```
4438
```

[28]:
```
sorted(unique_words2, key=len)[-10:]
```

[28]:
```
['machine-readable',
 'www.gutenberg.org',
 'chocolate-coloured',
 'pocket-handkerchief',
 'trademark/copyright',
 'extraordinary-looking',
 'continually-impending',
 'www.gutenberg.org/donate',
 'www.gutenberg.org/license',
 'www.gutenberg.org/contact']
```

2 Word Frequencies

We can now count up the frequencies with which words appear

Use a dictionary and put each previously unseen word into the dictionary with a count of 1.

Increment the entries each time a word is found.

[31]:
```
word_counter = {}
for line in open(filename,encoding="utf-8"):
    for word in split_line(line):
```

```
        word = clean_word(word)
        if word not in word_counter:
            word_counter[word] = 1
        else:
            word_counter[word] += 1
```

[33]:
```
def second_element(t):
    return t[1]
```

[35]:
```
items = sorted(word_counter.items(), key=second_element, reverse=True)
```

[37]:
```
for word, freq in items[:5]:
    print(freq, word, sep='\t')
```

```
1811    the
1067    of
1044    and
727     to
691     a
```

3 Removing “stopwords”

Most languages have stopwords, that just contribute to the structure of the language, our list of most used words is full of stopwords

We can get a lit of stopwards and exclude them

The Natural Language Toolkit has many tools for handling language, including a set of stopwords

[40]:
```
from nltk.corpus import stopwords
import nltk

nltk.download('stopwords')
```

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

[40]:
```
True
```

[42]:
```
stop_words = set(stopwords.words('english'))
stop_words
```

[42]:
```
{'a',
 'about',
 'above',
 'after',
 'again',
 'against',
```

```
'ain',
'all',
'am',
'an',
'and',
'any',
'are',
'aren',
"aren't",
'as',
'at',
'be',
'because',
'been',
'before',
'being',
'below',
'between',
'both',
'but',
'by',
'can',
'couldn',
"couldn't",
'd',
'did',
'didn',
"didn't",
'do',
'does',
'doesn',
"doesn't",
'doing',
'don',
"don't",
'down',
'during',
'each',
'few',
'for',
'from',
'further',
'had',
'hadn',
"hadn't",
'has',
'hasn',
```

```
"hasn't",
'have',
'haven',
"haven't",
'having',
'he',
"he'd",
"he'll",
"he's",
'her',
'here',
'hers',
'herself',
'him',
'himself',
'his',
'how',
'i',
"i'd",
"i'll",
"i'm",
"i've",
'if',
'in',
'into',
'is',
'isn',
"isn't",
'it',
"it'd",
"it'll",
"it's",
'its',
'itself',
'just',
'll',
'm',
'ma',
'me',
'mightn',
"mightn't",
'more',
'most',
'mustn',
"mustn't",
'my',
'myself',
```

```
'needn',
"needn't",
'no',
'nor',
'not',
'now',
'o',
'of',
'off',
'on',
'once',
'only',
'or',
'other',
'our',
'ours',
'ourselves',
'out',
'over',
'own',
're',
's',
'same',
'shan',
"shan't",
'she',
"she'd",
"she'll",
"she's",
'should',
"should've",
'shouldn',
"shouldn't",
'so',
'some',
'such',
't',
'than',
'that',
"that'll",
'the',
'their',
'theirs',
'them',
'themselves',
'then',
'there',
```

```
'these',
'they',
"they'd",
"they'll",
"they're",
"they've",
'this',
'those',
'through',
'to',
'too',
'under',
'until',
'up',
've',
'very',
'was',
'wasn',
"wasn't",
'we',
"we'd",
"we'll",
"we're",
"we've",
'were',
'weren',
"weren't",
'what',
'when',
'where',
'which',
'while',
'who',
'whom',
'why',
'will',
'with',
'won',
"won't",
'wouldn',
"wouldn't",
'y',
'you',
"you'd",
"you'll",
"you're",
"you've",
```

```
 'your',
 'yours',
 'yourself',
 'yourselves'}
```

[44]:
```
# do the word count again, but removing all stop words

word_counter = {}
for line in open(filename,encoding="utf-8"):
    for word in split_line(line):
        word = clean_word(word)
        if word not in stop_words:
            if word not in word_counter:
                word_counter[word] = 1
            else:
                word_counter[word] += 1
```

[46]:
```
items = sorted(word_counter.items(), key=second_element, reverse=True)
```

[48]:
```
for word, freq in items[:30]:
    print(freq, word, sep='\t')
```

```
130     said
128     mr
128     utterson
102     hyde
88      project
88      jekyll
83      one
77      man
67      lawyer
62      upon
61      poole
58      sir
56      like
56      would
56      gutenberg
53      door
51      must
50      could
50      see
49      dr
49      life
49      well
49      work
48      even
44      hand
44      know
```

```
41      last
40      face
40      good
39      thought
```

4 Generating a Word Cloud

The word cloud graphic is an interesting on, it is a plot of word frequencies, where the size of a given word in the cloud is proportional to the number of times is it used.

These are surprising effective graphics when looking at survey responses, viewers can interpret these surprisingly quickly and effectively, and they are popular.

[53]:
```
# We need to get all the words in a single string to use this
# so we will read all the lines and concatenate them into a single string

mywords=""
for line in open(filename,encoding="utf-8"):
    for word in split_line(line):
        word = clean_word(word)
        mywords=mywords+" "+word
```

[59]:
```
!pip install wordcloud
```

```
Collecting wordcloud
  Downloading wordcloud-1.9.4-cp312-cp312-win_amd64.whl.metadata (3.5 kB)
Requirement already satisfied: numpy>=1.6.1 in c:\users\luke\anaconda3\lib\site-
packages (from wordcloud) (1.26.4)
Requirement already satisfied: pillow in c:\users\luke\anaconda3\lib\site-
packages (from wordcloud) (10.4.0)
Requirement already satisfied: matplotlib in c:\users\luke\anaconda3\lib\site-
packages (from wordcloud) (3.9.2)
Requirement already satisfied: contourpy>=1.0.1 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.2.0)
Requirement already satisfied: cycler>=0.10 in c:\users\luke\anaconda3\lib\site-
packages (from matplotlib->wordcloud) (0.11.0)
Requirement already satisfied: fonttools>=4.22.0 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud) (4.51.0)
Requirement already satisfied: kiwisolver>=1.3.1 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud) (1.4.4)
Requirement already satisfied: packaging>=20.0 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud) (24.1)
Requirement already satisfied: pyparsing>=2.3.1 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud) (3.1.2)
Requirement already satisfied: python-dateutil>=2.7 in
c:\users\luke\anaconda3\lib\site-packages (from matplotlib->wordcloud)
(2.9.0.post0)
Requirement already satisfied: six>=1.5 in c:\users\luke\anaconda3\lib\site-
```

```
packages (from python-dateutil>=2.7->matplotlib->wordcloud) (1.16.0)
Downloading wordcloud-1.9.4-cp312-cp312-win_amd64.whl (301 kB)
Installing collected packages: wordcloud
Successfully installed wordcloud-1.9.4
```

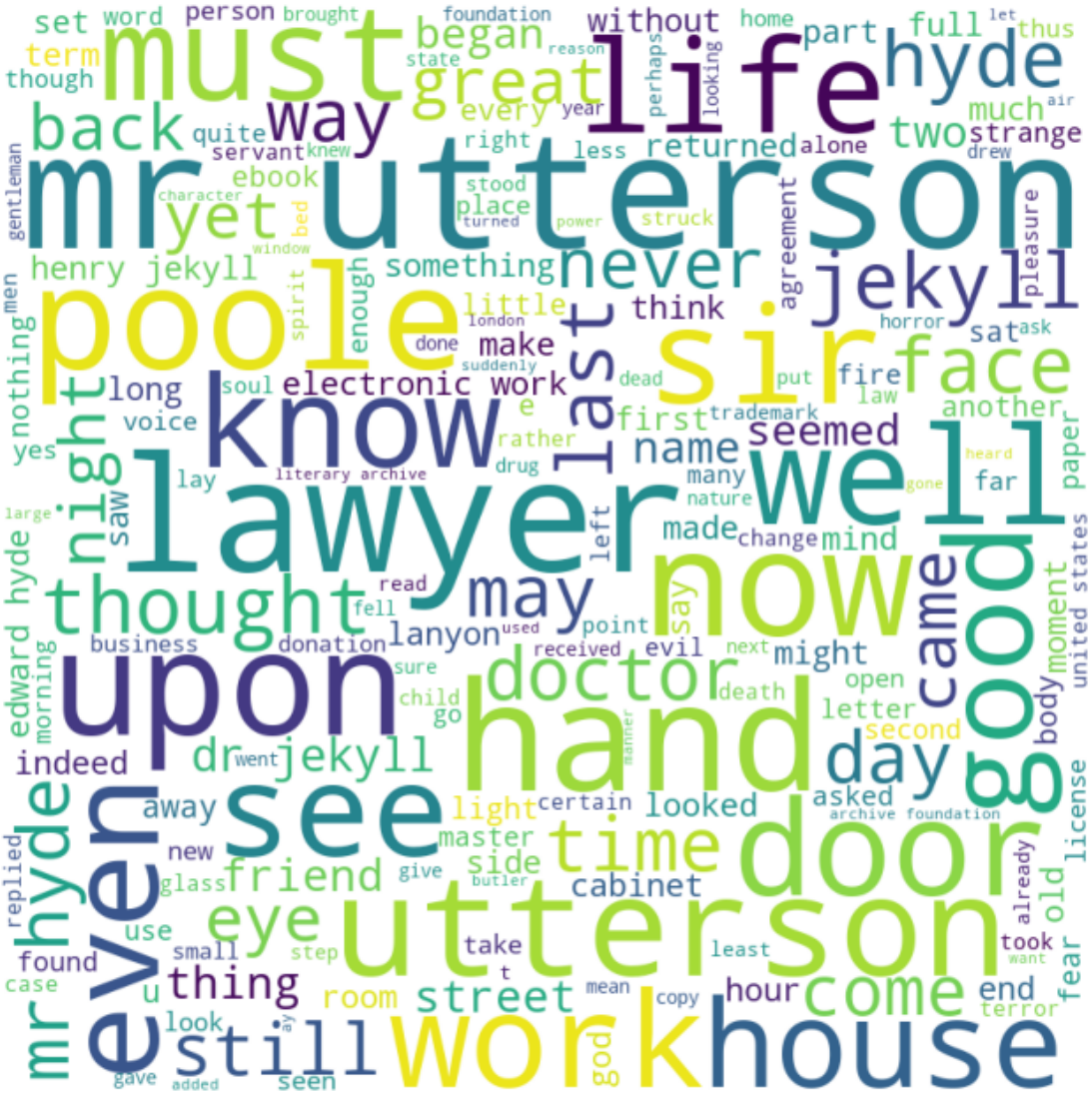
[63]:
```
from wordcloud import WordCloud, STOPWORDS
import matplotlib.pyplot as plt

#wordcloud has its' own stopwords,  they have to be placed into a set before use
# We already removed most of the stopwords, but the wordcloud generator appears␣
 ↪to need this
# set to run, so we will use it


stopwords = set(STOPWORDS)

wordcloud = WordCloud(width = 800, height = 800,
                background_color ='white',
                stopwords = stopwords,
                min_font_size = 10).generate(mywords)

# plot the WordCloud image
plt.figure(figsize = (8, 8), facecolor = None)
plt.imshow(wordcloud)
plt.axis("off")
```

[63]:
```
(-0.5, 799.5, 799.5, -0.5)
```

[65]:
```
# add a couple more words to the set stopwards
# the worlds below are large in the plot, but don't carry much information␣
 ↪about the book
# so I have added them to the stopwards

stopwords.add("said")
stopwords.add("s")
stopwords.add("project")
stopwords.add('gutenberg')
stopwords.add('one')
stopwords.add('man')
stopwords.add('will')
```

[82]:
```
#Plotting the wordplot again with more words removed


wordcloud = WordCloud(width = 800, height = 800,
                background_color ='white',
                stopwords = stopwords,
                min_font_size = 10).generate(mywords)

# plot the WordCloud image
plt.figure(figsize = (8, 8), facecolor = None)
plt.imshow(wordcloud)
plt.axis("off")
```

[82]:
```
(-0.5, 799.5, 799.5, -0.5)
```



[ ]: