Project

January 10, 2022

[1]:
```
import os
import sys

from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from pyspark.ml import Pipeline
from pyspark.sql.functions import udf
from pyspark.sql.types import *
from pyspark.sql import SparkSession, Row
from pyspark.ml.feature import Tokenizer, HashingTF, IDF
from sklearn.feature_extraction.text import TfidfVectorizer, CountVectorizer
from os import listdir
from os.path import isfile, join
import numpy as np
import pandas as pd
```

[2]:
```
os.environ['PYSPARK_PYTHON'] = sys.executable
os.environ['PYSPARK_DRIVER_PYTHON'] = sys.executable
spark = SparkSession\
    .builder\
    .appName("Assignment04")\
    .getOrCreate()

# get file list
txtpath = '/home/matthew/DSC680/textfiles/'
filelist = [f for f in listdir(txtpath) if isfile(join(txtpath,f))]
```

```
22/01/10 15:09:54 WARN Utils: Your hostname, matthew-MS-7A34 resolves to a
loopback address: 127.0.1.1; using 192.168.0.232 instead (on interface wlp40s0)
22/01/10 15:09:54 WARN Utils: Set SPARK_LOCAL_IP if you need to bind to another
address
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.spark.unsafe.Platform
(file:/opt/spark/jars/spark-unsafe_2.12-3.2.0.jar) to constructor
java.nio.DirectByteBuffer(long,int)
WARNING: Please consider reporting this to the maintainers of
org.apache.spark.unsafe.Platform
WARNING: Use --illegal-access=warn to enable warnings of further illegal
```

```
reflective access operations
WARNING: All illegal access operations will be denied in a future release
Using Spark's default log4j profile: org/apache/spark/log4j-defaults.properties
Setting default log level to "WARN".
To adjust logging level use sc.setLogLevel(newLevel). For SparkR, use
setLogLevel(newLevel).
22/01/10 15:09:55 WARN NativeCodeLoader: Unable to load native-hadoop library
for your platform… using builtin-java classes where applicable
```

[3]:
```
"""import random

#funtion takes author's content and shuffles the words in a single file
used so that original content is not published publicly
#files published in textfiles are shuffled through this code already
def shuffle_w(txtpath,inputfilename):
    list_of_words=[]
    fin = open(txtpath+inputfilename,'r+')
    fout = open(txtpath+'shuffled/'+inputfilename, "w+")
    content=fin.read()
    content=content.strip()
    content=content.replace('\n', ' ')
    wlist=list(content.split(' '))
    random.shuffle(wlist)
    shuffled =' '.join(word for word in wlist)
    fout.write(shuffled)
    fin.close()
    fout.close()
    return


for file in filelist:
    shuffle_w(inputfilename=file,txtpath=txtpath)
"""
```

[3]:
```
'import random\n\n#funtion takes author\'s content and shuffles the words in a
single file\nused so that original content is not published publicly\n#files
published in textfiles are shuffled through this code already\ndef
shuffle_w(txtpath,inputfilename):\n    list_of_words=[]\n    fin =
open(txtpath+inputfilename,\'r+\')\n    fout =
open(txtpath+\'shuffled/\'+inputfilename, "w+")\n    content=fin.read()\n
content=content.strip()\n    content=content.replace(\'\n\', \' \')\n
wlist=list(content.split(\' \'))\n    random.shuffle(wlist)\n    shuffled =\'
\'.join(word for word in wlist)\n    fout.write(shuffled)\n    fin.close()\n
fout.close()     \n    return \n\n\nfor file in filelist:\n
shuffle_w(inputfilename=file,txtpath=txtpath)\n'
```

[4]:
```
#function to pull file and read as a string
def pullfile(file):
    with open(file,encoding='utf-8') as f:
        chapStr=f.read()
    return chapStr

schema = StructType([
    StructField("filenumber", StringType(), True),
    StructField("filename", StringType(), True),
    StructField("filepath", StringType(), True),
    StructField("contents", StringType(), True)

])

def make_spark_df(filelist,txtpath):
    records = []
    filenumber = 0
    for file in filelist:
        filepath=txtpath+file
        contents = pullfile(filepath)
        record={'filenumber':filenumber,'filename':file,'filepath':
 ↪filepath,'contents':contents}
        records.append(record)
        filenumber+=1
    df = spark.createDataFrame((Row(**x) for x in records),schema )
    return df


df = make_spark_df(filelist,txtpath)

parse_content_func = udf(lambda z: parse_content(z), schema)

tokenizer= Tokenizer(inputCol="contents", outputCol="tokens")
hashing = HashingTF(inputCol='tokens',outputCol='rawfeatures',numFeatures=20)
idf = IDF(inputCol='rawfeatures', outputCol='features')
content_pipeline = Pipeline(stages=[tokenizer,hashing,idf])

model = content_pipeline.fit(df)
result = model.transform(df)

pdf=result.toPandas()

stop = stopwords.words('english')
tfidf=TfidfVectorizer(stop_words=stop)
x = tfidf.fit_transform(pdf.contents)
feature_array = np.array(tfidf.get_feature_names())
tfidf_sorting = np.argsort(x.toarray()).flatten()[::-1]
```

```
n = 20
top_20 = feature_array[tfidf_sorting][:n].tolist()
print(' '.join(top_20))
```

```
/home/matthew/anaconda3/lib/python3.8/site-
packages/sklearn/utils/deprecation.py:87: FutureWarning: Function
get_feature_names is deprecated; get_feature_names is deprecated in 1.0 and will
be removed in 1.2. Please use get_feature_names_out instead.
  warnings.warn(msg, category=FutureWarning)
```

```
ojwin hanbritt alice delia tarosse olivier gardens castle dragonblood dylin
linley east imperial guard roving patrols capital search said adkins
```

[5]:
```
pdf
```

[5]:

	filenumber	filename	filepath	contents	tokens
0	0	00083.txt	/home/matthew/DSC680/textfiles/00083.txt	to Holy and had, half was where have situatio…	[to, holy, and, had,, half, was, where, have, …
1	1	00700.txt	/home/matthew/DSC680/textfiles/00700.txt	was like It in them. coma a ever growing!" t…	[was, like, it, , in, them., coma, , a, ever, …
2	2	00768.txt	/home/matthew/DSC680/textfiles/00768.txt	tendrils plants." artifacts talent of Soverei…	[tendrils, plants.", , artifacts, talent, of, …
3	3	00583.txt	/home/matthew/DSC680/textfiles/00583.txt	Linley Tarosse, on Grand you to I is, this m…	[, linley, tarosse,, on, grand, you, , to, i, …
4	4	00087.txt	/home/matthew/DSC680/textfiles/00087.txt	clothes. master allow of mesmerizing this Bro…	[clothes., master, allow, of, mesmerizing, , t…
..	…	…	…	…	…
803	803	00254.txt	/home/matthew/DSC680/textfiles/00254.txt	from to Chapter are for both well? into him…	
804	804	00691.txt	/home/matthew/DSC680/textfiles/00691.txt	capable ten "That Mountain. just to his so arr…	
805	805	00742.txt	/home/matthew/DSC680/textfiles/00742.txt	the red head Linley than Chegwin Paragon. one…	
806	806	00345.txt	/home/matthew/DSC680/textfiles/00345.txt	are The "Ah!" been Rutherford, than this snic…	
807	807	00420.txt	/home/matthew/DSC680/textfiles/00420.txt	the two guard from Haha…" "Hey, when these c…	

```
803  [from, , to, chapter, are, for, both, well?, ,…
804  [capable, ten, "that, mountain., just, to, his…
805  [the, , red, head, linley, than, chegwin, para…
806  [are, the, "ah!", , been, rutherford,, than, t…
807  [, the, two, guard, from, haha…", "hey,, , whe…

                                              rawfeatures  \
0    (103.0, 78.0, 59.0, 111.0, 95.0, 72.0, 51.0, 7…
1    (149.0, 98.0, 82.0, 155.0, 142.0, 108.0, 113.0…
2    (155.0, 101.0, 63.0, 222.0, 126.0, 89.0, 127.0…
3    (122.0, 92.0, 82.0, 168.0, 140.0, 86.0, 74.0, …
4    (134.0, 109.0, 95.0, 177.0, 115.0, 88.0, 111.0…
..                                                 …
803  (147.0, 97.0, 103.0, 151.0, 101.0, 82.0, 95.0,…
804  (170.0, 104.0, 93.0, 166.0, 124.0, 86.0, 123.0…
805  (159.0, 124.0, 130.0, 211.0, 156.0, 96.0, 163…
806  (147.0, 80.0, 90.0, 162.0, 137.0, 104.0, 83.0,…
807  (115.0, 81.0, 76.0, 145.0, 107.0, 79.0, 98.0, …

                                                 features
0    (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
1    (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
2    (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
3    (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
4    (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
..                                                 …
803  (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
804  (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
805  (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
806  (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …
807  (0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, …

[808 rows x 7 columns]
```

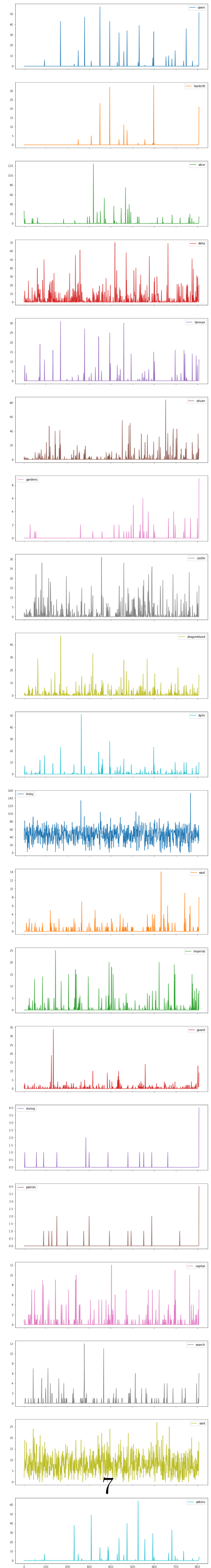
[7]:
```
cv=CountVectorizer(vocabulary=top_20)
cvt=cv.fit_transform(pdf.contents)

counts = pd.DataFrame(cvt.toarray(),columns=cv.get_feature_names())

from matplotlib import pyplot as plt
counts.plot.line(subplots=True,figsize=(12,100))
#get the top 20 words in the whole book
#pull into a list
#pull vocab for each chapter
#return the value counts for top 20 words
#graph number of occuances per word over course of book
```

```
/home/matthew/anaconda3/lib/python3.8/site-
packages/sklearn/utils/deprecation.py:87: FutureWarning: Function
get_feature_names is deprecated; get_feature_names is deprecated in 1.0 and will
be removed in 1.2. Please use get_feature_names_out instead.
  warnings.warn(msg, category=FutureWarning)
```

[7]:
```
array([<AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>,
       <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>,
       <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>,
       <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>,
       <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>, <AxesSubplot:>],
      dtype=object)
```



[ ]: