Assignment # 1:	NLTK
Course:	CAP 6776-003 Information Retrieval
Professor:	Dr. Dingding Wang
Student Number:	Z23596812
Student Name:	Renee Raven
Term:	Fall 2022

For this assignment I've added also uploaded:

The code file: cap6776_a1_renee_raven.py

The output file: nltk_output.txt

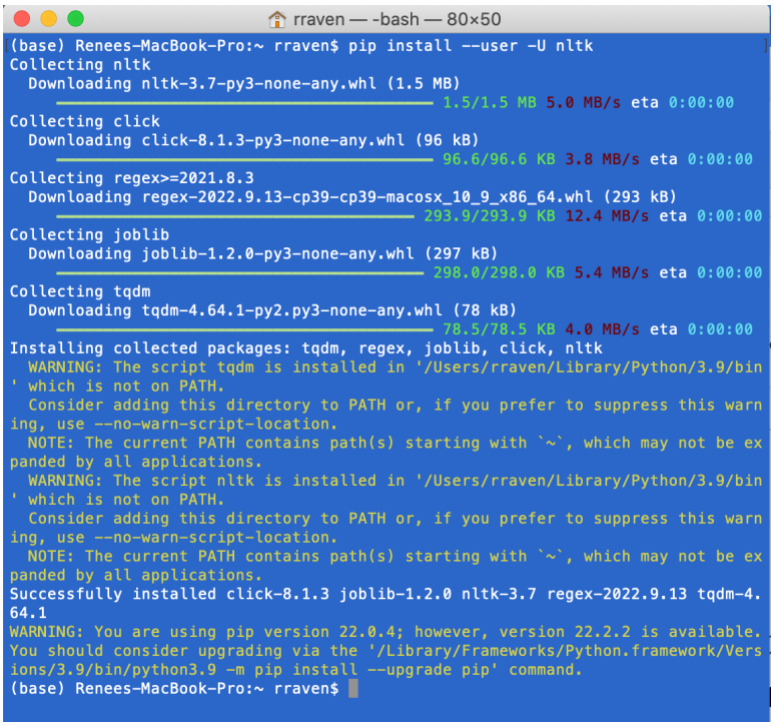
Thank you

Step 1: Install Python and NLTK

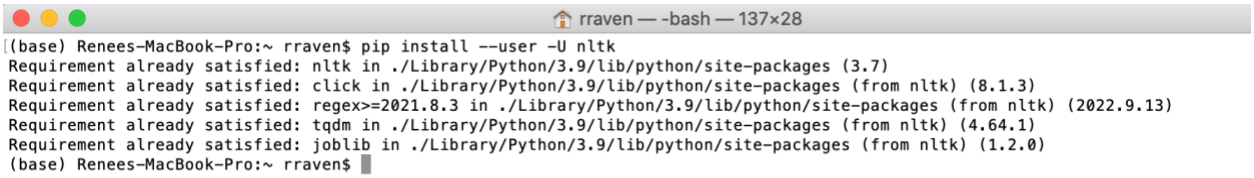
Python is already installed on my computer.

```
(base) Renees-MacBook-Pro:~ rraven$ /usr/local/bin/python3
Python 3.10.7 (v3.10.7:6cc6b13308, Sep  5 2022, 14:02:52) [Clang 13.0.0 (clang-1
300.0.29.30)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

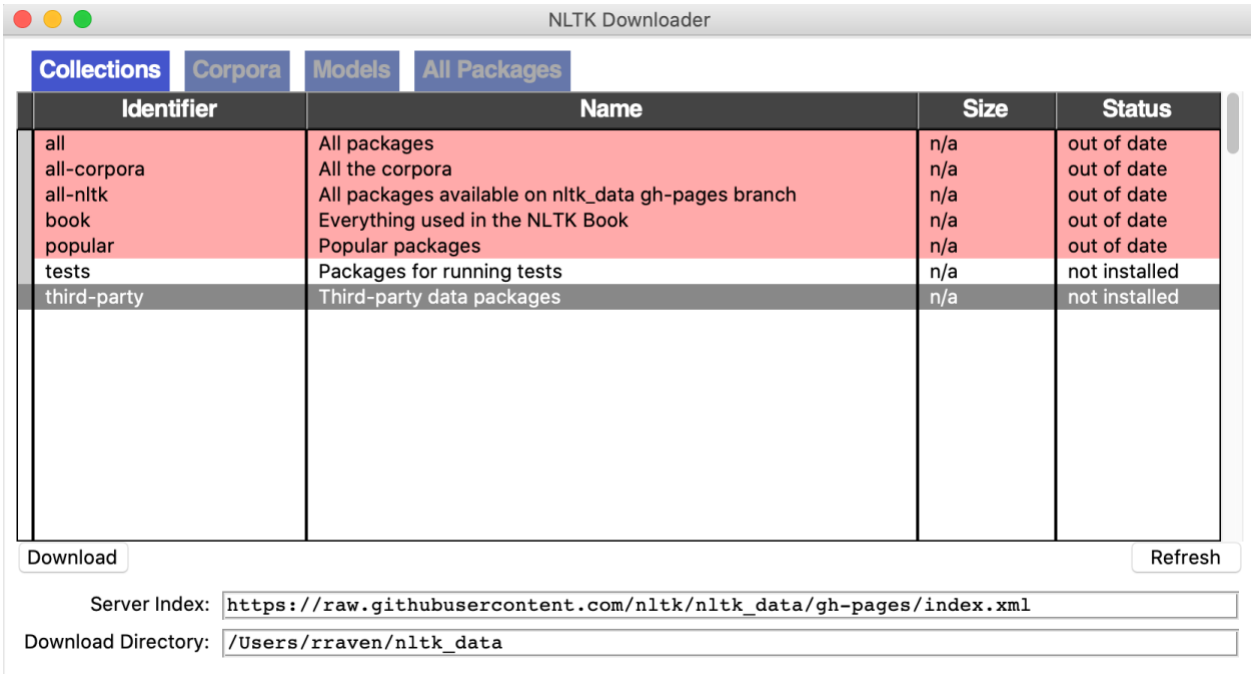
Installed nltk



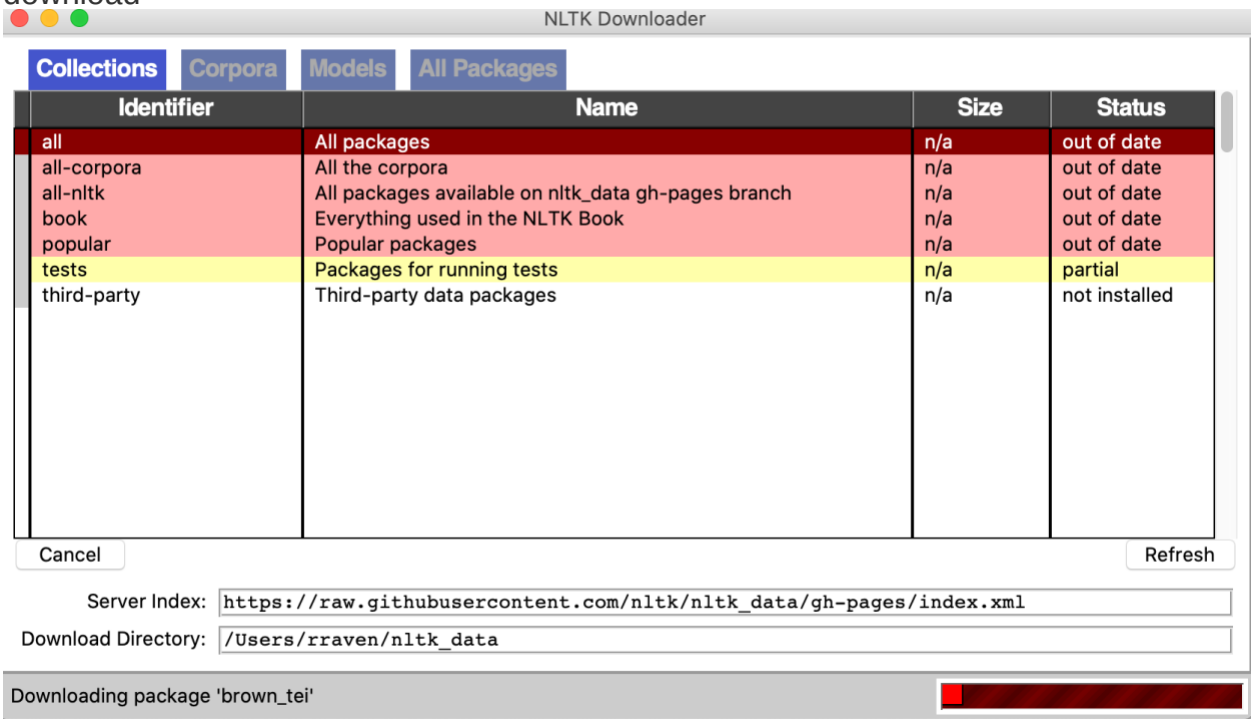
Verified installation of nltk



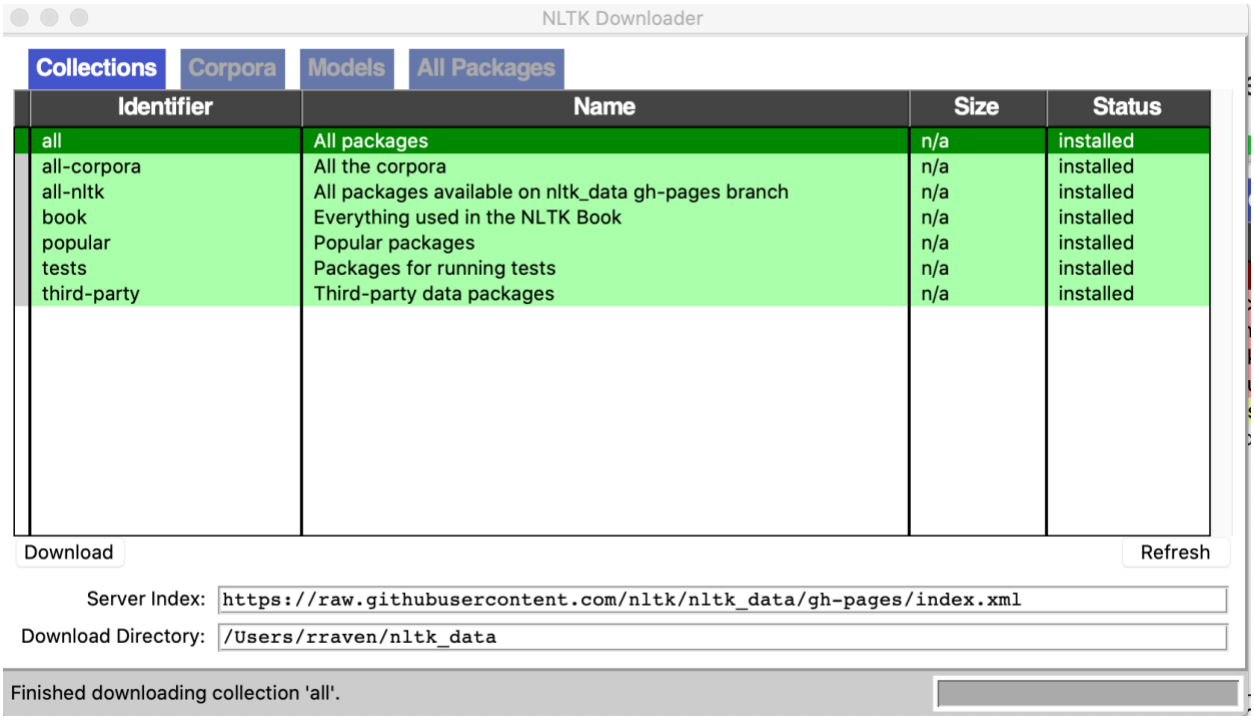
Used nltk.download() to open downloader



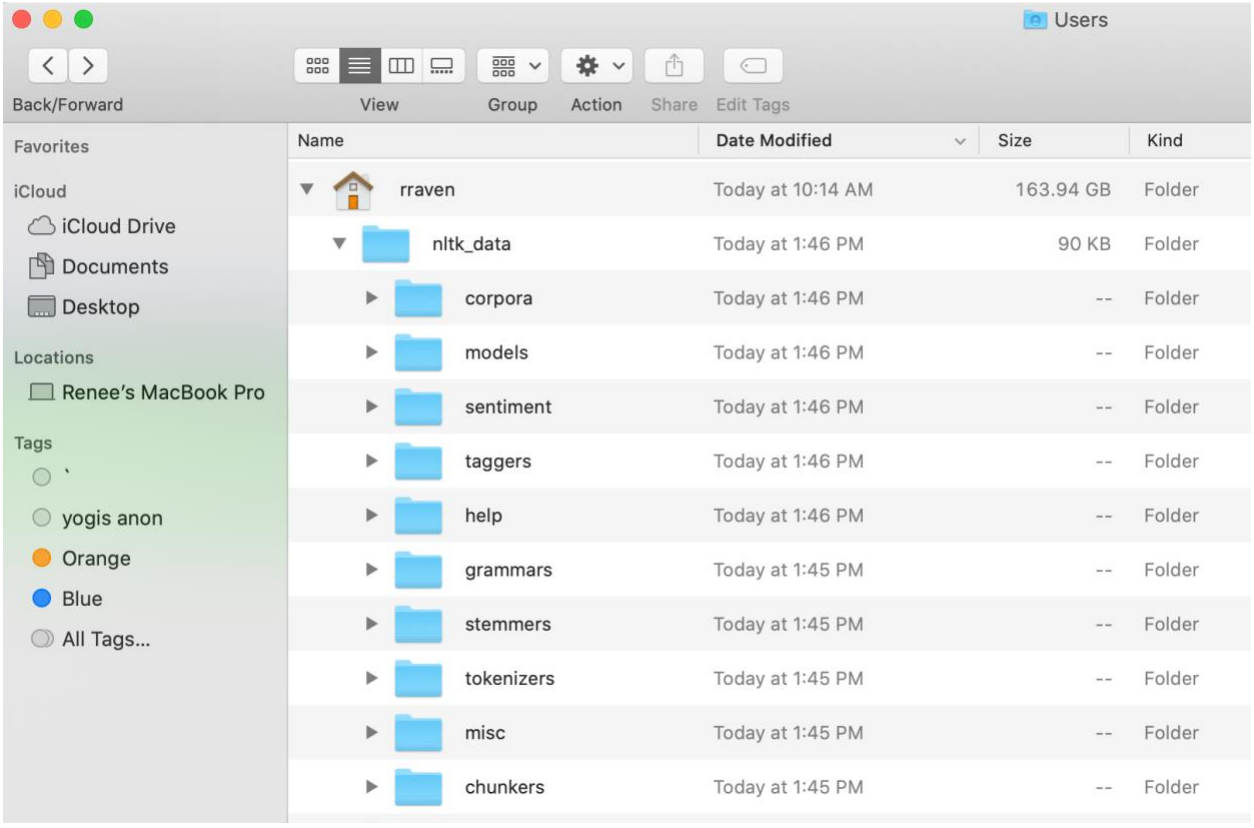
Clicked all packages and then download



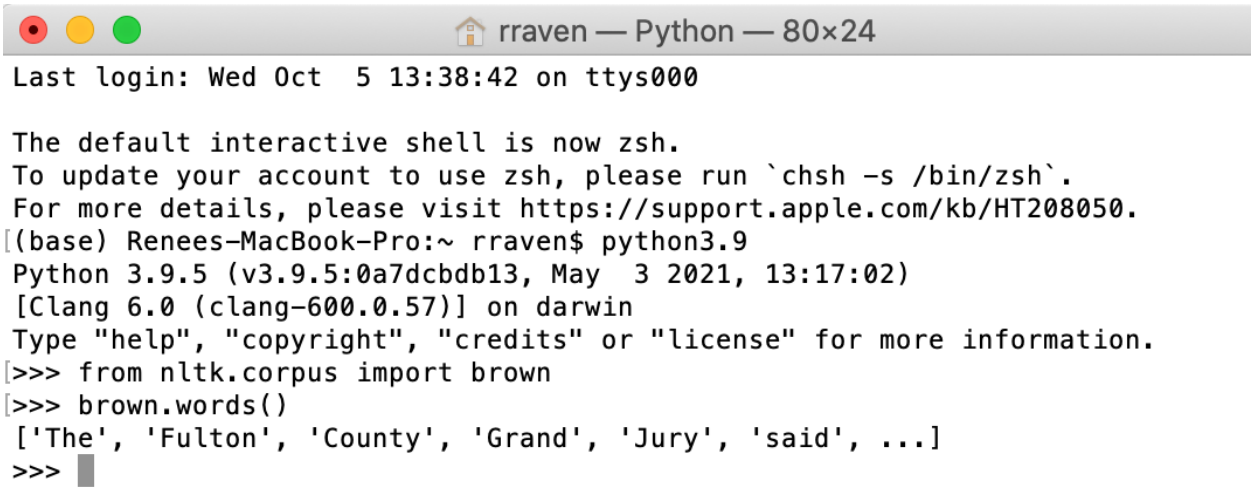
Downloaded all packages for nltk



Verification of installation



Verified nltk is working



Step 2: Tokenize the documents into words remove stop words, and conduct stemming

Code used:

Get Started # Renee Raven Untitled-1 7

```python
# Renee Raven
# CAP6776 Assignment 1 nltk
# Code adapted from Shuwen Wang's (excellent) video

# import modules and libraries
import string
import os
from nltk.tokenize import sent_tokenize, word_tokenize
from nltk.corpus import stopwords
from nltk.stem.porter import PorterStemmer
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.feature_extraction.text import TfidfTransformer
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.metrics.pairwise import cosine_similarity

# save path to files for convenience
data_path = '/Users/rraven/info_retriv'

# initialize
token_dict = {}
all_stemmed_words = []
ps = PorterStemmer()
stop_words = set(stopwords.words("english")) | set(string.punctuation)
output_file = open('/Users/rraven/Desktop/nltk_output.txt','w')
text_lines = "\n"

for subdir, dirs, files in os.walk(data_path):
    for file in files:
        file_path = subdir + os.path.sep + file
        file_contents = open(file_path,'r')
        if '.txt' in file_path:
            text = file_contents.read()
            lowered = text.lower()
            token_dict[file] = lowered
            file_contents.close()
num_docs = len(token_dict)

doc_names = []
for file_name in token_dict.keys():
    doc_names.append(file_name)

for file in token_dict.keys():
    # tokenize
    words = word_tokenize(token_dict[file])
    print("number of words", len(words)) # just to make sure that are different files
    output_file.write((text_lines + "Sentence tokenizing" + ' ' + file + " .\n" + text_lines))
    output_file.write(str(sent_tokenize(token_dict[file])) + "\n")

    output_file.write(text_lines + "Word tokenizing" + ' ' + file + " .\n" + text_lines)
    output_file.write(str(words) + "\n")

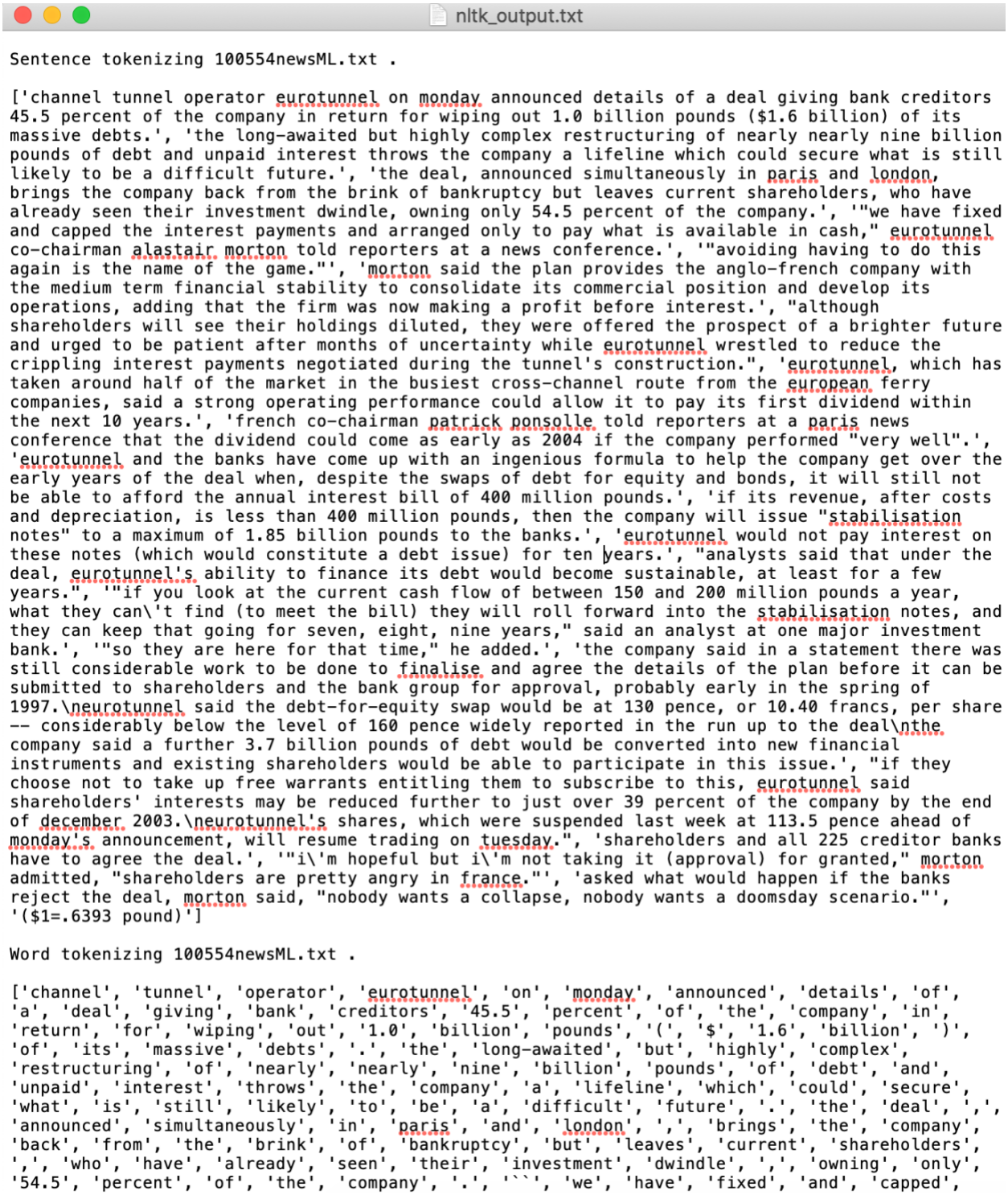
    # remove stop words
    no_stop_words = []
    for w in words:
        if w not in stop_words:
            no_stop_words.append(w)
    output_file.write(text_lines + "Stop words removed from" + ' ' + file + " .\n" + text_lines)
    output_file.write(str(no_stop_words) + "\n")

    # stemming
    stemmed_words = []
    for w in words:
        if w not in stop_words:
            stemmed_words.append(ps.stem(w))
    output_file.write(text_lines + "Stemming" + ' ' + file + " .\n" + text_lines)
    output_file.write(str(stemmed_words) + "\n")

    all_stemmed_words.append(stemmed_words)

```

Screenshot of output of code that performs sentence tokenization, word tokenization, removal of stop words and stemming for 3 files:



Copied output of code that performs sentence tokenization, word tokenization, removal of stop words and stemming for 3 files:

Sentence tokenizing 100554newsML.txt .

['channel tunnel operator eurotunnel on monday announced details of a deal giving bank creditors 45.5 percent of the company in return for wiping out 1.0 billion pounds ($1.6 billion) of its massive debts.', 'the long-awaited but highly complex restructuring of nearly nearly nine billion pounds of debt and unpaid interest throws the company a lifeline which could secure what is still likely to be a difficult future.', 'the deal, announced simultaneously in paris and london, brings the company back from the brink of bankruptcy but leaves current shareholders, who have already seen their investment dwindle, owning only 54.5 percent of the company.', '"we have fixed and capped the interest payments and arranged only to pay what is available in cash," eurotunnel co-chairman alastair morton told reporters at a news conference.', '"avoiding having to do this again is the name of the game."', 'morton said the plan provides the anglo-french company with the medium term financial stability to consolidate its commercial position and develop its operations, adding that the firm was now making a profit before interest.', "although shareholders will see their holdings diluted, they were offered the prospect of a brighter future and urged to be patient after months of uncertainty while eurotunnel wrestled to reduce the crippling interest payments negotiated during the tunnel's construction.", 'eurotunnel, which has taken around half of the market in the busiest cross-channel route from the european ferry companies, said a strong operating performance could allow it to pay its first dividend within the next 10 years.', 'french co-chairman patrick ponsolle told reporters at a paris news conference that the dividend could come as early as 2004 if the company performed "very well".', 'eurotunnel and the banks have come up with an ingenious formula to help the company get over the early years of the deal when, despite the swaps of debt for equity and bonds, it will still not be able to afford the annual interest bill of 400 million pounds.', 'if its revenue, after costs and depreciation, is less than 400 million pounds, then the company will issue "stabilisation notes" to a maximum of 1.85 billion pounds to the banks.', 'eurotunnel would not pay interest on these notes (which would constitute a debt issue) for ten years.', "analysts said that under the deal, eurotunnel's ability to finance its debt would become sustainable, at least for a few years.", '"if you look at the current cash flow of between 150 and 200 million pounds a year, what they can\'t find (to meet the bill) they will roll forward into the stabilisation notes, and they can keep that going for seven, eight, nine years," said an analyst at one major investment bank.', '"so they are here for that time," he added.', 'the company said in a statement there was still considerable work to be done to finalise and agree the details of the plan before it can be submitted to shareholders and the bank group for approval, probably early in the spring of 1997.\neurotunnel said the debt-for-equity swap would be at 130 pence, or 10.40 francs, per share -- considerably below the level of 160 pence widely reported in the run up to the deal\nthe company said a further 3.7 billion pounds of debt would be converted into new financial instruments and existing shareholders would be able to participate in this issue.', "if they choose not to take up free warrants entitling them to subscribe to this, eurotunnel said shareholders' interests may be reduced further to just over 39 percent of the company by the end of december 2003.\neurotunnel's shares, which were suspended last week at 113.5 pence ahead of monday's announcement, will resume trading on tuesday.", 'shareholders and all 225 creditor banks have to agree the deal.', '"i\'m hopeful but i\'m not taking it (approval) for granted," morton admitted, "shareholders are pretty angry in france."', 'asked what would

happen if the banks reject the deal, morton said, "nobody wants a collapse, nobody wants a doomsday scenario."', '($1=.6393 pound)']

Word tokenizing 100554newsML.txt .

['channel', 'tunnel', 'operator', 'eurotunnel', 'on', 'monday', 'announced', 'details', 'of', 'a', 'deal', 'giving', 'bank', 'creditors', '45.5', 'percent', 'of', 'the', 'company', 'in', 'return', 'for', 'wiping', 'out', '1.0', 'billion', 'pounds', '(', '$', '1.6', 'billion', ')', 'of', 'its', 'massive', 'debts', '.', 'the', 'long-awaited', 'but', 'highly', 'complex', 'restructuring', 'of', 'nearly', 'nearly', 'nine', 'billion', 'pounds', 'of', 'debt', 'and', 'unpaid', 'interest', 'throws', 'the', 'company', 'a', 'lifeline', 'which', 'could', 'secure', 'what', 'is', 'still', 'likely', 'to', 'be', 'a', 'difficult', 'future', '.', 'the', 'deal', ',', 'announced', 'simultaneously', 'in', 'paris', 'and', 'london', ',', 'brings', 'the', 'company', 'back', 'from', 'the', 'brink', 'of', 'bankruptcy', 'but', 'leaves', 'current', 'shareholders', ',', 'who', 'have', 'already', 'seen', 'their', 'investment', 'dwindle', ',', 'owning', 'only', '54.5', 'percent', 'of', 'the', 'company', '.', '``', 'we', 'have', 'fixed', 'and', 'capped', 'the', 'interest', 'payments', 'and', 'arranged', 'only', 'to', 'pay', 'what', 'is', 'available', 'in', 'cash', ',', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'told', 'reporters', 'at', 'a', 'news', 'conference', '.', '``', 'avoiding', 'having', 'to', 'do', 'this', 'again', 'is', 'the', 'name', 'of', 'the', 'game', '.', '"', 'morton', 'said', 'the', 'plan', 'provides', 'the', 'anglo-french', 'company', 'with', 'the', 'medium', 'term', 'financial', 'stability', 'to', 'consolidate', 'its', 'commercial', 'position', 'and', 'develop', 'its', 'operations', ',', 'adding', 'that', 'the', 'firm', 'was', 'now', 'making', 'a', 'profit', 'before', 'interest', '.', 'although', 'shareholders', 'will', 'see', 'their', 'holdings', 'diluted', ',', 'they', 'were', 'offered', 'the', 'prospect', 'of', 'a', 'brighter', 'future', 'and', 'urged', 'to', 'be', 'patient', 'after', 'months', 'of', 'uncertainty', 'while', 'eurotunnel', 'wrestled', 'to', 'reduce', 'the', 'crippling', 'interest', 'payments', 'negotiated', 'during', 'the', 'tunnel', "'s", 'construction', '.', 'eurotunnel', ',', 'which', 'has', 'taken', 'around', 'half', 'of', 'the', 'market', 'in', 'the', 'busiest', 'cross-channel', 'route', 'from', 'the', 'european', 'ferry', 'companies', ',', 'said', 'a', 'strong', 'operating', 'performance', 'could', 'allow', 'it', 'to', 'pay', 'its', 'first', 'dividend', 'within', 'the', 'next', '10', 'years', '.', 'french', 'co-chairman', 'patrick', 'ponsolle', 'told', 'reporters', 'at', 'a', 'paris', 'news', 'conference', 'that', 'the', 'dividend', 'could', 'come', 'as', 'early', 'as', '2004', 'if', 'the', 'company', 'performed', '``', 'very', 'well', '"', '.', 'eurotunnel', 'and', 'the', 'banks', 'have', 'come', 'up', 'with', 'an', 'ingenious', 'formula', 'to', 'help', 'the', 'company', 'get', 'over', 'the', 'early', 'years', 'of', 'the', 'deal', 'when', ',', 'despite', 'the', 'swaps', 'of', 'debt', 'for', 'equity', 'and', 'bonds', ',', 'it', 'will', 'still', 'not', 'be', 'able', 'to', 'afford', 'the', 'annual', 'interest', 'bill', 'of', '400', 'million', 'pounds', '.', 'if', 'its', 'revenue', ',', 'after', 'costs', 'and', 'depreciation', ',', 'is', 'less', 'than', '400', 'million', 'pounds', ',', 'then', 'the', 'company', 'will', 'issue', '``', 'stabilisation', 'notes', '"', 'to', 'a', 'maximum', 'of', '1.85', 'billion', 'pounds', 'to', 'the', 'banks', '.', 'eurotunnel', 'would', 'not', 'pay', 'interest', 'on', 'these', 'notes', '(', 'which', 'would', 'constitute', 'a', 'debt', 'issue', ')', 'for', 'ten', 'years', '.', 'analysts', 'said', 'that', 'under', 'the', 'deal', ',', 'eurotunnel', "'s", 'ability', 'to', 'finance', 'its', 'debt', 'would', 'become', 'sustainable', ',', 'at', 'least', 'for', 'a', 'few', 'years', '.', '``', 'if', 'you', 'look', 'at', 'the', 'current', 'cash', 'flow', 'of', 'between', '150', 'and', '200', 'million', 'pounds', 'a', 'year', ',', 'what', 'they', 'ca', "n't", 'find', '(', 'to', 'meet', 'the', 'bill', ')', 'they', 'will', 'roll', 'forward', 'into', 'the', 'stabilisation', 'notes', ',', 'and', 'they', 'can', 'keep', 'that', 'going', 'for', 'seven', ',', 'eight', ',', 'nine', 'years', ',', '"', 'said', 'an', 'analyst', 'at', 'one', 'major', 'investment', 'bank', '.', '``', 'so', 'they', 'are', 'here', 'for', 'that', 'time', ',', '"', 'he', 'added', '.', 'the', 'company', 'said', 'in', 'a', 'statement', 'there', 'was', 'still', 'considerable', 'work', 'to', 'be', 'done', 'to', 'finalise', 'and', 'agree', 'the', 'details', 'of', 'the', 'plan', 'before', 'it', 'can', 'be', 'submitted', 'to', 'shareholders', 'and', 'the', 'bank', 'group', 'for', 'approval', ',', 'probably', 'early', 'in', 'the', 'spring', 'of', '1997.', 'eurotunnel', 'said', 'the', 'debt-for-equity', 'swap', 'would', 'be', 'at', '130', 'pence', ',', 'or', '10.40', 'francs', ',', 'per', 'share', '--', 'considerably', 'below', 'the', 'level', 'of', '160', 'pence', 'widely',

'reported', 'in', 'the', 'run', 'up', 'to', 'the', 'deal', 'the', 'company', 'said', 'a', 'further', '3.7', 'billion', 'pounds', 'of', 'debt', 'would', 'be', 'converted', 'into', 'new', 'financial', 'instruments', 'and', 'existing', 'shareholders', 'would', 'be', 'able', 'to', 'participate', 'in', 'this', 'issue', '.', 'if', 'they', 'choose', 'not', 'to', 'take', 'up', 'free', 'warrants', 'entitling', 'them', 'to', 'subscribe', 'to', 'this', ',', 'eurotunnel', 'said', 'shareholders', '"', 'interests', 'may', 'be', 'reduced', 'further', 'to', 'just', 'over', '39', 'percent', 'of', 'the', 'company', 'by', 'the', 'end', 'of', 'december', '2003.', 'eurotunnel', "'s", 'shares', ',', 'which', 'were', 'suspended', 'last', 'week', 'at', '113.5', 'pence', 'ahead', 'of', 'monday', "'s", 'announcement', ',', 'will', 'resume', 'trading', 'on', 'tuesday', '.', 'shareholders', 'and', 'all', '225', 'creditor', 'banks', 'have', 'to', 'agree', 'the', 'deal', '.', '``', 'i', "'m", 'hopeful', 'but', 'i', "'m", 'not', 'taking', 'it', '(', 'approval', ')', 'for', 'granted', ',', '"', 'morton', 'admitted', ',', '``', 'shareholders', 'are', 'pretty', 'angry', 'in', 'france', '.', '"', 'asked', 'what', 'would', 'happen', 'if', 'the', 'banks', 'reject', 'the', 'deal', ',', 'morton', 'said', ',', '``', 'nobody', 'wants', 'a', 'collapse', ',', 'nobody', 'wants', 'a', 'doomsday', 'scenario', '.', '"', '(', '$', '1=.6393', 'pound', ')']

Stop words removed from 100554newsML.txt .

['channel', 'tunnel', 'operator', 'eurotunnel', 'monday', 'announced', 'details', 'deal', 'giving', 'bank', 'creditors', '45.5', 'percent', 'company', 'return', 'wiping', '1.0', 'billion', 'pounds', '1.6', 'billion', 'massive', 'debts', 'long-awaited', 'highly', 'complex', 'restructuring', 'nearly', 'nearly', 'nine', 'billion', 'pounds', 'debt', 'unpaid', 'interest', 'throws', 'company', 'lifeline', 'could', 'secure', 'still', 'likely', 'difficult', 'future', 'deal', 'announced', 'simultaneously', 'paris', 'london', 'brings', 'company', 'back', 'brink', 'bankruptcy', 'leaves', 'current', 'shareholders', 'already', 'seen', 'investment', 'dwindle', 'owning', '54.5', 'percent', 'company', '``', 'fixed', 'capped', 'interest', 'payments', 'arranged', 'pay', 'available', 'cash', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'told', 'reporters', 'news', 'conference', '``', 'avoiding', 'name', 'game', '"', 'morton', 'said', 'plan', 'provides', 'anglo-french', 'company', 'medium', 'term', 'financial', 'stability', 'consolidate', 'commercial', 'position', 'develop', 'operations', 'adding', 'firm', 'making', 'profit', 'interest', 'although', 'shareholders', 'see', 'holdings', 'diluted', 'offered', 'prospect', 'brighter', 'future', 'urged', 'patient', 'months', 'uncertainty', 'eurotunnel', 'wrestled', 'reduce', 'crippling', 'interest', 'payments', 'negotiated', 'tunnel', "'s", 'construction', 'eurotunnel', 'taken', 'around', 'half', 'market', 'busiest', 'cross-channel', 'route', 'european', 'ferry', 'companies', 'said', 'strong', 'operating', 'performance', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'years', 'french', 'co-chairman', 'patrick', 'ponsolle', 'told', 'reporters', 'paris', 'news', 'conference', 'dividend', 'could', 'come', 'early', '2004', 'company', 'performed', '``', 'well', '"', 'eurotunnel', 'banks', 'come', 'ingenious', 'formula', 'help', 'company', 'get', 'early', 'years', 'deal', 'despite', 'swaps', 'debt', 'equity', 'bonds', 'still', 'able', 'afford', 'annual', 'interest', 'bill', '400', 'million', 'pounds', 'revenue', 'costs', 'depreciation', 'less', '400', 'million', 'pounds', 'company', 'issue', '``', 'stabilisation', 'notes', '"', 'maximum', '1.85', 'billion', 'pounds', 'banks', 'eurotunnel', 'would', 'pay', 'interest', 'notes', 'would', 'constitute', 'debt', 'issue', 'ten', 'years', 'analysts', 'said', 'deal', 'eurotunnel', "'s", 'ability', 'finance', 'debt', 'would', 'become', 'sustainable', 'least', 'years', '``', 'look', 'current', 'cash', 'flow', '150', '200', 'million', 'pounds', 'year', 'ca', "n't", 'find', 'meet', 'bill', 'roll', 'forward', 'stabilisation', 'notes', 'keep', 'going', 'seven', 'eight', 'nine', 'years', '"', 'said', 'analyst', 'one', 'major', 'investment', 'bank', '``', 'time', '"', 'added', 'company', 'said', 'statement', 'still', 'considerable', 'work', 'done', 'finalise', 'agree', 'details', 'plan', 'submitted', 'shareholders', 'bank', 'group', 'approval', 'probably', 'early', 'spring', '1997.', 'eurotunnel', 'said', 'debt-for-equity', 'swap', 'would', '130', 'pence', '10.40', 'francs', 'per', 'share', '--', 'considerably', 'level', '160', 'pence', 'widely', 'reported', 'run', 'deal', 'company', 'said', '3.7', 'billion', 'pounds', 'debt', 'would', 'converted', 'new', 'financial', 'instruments', 'existing', 'shareholders', 'would', 'able', 'participate', 'issue', 'choose', 'take', 'free', 'warrants', 'entitling', 'subscribe', 'eurotunnel', 'said', 'shareholders', 'interests', 'may', 'reduced', '39', 'percent', 'company', 'end', 'december', '2003.', 'eurotunnel', "'s", 'shares', 'suspended',

'last', 'week', '113.5', 'pence', 'ahead', 'monday', "'s", 'announcement', 'resume', 'trading', 'tuesday', 'shareholders', '225', 'creditor', 'banks', 'agree', 'deal', '``', "'m", 'hopeful', "'m", 'taking', 'approval', 'granted', '"', 'morton', 'admitted', '``', 'shareholders', 'pretty', 'angry', 'france', '"', 'asked', 'would', 'happen', 'banks', 'reject', 'deal', 'morton', 'said', '``', 'nobody', 'wants', 'collapse', 'nobody', 'wants', 'doomsday', 'scenario', '"', '1=.6393', 'pound']

Stemming 100554newsML.txt .

['channel', 'tunnel', 'oper', 'eurotunnel', 'monday', 'announc', 'detail', 'deal', 'give', 'bank', 'creditor', '45.5', 'percent', 'compani', 'return', 'wipe', '1.0', 'billion', 'pound', '1.6', 'billion', 'massiv', 'debt', 'long-await', 'highli', 'complex', 'restructur', 'nearli', 'nearli', 'nine', 'billion', 'pound', 'debt', 'unpaid', 'interest', 'throw', 'compani', 'lifelin', 'could', 'secur', 'still', 'like', 'difficult', 'futur', 'deal', 'announc', 'simultan', 'pari', 'london', 'bring', 'compani', 'back', 'brink', 'bankruptci', 'leav', 'current', 'sharehold', 'alreadi', 'seen', 'invest', 'dwindl', 'own', '54.5', 'percent', 'compani', '``', 'fix', 'cap', 'interest', 'payment', 'arrang', 'pay', 'avail', 'cash', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'told', 'report', 'news', 'confer', '``', 'avoid', 'name', 'game', '"', 'morton', 'said', 'plan', 'provid', 'anglo-french', 'compani', 'medium', 'term', 'financi', 'stabil', 'consolid', 'commerci', 'posit', 'develop', 'oper', 'ad', 'firm', 'make', 'profit', 'interest', 'although', 'sharehold', 'see', 'hold', 'dilut', 'offer', 'prospect', 'brighter', 'futur', 'urg', 'patient', 'month', 'uncertainti', 'eurotunnel', 'wrestl', 'reduc', 'crippl', 'interest', 'payment', 'negoti', 'tunnel', "'s", 'construct', 'eurotunnel', 'taken', 'around', 'half', 'market', 'busiest', 'cross-channel', 'rout', 'european', 'ferri', 'compani', 'said', 'strong', 'oper', 'perform', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'year', 'french', 'co-chairman', 'patrick', 'ponsol', 'told', 'report', 'pari', 'news', 'confer', 'dividend', 'could', 'come', 'earli', '2004', 'compani', 'perform', '``', 'well', '"', 'eurotunnel', 'bank', 'come', 'ingeni', 'formula', 'help', 'compani', 'get', 'earli', 'year', 'deal', 'despit', 'swap', 'debt', 'equiti', 'bond', 'still', 'abl', 'afford', 'annual', 'interest', 'bill', '400', 'million', 'pound', 'revenu', 'cost', 'depreci', 'less', '400', 'million', 'pound', 'compani', 'issu', '``', 'stabilis', 'note', '"', 'maximum', '1.85', 'billion', 'pound', 'bank', 'eurotunnel', 'would', 'pay', 'interest', 'note', 'would', 'constitut', 'debt', 'issu', 'ten', 'year', 'analyst', 'said', 'deal', 'eurotunnel', "'s", 'abil', 'financ', 'debt', 'would', 'becom', 'sustain', 'least', 'year', '``', 'look', 'current', 'cash', 'flow', '150', '200', 'million', 'pound', 'year', 'ca', "n't", 'find', 'meet', 'bill', 'roll', 'forward', 'stabilis', 'note', 'keep', 'go', 'seven', 'eight', 'nine', 'year', '"', 'said', 'analyst', 'one', 'major', 'invest', 'bank', '``', 'time', '"', 'ad', 'compani', 'said', 'statement', 'still', 'consider', 'work', 'done', 'finalis', 'agre', 'detail', 'plan', 'submit', 'sharehold', 'bank', 'group', 'approv', 'probabl', 'earli', 'spring', '1997.', 'eurotunnel', 'said', 'debt-for-equ', 'swap', 'would', '130', 'penc', '10.40', 'franc', 'per', 'share', '--', 'consider', 'level', '160', 'penc', 'wide', 'report', 'run', 'deal', 'compani', 'said', '3.7', 'billion', 'pound', 'debt', 'would', 'convert', 'new', 'financi', 'instrument', 'exist', 'sharehold', 'would', 'abl', 'particip', 'issu', 'choos', 'take', 'free', 'warrant', 'entitl', 'subscrib', 'eurotunnel', 'said', 'sharehold', 'interest', 'may', 'reduc', '39', 'percent', 'compani', 'end', 'decemb', '2003.', 'eurotunnel', "'s", 'share', 'suspend', 'last', 'week', '113.5', 'penc', 'ahead', 'monday', "'s", 'announc', 'resum', 'trade', 'tuesday', 'sharehold', '225', 'creditor', 'bank', 'agre', 'deal', '``', "'m", 'hope', "'m", 'take', 'approv', 'grant', '"', 'morton', 'admit', '``', 'sharehold', 'pretti', 'angri', 'franc', '"', 'ask', 'would', 'happen', 'bank', 'reject', 'deal', 'morton', 'said', '``', 'nobodi', 'want', 'collaps', 'nobodi', 'want', 'doomsday', 'scenario', '"', '1=.6393', 'pound']

Sentence tokenizing 100593newsML.txt .

['anglo-french channel tunnel operator eurotunnel monday announced a deal giving its creditor banks 45.5 percent of the company in return for wiping out one billion pounds ($1.56 billion) of its debt.', 'the long-awaited restructuring brings to an end months of wrangling between eurotunnel and the 225 banks to which it owes nearly nine billion pounds ($14.1 billion).', 'the deal, announced simultaneously in paris and london, brings the company back from the brink of insolvency but leaves shareholders owning only 54.5 percent of the company.', '"the restructuring plan provides eurotunnel with the medium-term financial stability to allow it to consolidate its substantial commercial achievements to date and to develop its operations," eurotunnel co-chairman alastair morton said.', 'the firm was now making a profit before interest, he added.', "although shareholders will see their interests diluted, they were offered the prospect of a brighter future after months of uncertainty while eurotunnel wrestled to reduce crippling interest payments negotiated during the tunnel's construction.", 'eurotunnel, which has taken around half the cross-channel market from the european ferry companies, said a strong operating performance could allow it to pay its first dividend within the next 10 years.', "french co-chairman patrick ponsolle said shareholders would have to be patient before they could reap the benefits of the company's success.", 'he called the debt restructuring plan "an acceptable compromise" for holders of eurotunnel shares.', "the company said there was still considerable work to be done to finalise and agree on the details of the plan before it can be submitted to shareholders and the full 225 bank syndicate for approval, probably early in 1997.\nmonday's announcement followed two weeks of highly secretive negotiations between eurotunnel and its six leading banks.", 'this was extended to the 24 "instructing banks" at a meeting late last week in london.', 'eurotunnel said the debt-for-equity swap would be at 130 pence, or 10.40 francs, per share.', 'that is considerably below the level of around 160 pence widely reported before announcement of the deal, and will reduce outstanding debt of 8.7 billion pounds ($13.6 billion) by 1.0 billion ($1.56 billion).', 'the company said a further 3.7 billion pounds ($5.8 billion) of debt would be converted into new financial instruments and existing shareholders would be able to participate in this issue.', "if they choose not to take up free warrants entitling them to subscribe to this, eurotunnel said shareholders' interests may be reduced further to just over 39 percent of the company by the end of december 2003.\neurotunnel's shares, which were suspended last week at 113.5 pence ahead of monday's announcement, should resume trading on tuesday, the company said."]

Word tokenizing 100593newsML.txt .

['anglo-french', 'channel', 'tunnel', 'operator', 'eurotunnel', 'monday', 'announced', 'a', 'deal', 'giving', 'its', 'creditor', 'banks', '45.5', 'percent', 'of', 'the', 'company', 'in', 'return', 'for', 'wiping', 'out', 'one', 'billion', 'pounds', '(', '$', '1.56', 'billion', ')', 'of', 'its', 'debt', '.', 'the', 'long-awaited', 'restructuring', 'brings', 'to', 'an', 'end', 'months', 'of', 'wrangling', 'between', 'eurotunnel', 'and', 'the', '225', 'banks', 'to', 'which', 'it', 'owes', 'nearly', 'nine', 'billion', 'pounds', '(', '$', '14.1', 'billion', ')', '.', 'the', 'deal', ',', 'announced', 'simultaneously', 'in', 'paris', 'and', 'london', ',', 'brings', 'the', 'company', 'back', 'from', 'the', 'brink', 'of', 'insolvency', 'but', 'leaves', 'shareholders', 'owning', 'only', '54.5', 'percent', 'of', 'the', 'company', '.', '``', 'the', 'restructuring', 'plan', 'provides', 'eurotunnel', 'with', 'the', 'medium-term', 'financial', 'stability', 'to', 'allow', 'it', 'to', 'consolidate', 'its', 'substantial', 'commercial', 'achievements', 'to', 'date', 'and', 'to', 'develop', 'its', 'operations', ',', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', '.', 'the', 'firm', 'was', 'now', 'making', 'a', 'profit', 'before', 'interest', ',', 'he', 'added', '.', 'although', 'shareholders', 'will', 'see', 'their', 'interests', 'diluted', ',', 'they', 'were', 'offered', 'the', 'prospect', 'of', 'a', 'brighter', 'future', 'after', 'months', 'of', 'uncertainty', 'while', 'eurotunnel', 'wrestled', 'to', 'reduce', 'crippling', 'interest', 'payments', 'negotiated', 'during', 'the', 'tunnel', "'s", 'construction', '.', 'eurotunnel', ',', 'which', 'has', 'taken', 'around', 'half', 'the', 'cross-

channel', 'market', 'from', 'the', 'european', 'ferry', 'companies', ',', 'said', 'a', 'strong', 'operating', 'performance', 'could', 'allow', 'it', 'to', 'pay', 'its', 'first', 'dividend', 'within', 'the', 'next', '10', 'years', '.', 'french', 'co-chairman', 'patrick', 'ponsolle', 'said', 'shareholders', 'would', 'have', 'to', 'be', 'patient', 'before', 'they', 'could', 'reap', 'the', 'benefits', 'of', 'the', 'company', "'s", 'success', '.', 'he', 'called', 'the', 'debt', 'restructuring', 'plan', '``', 'an', 'acceptable', 'compromise', '"', 'for', 'holders', 'of', 'eurotunnel', 'shares', '.', 'the', 'company', 'said', 'there', 'was', 'still', 'considerable', 'work', 'to', 'be', 'done', 'to', 'finalise', 'and', 'agree', 'on', 'the', 'details', 'of', 'the', 'plan', 'before', 'it', 'can', 'be', 'submitted', 'to', 'shareholders', 'and', 'the', 'full', '225', 'bank', 'syndicate', 'for', 'approval', ',', 'probably', 'early', 'in', '1997.', 'monday', "'s", 'announcement', 'followed', 'two', 'weeks', 'of', 'highly', 'secretive', 'negotiations', 'between', 'eurotunnel', 'and', 'its', 'six', 'leading', 'banks', '.', 'this', 'was', 'extended', 'to', 'the', '24', '``', 'instructing', 'banks', '"', 'at', 'a', 'meeting', 'late', 'last', 'week', 'in', 'london', '.', 'eurotunnel', 'said', 'the', 'debt-for-equity', 'swap', 'would', 'be', 'at', '130', 'pence', ',', 'or', '10.40', 'francs', ',', 'per', 'share', '.', 'that', 'is', 'considerably', 'below', 'the', 'level', 'of', 'around', '160', 'pence', 'widely', 'reported', 'before', 'announcement', 'of', 'the', 'deal', ',', 'and', 'will', 'reduce', 'outstanding', 'debt', 'of', '8.7', 'billion', 'pounds', '(', '$', '13.6', 'billion', ')', 'by', '1.0', 'billion', '(', '$', '1.56', 'billion', ')', '.', 'the', 'company', 'said', 'a', 'further', '3.7', 'billion', 'pounds', '(', '$', '5.8', 'billion', ')', 'of', 'debt', 'would', 'be', 'converted', 'into', 'new', 'financial', 'instruments', 'and', 'existing', 'shareholders', 'would', 'be', 'able', 'to', 'participate', 'in', 'this', 'issue', '.', 'if', 'they', 'choose', 'not', 'to', 'take', 'up', 'free', 'warrants', 'entitling', 'them', 'to', 'subscribe', 'to', 'this', ',', 'eurotunnel', 'said', 'shareholders', '"', 'interests', 'may', 'be', 'reduced', 'further', 'to', 'just', 'over', '39', 'percent', 'of', 'the', 'company', 'by', 'the', 'end', 'of', 'december', '2003.', 'eurotunnel', "'s", 'shares', ',', 'which', 'were', 'suspended', 'last', 'week', 'at', '113.5', 'pence', 'ahead', 'of', 'monday', "'s", 'announcement', ',', 'should', 'resume', 'trading', 'on', 'tuesday', ',', 'the', 'company', 'said', '.']

Stop words removed from 100593newsML.txt .

['anglo-french', 'channel', 'tunnel', 'operator', 'eurotunnel', 'monday', 'announced', 'deal', 'giving', 'creditor', 'banks', '45.5', 'percent', 'company', 'return', 'wiping', 'one', 'billion', 'pounds', '1.56', 'billion', 'debt', 'long-awaited', 'restructuring', 'brings', 'end', 'months', 'wrangling', 'eurotunnel', '225', 'banks', 'owes', 'nearly', 'nine', 'billion', 'pounds', '14.1', 'billion', 'deal', 'announced', 'simultaneously', 'paris', 'london', 'brings', 'company', 'back', 'brink', 'insolvency', 'leaves', 'shareholders', 'owning', '54.5', 'percent', 'company', '``', 'restructuring', 'plan', 'provides', 'eurotunnel', 'medium-term', 'financial', 'stability', 'allow', 'consolidate', 'substantial', 'commercial', 'achievements', 'date', 'develop', 'operations', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', 'firm', 'making', 'profit', 'interest', 'added', 'although', 'shareholders', 'see', 'interests', 'diluted', 'offered', 'prospect', 'brighter', 'future', 'months', 'uncertainty', 'eurotunnel', 'wrestled', 'reduce', 'crippling', 'interest', 'payments', 'negotiated', 'tunnel', "'s", 'construction', 'eurotunnel', 'taken', 'around', 'half', 'cross-channel', 'market', 'european', 'ferry', 'companies', 'said', 'strong', 'operating', 'performance', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'years', 'french', 'co-chairman', 'patrick', 'ponsolle', 'said', 'shareholders', 'would', 'patient', 'could', 'reap', 'benefits', 'company', "'s", 'success', 'called', 'debt', 'restructuring', 'plan', '``', 'acceptable', 'compromise', '"', 'holders', 'eurotunnel', 'shares', 'company', 'said', 'still', 'considerable', 'work', 'done', 'finalise', 'agree', 'details', 'plan', 'submitted', 'shareholders', 'full', '225', 'bank', 'syndicate', 'approval', 'probably', 'early', '1997.', 'monday', "'s", 'announcement', 'followed', 'two', 'weeks', 'highly', 'secretive', 'negotiations', 'eurotunnel', 'six', 'leading', 'banks', 'extended', '24', '``', 'instructing', 'banks', '"', 'meeting', 'late', 'last', 'week', 'london', 'eurotunnel', 'said', 'debt-for-equity', 'swap', 'would', '130', 'pence', '10.40', 'francs', 'per', 'share', 'considerably', 'level', 'around', '160', 'pence', 'widely', 'reported', 'announcement', 'deal', 'reduce', 'outstanding', 'debt', '8.7', 'billion', 'pounds', '13.6', 'billion', '1.0', 'billion',

'1.56', 'billion', 'company', 'said', '3.7', 'billion', 'pounds', '5.8', 'billion', 'debt', 'would', 'converted', 'new', 'financial', 'instruments', 'existing', 'shareholders', 'would', 'able', 'participate', 'issue', 'choose', 'take', 'free', 'warrants', 'entitling', 'subscribe', 'eurotunnel', 'said', 'shareholders', 'interests', 'may', 'reduced', '39', 'percent', 'company', 'end', 'december', '2003.', 'eurotunnel', "'s", 'shares', 'suspended', 'last', 'week', '113.5', 'pence', 'ahead', 'monday', "'s", 'announcement', 'resume', 'trading', 'tuesday', 'company', 'said']

Stemming 100593newsML.txt .

['anglo-french', 'channel', 'tunnel', 'oper', 'eurotunnel', 'monday', 'announc', 'deal', 'give', 'creditor', 'bank', '45.5', 'percent', 'compani', 'return', 'wipe', 'one', 'billion', 'pound', '1.56', 'billion', 'debt', 'long-await', 'restructur', 'bring', 'end', 'month', 'wrangl', 'eurotunnel', '225', 'bank', 'owe', 'nearli', 'nine', 'billion', 'pound', '14.1', 'billion', 'deal', 'announc', 'simultan', 'pari', 'london', 'bring', 'compani', 'back', 'brink', 'insolv', 'leav', 'sharehold', 'own', '54.5', 'percent', 'compani', '``', 'restructur', 'plan', 'provid', 'eurotunnel', 'medium-term', 'financi', 'stabil', 'allow', 'consolid', 'substanti', 'commerci', 'achiev', 'date', 'develop', 'oper', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', 'firm', 'make', 'profit', 'interest', 'ad', 'although', 'sharehold', 'see', 'interest', 'dilut', 'offer', 'prospect', 'brighter', 'futur', 'month', 'uncertainti', 'eurotunnel', 'wrestl', 'reduc', 'crippl', 'interest', 'payment', 'negoti', 'tunnel', "'s", 'construct', 'eurotunnel', 'taken', 'around', 'half', 'cross-channel', 'market', 'european', 'ferri', 'compani', 'said', 'strong', 'oper', 'perform', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'year', 'french', 'co-chairman', 'patrick', 'ponsol', 'said', 'sharehold', 'would', 'patient', 'could', 'reap', 'benefit', 'compani', "'s", 'success', 'call', 'debt', 'restructur', 'plan', '``', 'accept', 'compromis', '"', 'holder', 'eurotunnel', 'share', 'compani', 'said', 'still', 'consider', 'work', 'done', 'finalis', 'agre', 'detail', 'plan', 'submit', 'sharehold', 'full', '225', 'bank', 'syndic', 'approv', 'probabl', 'earli', '1997.', 'monday', "'s", 'announc', 'follow', 'two', 'week', 'highli', 'secret', 'negoti', 'eurotunnel', 'six', 'lead', 'bank', 'extend', '24', '``', 'instruct', 'bank', '"', 'meet', 'late', 'last', 'week', 'london', 'eurotunnel', 'said', 'debt-for-equ', 'swap', 'would', '130', 'penc', '10.40', 'franc', 'per', 'share', 'consider', 'level', 'around', '160', 'penc', 'wide', 'report', 'announc', 'deal', 'reduc', 'outstand', 'debt', '8.7', 'billion', 'pound', '13.6', 'billion', '1.0', 'billion', '1.56', 'billion', 'compani', 'said', '3.7', 'billion', 'pound', '5.8', 'billion', 'debt', 'would', 'convert', 'new', 'financi', 'instrument', 'exist', 'sharehold', 'would', 'abl', 'particip', 'issu', 'choos', 'take', 'free', 'warrant', 'entitl', 'subscrib', 'eurotunnel', 'said', 'sharehold', 'interest', 'may', 'reduc', '39', 'percent', 'compani', 'end', 'decemb', '2003.', 'eurotunnel', "'s", 'share', 'suspend', 'last', 'week', '113.5', 'penc', 'ahead', 'monday', "'s", 'announc', 'resum', 'trade', 'tuesday', 'compani', 'said']

Sentence tokenizing 100618newsML.txt .

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Word tokenizing 100618newsML.txt .

['anglo-french', 'channel', 'tunnel', 'operator', 'eurotunnel', 'on', 'monday', 'announced', 'a', 'deal', 'giving', 'creditor', 'banks', '45.5', 'percent', 'of', 'the', 'company', 'in', 'return', 'for', 'wiping', 'out', 'one', 'billion', 'pounds', '(', '$', '1.56', 'billion', ')', 'of', 'its', 'debt', 'mountain', '.', 'the', 'long-awaited', 'restructuring', 'brings', 'to', 'an', 'end', 'months', 'of', 'wrangling', 'between', 'eurotunnel', 'and', 'the', '225', 'banks', 'to', 'which', 'it', 'owes', 'nearly', 'nine', 'billion', 'pounds', '.', 'the', 'deal', ',', 'announced', 'simultaneously', 'in', 'paris', 'and', 'london', ',', 'brings', 'the', 'company', 'back', 'from', 'the', 'brink', 'of', 'insolvency', 'but', 'leaves', 'shareholders', 'owning', 'only', '54.5', 'percent', 'of', 'the', 'company', '.', '``', 'the', 'restructuring', 'plan', 'provides', 'eurotunnel', 'with', 'the', 'medium', 'term', 'financial', 'stability', 'to', 'allow', 'it', 'to', 'consolidate', 'its', 'substantial', 'commercial', 'achievements', 'to', 'date', 'and', 'to', 'develop', 'its', 'operations', ',', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', '.', 'the', 'firm', 'was', 'now', 'making', 'a', 'profit', 'before', 'interest', ',', 'he', 'added', '.', 'although', 'shareholders', 'will', 'see', 'their', 'interests', 'diluted', ',', 'they', 'were', 'offered', 'the', 'prospect', 'of', 'a', 'brighter', 'future', 'after', 'months', 'of', 'uncertainty', 'while', 'eurotunnel', 'wrestled', 'to', 'reduce', 'crippling', 'interest', 'payments', 'negotiated', 'during', 'the', 'tunnel', "'s", 'construction', '.', 'eurotunnel', ',', 'which', 'has', 'taken', 'around', 'half', 'the', 'cross-channel', 'market', 'from', 'the', 'european', 'ferry', 'companies', ',', 'said', 'a', 'strong', 'operating', 'performance', 'could', 'allow', 'it', 'to', 'pay', 'its', 'first', 'dividend', 'within', 'the', 'next', '10', 'years', '.', 'french', 'co-chairman', 'patrick', 'ponsolle', 'said', 'shareholders', 'would', 'have', 'to', 'be', 'patient', 'before', 'they', 'could', 'reap', 'the', 'benefits', 'of', 'the', 'company', "'s", 'success', '.', 'he', 'called', 'the', 'debt', 'restructuring', 'plan', '``', 'an', 'acceptable', 'compromise', '"', 'for', 'holders', 'of', 'eurotunnel', 'shares', '.', 'the', 'company', 'said', 'in', 'a', 'statement', 'there', 'was', 'still', 'considerable', 'work', 'to', 'be', 'done', 'to', 'finalise', 'and', 'agree', 'the', 'details', 'of', 'the', 'plan', 'before', 'it', 'can', 'be', 'submitted', 'to', 'shareholders', 'and', 'the', 'full', '225', 'bank', 'syndicate', 'for', 'approval', ',', 'probably', 'early', 'in', '1997.', 'monday', "'s", 'announcement', 'followed', 'two', 'weeks', 'of', 'highly', 'secretive', 'negotiations', 'between', 'eurotunnel', 'and', 'its', 'six', 'leading', 'banks', '.', 'this', 'was', 'extended', 'to', 'the', '24', '``', 'instructing', 'banks', '"', 'at', 'a', 'meeting', 'late', 'last', 'week', 'in', 'london',

'.', 'eurotunnel', 'said', 'the', 'debt-for-equity', 'swap', 'would', 'be', 'at', '130', 'pence', ',', 'or', '10.40', 'francs', ',', 'per', 'share', '.', 'that', 'is', 'considerably', 'below', 'the', 'level', 'of', 'around', '160', 'pence', 'widely', 'reported', 'in', 'the', 'run', 'up', 'to', 'the', 'deal', ',', 'and', 'will', 'reduce', 'outstanding', 'debt', 'of', '8.7', 'billion', 'pounds', 'by', '1.0', 'billion', '.', 'the', 'company', 'said', 'a', 'further', '3.7', 'billion', 'pounds', 'of', 'debt', 'would', 'be', 'converted', 'into', 'new', 'financial', 'instruments', 'and', 'existing', 'shareholders', 'would', 'be', 'able', 'to', 'participate', 'in', 'this', 'issue', '.', 'if', 'they', 'choose', 'not', 'to', 'take', 'up', 'free', 'warrants', 'entitling', 'them', 'to', 'subscribe', 'to', 'this', ',', 'eurotunnel', 'said', 'shareholders', '"', 'interests', 'may', 'be', 'reduced', 'further', 'to', 'just', 'over', '39', 'percent', 'of', 'the', 'company', 'by', 'the', 'end', 'of', 'december', '2003.', 'eurotunnel', "'s", 'shares', ',', 'which', 'were', 'suspended', 'last', 'week', 'at', '113.5', 'pence', 'ahead', 'of', 'monday', "'s", 'announcement', ',', 'should', 'resume', 'trading', 'on', 'tuesday', ',', 'the', 'company', 'said', '.', '(', '$', '1=.6393', 'pound', ')']

Stop words removed from 100618newsML.txt .

['anglo-french', 'channel', 'tunnel', 'operator', 'eurotunnel', 'monday', 'announced', 'deal', 'giving', 'creditor', 'banks', '45.5', 'percent', 'company', 'return', 'wiping', 'one', 'billion', 'pounds', '1.56', 'billion', 'debt', 'mountain', 'long-awaited', 'restructuring', 'brings', 'end', 'months', 'wrangling', 'eurotunnel', '225', 'banks', 'owes', 'nearly', 'nine', 'billion', 'pounds', 'deal', 'announced', 'simultaneously', 'paris', 'london', 'brings', 'company', 'back', 'brink', 'insolvency', 'leaves', 'shareholders', 'owning', '54.5', 'percent', 'company', '``', 'restructuring', 'plan', 'provides', 'eurotunnel', 'medium', 'term', 'financial', 'stability', 'allow', 'consolidate', 'substantial', 'commercial', 'achievements', 'date', 'develop', 'operations', '"', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', 'firm', 'making', 'profit', 'interest', 'added', 'although', 'shareholders', 'see', 'interests', 'diluted', 'offered', 'prospect', 'brighter', 'future', 'months', 'uncertainty', 'eurotunnel', 'wrestled', 'reduce', 'crippling', 'interest', 'payments', 'negotiated', 'tunnel', "'s", 'construction', 'eurotunnel', 'taken', 'around', 'half', 'cross-channel', 'market', 'european', 'ferry', 'companies', 'said', 'strong', 'operating', 'performance', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'years', 'french', 'co-chairman', 'patrick', 'ponsolle', 'said', 'shareholders', 'would', 'patient', 'could', 'reap', 'benefits', 'company', "'s", 'success', 'called', 'debt', 'restructuring', 'plan', '``', 'acceptable', 'compromise', '"', 'holders', 'eurotunnel', 'shares', 'company', 'said', 'statement', 'still', 'considerable', 'work', 'done', 'finalise', 'agree', 'details', 'plan', 'submitted', 'shareholders', 'full', '225', 'bank', 'syndicate', 'approval', 'probably', 'early', '1997.', 'monday', "'s", 'announcement', 'followed', 'two', 'weeks', 'highly', 'secretive', 'negotiations', 'eurotunnel', 'six', 'leading', 'banks', 'extended', '24', '``', 'instructing', 'banks', '"', 'meeting', 'late', 'last', 'week', 'london', 'eurotunnel', 'said', 'debt-for-equity', 'swap', 'would', '130', 'pence', '10.40', 'francs', 'per', 'share', 'considerably', 'level', 'around', '160', 'pence', 'widely', 'reported', 'run', 'deal', 'reduce', 'outstanding', 'debt', '8.7', 'billion', 'pounds', '1.0', 'billion', 'company', 'said', '3.7', 'billion', 'pounds', 'debt', 'would', 'converted', 'new', 'financial', 'instruments', 'existing', 'shareholders', 'would', 'able', 'participate', 'issue', 'choose', 'take', 'free', 'warrants', 'entitling', 'subscribe', 'eurotunnel', 'said', 'shareholders', 'interests', 'may', 'reduced', '39', 'percent', 'company', 'end', 'december', '2003.', 'eurotunnel', "'s", 'shares', 'suspended', 'last', 'week', '113.5', 'pence', 'ahead', 'monday', "'s", 'announcement', 'resume', 'trading', 'tuesday', 'company', 'said', '1=.6393', 'pound']

Stemming 100618newsML.txt .

['anglo-french', 'channel', 'tunnel', 'oper', 'eurotunnel', 'monday', 'announc', 'deal', 'give', 'creditor', 'bank', '45.5', 'percent', 'compani', 'return', 'wipe', 'one', 'billion', 'pound', '1.56', 'billion', 'debt', 'mountain', 'long-await', 'restructur', 'bring', 'end', 'month', 'wrangl', 'eurotunnel', '225', 'bank', 'owe', 'nearli', 'nine', 'billion', 'pound', 'deal', 'announc', 'simultan', 'pari', 'london', 'bring', 'compani', 'back', 'brink', 'insolv', 'leav', 'sharehold', 'own', '54.5', 'percent', 'compani', '```', 'restructur', 'plan', 'provid', 'eurotunnel', 'medium', 'term', 'financi', 'stabil', 'allow', 'consolid', 'substanti', 'commerci', 'achiev', 'date', 'develop', 'oper', '"""', 'eurotunnel', 'co-chairman', 'alastair', 'morton', 'said', 'firm', 'make', 'profit', 'interest', 'ad', 'although', 'sharehold', 'see', 'interest', 'dilut', 'offer', 'prospect', 'brighter', 'futur', 'month', 'uncertainti', 'eurotunnel', 'wrestl', 'reduc', 'crippl', 'interest', 'payment', 'negoti', 'tunnel', "'s", 'construct', 'eurotunnel', 'taken', 'around', 'half', 'cross-channel', 'market', 'european', 'ferri', 'compani', 'said', 'strong', 'oper', 'perform', 'could', 'allow', 'pay', 'first', 'dividend', 'within', 'next', '10', 'year', 'french', 'co-chairman', 'patrick', 'ponsol', 'said', 'sharehold', 'would', 'patient', 'could', 'reap', 'benefit', 'compani', "'s", 'success', 'call', 'debt', 'restructur', 'plan', '```', 'accept', 'compromis', '"""', 'holder', 'eurotunnel', 'share', 'compani', 'said', 'statement', 'still', 'consider', 'work', 'done', 'finalis', 'agre', 'detail', 'plan', 'submit', 'sharehold', 'full', '225', 'bank', 'syndic', 'approv', 'probabl', 'earli', '1997.', 'monday', "'s", 'announc', 'follow', 'two', 'week', 'highli', 'secret', 'negoti', 'eurotunnel', 'six', 'lead', 'bank', 'extend', '24', '```', 'instruct', 'bank', '"""', 'meet', 'late', 'last', 'week', 'london', 'eurotunnel', 'said', 'debt-for-equ', 'swap', 'would', '130', 'penc', '10.40', 'franc', 'per', 'share', 'consider', 'level', 'around', '160', 'penc', 'wide', 'report', 'run', 'deal', 'reduc', 'outstand', 'debt', '8.7', 'billion', 'pound', '1.0', 'billion', 'compani', 'said', '3.7', 'billion', 'pound', 'debt', 'would', 'convert', 'new', 'financi', 'instrument', 'exist', 'sharehold', 'would', 'abl', 'particip', 'issu', 'choos', 'take', 'free', 'warrant', 'entitl', 'subscrib', 'eurotunnel', 'said', 'sharehold', 'interest', 'may', 'reduc', '39', 'percent', 'compani', 'end', 'decemb', '2003.', 'eurotunnel', "'s", 'share', 'suspend', 'last', 'week', '113.5', 'penc', 'ahead', 'monday', "'s", 'announc', 'resum', 'trade', 'tuesday', 'compani', 'said', '1=.6393', 'pound']

Step 3: Calculate tf-idf for each word in each document and generate document-word matrix (each element in the matrix is the tf-idf score for a word in a document)

Code used:

```
# tf-idf

vectorizer = TfidfVectorizer()
X = vectorizer.fit_transform(token_dict.values())
doc_matrix = X.toarray()
set_vocab = vectorizer.get_feature_names_out()
print(X.shape) # verify size

output_file.write(text_lines + "TF-IDF document-word matrix.\n" + text_lines)
output_file.write("%-15s%-20s%-20s%-20s\n" % ("Words", str(doc_names[0]), str(doc_names[1]), str(doc_names[2])))

for i in range(0,len(set_vocab)):
    output_file.write("%-15s%-20s%-20s%-20s\n" % (str(set_vocab[i]), str(doc_matrix[0][i]), str(doc_matrix[2][i]), str(doc_matrix[0][i
```

Screenshot of output of code that performs sentence tokenization, word tokenization, removal of stop words and stemming for 3 files:

nltk_output.txt

TF-IDF document-word matrix.

Words	100554newsML.txt	100593newsML.txt	100618newsML.txt
10	0.026060359604361007	0.03876927945294868	0.026060359604361007
113	0.013030179802180504	0.01938463972647434	0.013030179802180504
13	0.0	0.0	0.0
130	0.013030179802180504	0.01938463972647434	0.013030179802180504
14	0.0	0.0	0.0
150	0.022062012194251066	0.0	0.022062012194251066
160	0.013030179802180504	0.01938463972647434	0.013030179802180504
1997	0.013030179802180504	0.01938463972647434	0.013030179802180504
200	0.022062012194251066	0.0	0.022062012194251066
2003	0.013030179802180504	0.01938463972647434	0.013030179802180504
2004	0.022062012194251066	0.0	0.022062012194251066
225	0.013030179802180504	0.03876927945294868	0.013030179802180504
24	0.0	0.0249612530567176	0.0
39	0.013030179802180504	0.01938463972647434	0.013030179802180504
40	0.013030179802180504	0.01938463972647434	0.013030179802180504
400	0.04412402438850213	0.0	0.04412402438850213
45	0.013030179802180504	0.01938463972647434	0.013030179802180504
54	0.013030179802180504	0.01938463972647434	0.013030179802180504
56	0.0	0.0249612530567176	0.0
6393	0.016778728932091126	0.0249612530567176	0.016778728932091126
85	0.022062012194251066	0.0	0.022062012194251066
ability	0.022062012194251066	0.0	0.022062012194251066
able	0.026060359604361007	0.01938463972647434	0.026060359604361007
acceptable	0.0	0.0249612530567176	0.0
achievements	0.0	0.0249612530567176	0.0
added	0.013030179802180504	0.01938463972647434	0.013030179802180504
adding	0.022062012194251066	0.0	0.022062012194251066
admitted	0.022062012194251066	0.0	0.022062012194251066
afford	0.022062012194251066	0.0	0.022062012194251066
after	0.026060359604361007	0.01938463972647434	0.026060359604361007
again	0.022062012194251066	0.0	0.022062012194251066
agree	0.026060359604361007	0.01938463972647434	0.026060359604361007
ahead	0.013030179802180504	0.01938463972647434	0.013030179802180504
alastair	0.013030179802180504	0.01938463972647434	0.013030179802180504
all	0.022062012194251066	0.0	0.022062012194251066
allow	0.013030179802180504	0.03876927945294868	0.013030179802180504
already	0.022062012194251066	0.0	0.022062012194251066
although	0.013030179802180504	0.01938463972647434	0.013030179802180504
an	0.026060359604361007	0.03876927945294868	0.026060359604361007
analyst	0.022062012194251066	0.0	0.022062012194251066
analysts	0.022062012194251066	0.0	0.022062012194251066
and	0.19545269703270754	0.15507711781179473	0.19545269703270754
anglo	0.013030179802180504	0.01938463972647434	0.013030179802180504
angry	0.022062012194251066	0.0	0.022062012194251066
announced	0.026060359604361007	0.03876927945294868	0.026060359604361007
announcement	0.013030179802180504	0.03876927945294868	0.013030179802180504
annual	0.022062012194251066	0.0	0.022062012194251066
approval	0.026060359604361007	0.01938463972647434	0.026060359604361007
are	0.04412402438850213	0.0	0.04412402438850213
around	0.013030179802180504	0.03876927945294868	0.013030179802180504
arranged	0.022062012194251066	0.0	0.022062012194251066
as	0.04412402438850213	0.0	0.04412402438850213
asked	0.022062012194251066	0.0	0.022062012194251066
at	0.09121125861526352	0.05815391917942302	0.09121125861526352
available	0.022062012194251066	0.0	0.022062012194251066
avoiding	0.022062012194251066	0.0	0.022062012194251066
awaited	0.013030179802180504	0.01938463972647434	0.013030179802180504
back	0.013030179802180504	0.01938463972647434	0.013030179802180504

Output of code for calculating TF-IDF:

TF-IDF document-word matrix.

Words	100554newsML.txt	100593newsML.txt	100618newsML.txt
10	0.026060359604361007	0.03876927945294868	0.026060359604361007
113	0.013030179802180504	0.01938463972647434	0.013030179802180504
13	0.0	0.0	0.0
130	0.013030179802180504	0.01938463972647434	0.013030179802180504
14	0.0	0.0	0.0
150	0.022062012194251066	0.0	0.022062012194251066
160	0.013030179802180504	0.01938463972647434	0.013030179802180504
1997	0.013030179802180504	0.01938463972647434	0.013030179802180504
200	0.022062012194251066	0.0	0.022062012194251066
2003	0.013030179802180504	0.01938463972647434	0.013030179802180504
2004	0.022062012194251066	0.0	0.022062012194251066
225	0.013030179802180504	0.03876927945294868	0.013030179802180504
24	0.0	0.024961253056717 6	0.0
39	0.013030179802180504	0.01938463972647434	0.013030179802180504
40	0.013030179802180504	0.01938463972647434	0.013030179802180504
400	0.04412402438850213	0.0	0.04412402438850213
45	0.013030179802180504	0.01938463972647434	0.013030179802180504
54	0.013030179802180504	0.01938463972647434	0.013030179802180504
56	0.0	0.024961253056717 6	0.0
6393	0.016778728932091126	0.024961253056717 6	0.016778728932091126
85	0.022062012194251066	0.0	0.022062012194251066
ability	0.022062012194251066	0.0	0.022062012194251066
able	0.026060359604361007	0.01938463972647434	0.026060359604361007
acceptable	0.0	0.024961253056717 6	0.0
achievements	0.0	0.024961253056717 6	0.0
added	0.013030179802180504	0.01938463972647434	0.013030179802180504
adding	0.022062012194251066	0.0	0.022062012194251066
admitted	0.022062012194251066	0.0	0.022062012194251066
afford	0.022062012194251066	0.0	0.022062012194251066
after	0.026060359604361007	0.01938463972647434	0.026060359604361007
again	0.022062012194251066	0.0	0.022062012194251066
agree	0.026060359604361007	0.01938463972647434	0.026060359604361007
ahead	0.013030179802180504	0.01938463972647434	0.013030179802180504
alastair	0.013030179802180504	0.01938463972647434	0.013030179802180504
all	0.022062012194251066	0.0	0.022062012194251066
allow	0.013030179802180504	0.03876927945294868	0.013030179802180504
already	0.022062012194251066	0.0	0.022062012194251066
although	0.013030179802180504	0.01938463972647434	0.013030179802180504
an	0.026060359604361007	0.03876927945294868	0.026060359604361007
analyst	0.022062012194251066	0.0	0.022062012194251066
analysts	0.022062012194251066	0.0	0.022062012194251066
and	0.19545269703270754	0.15507711781179473	0.19545269703270754
anglo	0.013030179802180504	0.01938463972647434	0.013030179802180504
angry	0.022062012194251066	0.0	0.022062012194251066
announced	0.026060359604361007	0.03876927945294868	0.026060359604361007
announcement	0.013030179802180504	0.03876927945294868	0.013030179802180504
annual	0.022062012194251066	0.0	0.022062012194251066
approval	0.026060359604361007	0.01938463972647434	0.026060359604361007
are	0.04412402438850213	0.0	0.04412402438850213
around	0.013030179802180504	0.03876927945294868	0.013030179802180504
arranged	0.022062012194251066	0.0	0.022062012194251066
as	0.04412402438850213	0.0	0.04412402438850213
asked	0.022062012194251066	0.0	0.022062012194251066
at	0.09121125861526352	0.05815391917942302	0.09121125861526352
available	0.022062012194251066	0.0	0.022062012194251066
avoiding	0.022062012194251066	0.0	0.022062012194251066
awaited	0.013030179802180504	0.01938463972647434	0.013030179802180504
back	0.013030179802180504	0.01938463972647434	0.013030179802180504
bank	0.03909053940654151	0.01938463972647434	0.03909053940654151
bankruptcy	0.022062012194251066	0.0	0.022062012194251066
banks	0.052120719208722015	0.07753855890589736	0.052120719208722015

be 0.11727161821962452 0.1356924780853204 0.11727161821962452
become 0.022062012194251066 0.022062012194251066 0.022062012194251066
before 0.026060359604361007 0.05815391917942302 0.026060359604361007
below 0.013030179802180504 0.01938463972647434 0.013030179802180504
benefits 0.0 0.0249612530567176 0.0
between 0.013030179802180504 0.03876927945294868 0.013030179802180504
bill 0.04412402438850213 0.0 0.04412402438850213
billion 0.06515089901090251 0.11630783835884605 0.06515089901090251
bonds 0.022062012194251066 0.022062012194251066 0.022062012194251066
brighter 0.013030179802180504 0.01938463972647434 0.013030179802180504
brings 0.013030179802180504 0.03876927945294868 0.013030179802180504
brink 0.013030179802180504 0.01938463972647434 0.013030179802180504
busiest 0.022062012194251066 0.022062012194251066 0.022062012194251066
but 0.03909053940654151 0.01938463972647434 0.03909053940654151
by 0.013030179802180504 0.03876927945294868 0.013030179802180504
called 0.0 0.0249612530567176 0.0
can 0.03909053940654151 0.01938463972647434 0.03909053940654151
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unpaid 0.022062012194251066 0.0220620121942510660.0 0.022062012194251066
up 0.03909053940654151 0.03876927945294868 0.03909053940654151

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we         0.0220620121942510660.0             0.022062012194251066
week        0.013030179802180504.0387692794529486 8 0.013030179802180504
weeks       0.0             0.0249612530567176  0.0
well       0.0220620121942510660.0             0.022062012194251066
were        0.026060359604361007.0387692794529486 8 0.026060359604361007
what        0.08824804877700426 0.0             0.08824804877700426
when        0.0220620121942510660.0             0.022062012194251066
which       0.052120719208722015.0581539191794230 2 0.052120719208722015
while      0.013030179802180504.0193846397264743 4 0.013030179802180504
who         0.0220620121942510660.0             0.022062012194251066
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wiping      0.013030179802180504.0193846397264743 4 0.013030179802180504
with       0.026060359604361007.0193846397264743 4 0.026060359604361007
within      0.013030179802180504.0193846397264743 4 0.013030179802180504
work        0.013030179802180504.0193846397264743 4 0.013030179802180504
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wrestled      0.013030179802180504.0193846397264743 4 0.013030179802180504
year       0.0220620121942510660.0             0.022062012194251066
years       0.06515089901090251 0.0193846397264743 4 0.06515089901090251
you        0.0220620121942510660.0             0.022062012194251066
```

Step 4: Calculate pairwise cosine similarity for the document

Code used:

```
# cosine similarity

output_file.write(text_lines + "Cosine similarity.\n" + text_lines)
for i in range(0, num_docs):
    for j in range(i, num_docs):
        if i != j:
            output_file.write("cosine similarity of %s to %s is %s. \n" % ( doc_names[i], doc_names[j], cosine_similarity(X[i,], X[j,])))
output_file.close()
```

Output of code for calculating cosine similarity:

```
Cosine similarity.

cosine similarity of 100554newsML.txt to 100593newsML.txt is [[0.89622189]].
cosine similarity of 100554newsML.txt to 100618newsML.txt is [[0.90820406]].
cosine similarity of 100593newsML.txt to 100618newsML.txt is [[0.99175097]].
```

This fairly high cosine similarity makes sense because all documents share many words. Additionally, we would expect the 100554newsML, which has 758 words, to have a lower cosine similarity compared to the other two with their lower word counts. The best match is for 100593newsML.txt to 100618newsML.txt at [[0.99175097]]. This

makes sense because they do share many words and their word counts (483 and 492) are similar.

```
/Users/rraven/PycharmProjects/pythonProject1/venv/bin/python /Users/rraven/
file 100554newsML.txt
number of words 758
file 100593newsML.txt
number of words 492
file 100618newsML.txt
number of words 483
```