In [1]:
```
#SWETHA JENIFER S_225229142_12-01-23
```

## Exercise-1:Process simple bigram datafile

In [2]:
```
#STEP 1: Open the file,count_2w.txt
myfile=open('count_2w.txt','r',encoding='utf8')
myfile.read()
```

Out[2]:
```
'0Uplink verified\t523545\n0km to\t116103\n1000s of\t939476\n100s of\t539389
\n100th anniversary\t158621\n10am to\t376141\n10th and\t183715\n10th annivers
ary\t242830\n10th century\t117755\n10th grade\t174046\n10th in\t107194\n10th
of\t277970\n11am to\t127624\n11th and\t178884\n11th century\t168601\n11th gra
de\t126301\n11th of\t189501\n125Mbps w\t108645\n12th and\t136706\n12th centur
y\t274359\n12th grade\t366488\n12th of\t211371\n13th and\t134558\n13th centur
y\t401174\n13th of\t204438\n14k gold\t275982\n14kt gold\t104516\n14th and\t16
5714\n14th century\t351680\n14th of\t249932\n15th and\t173563\n15th century\t
429932\n15th day\t124603\n15th of\t376136\n16th and\t188678\n16th century\t73
3066\n16th of\t209985\n16th to\t111405\n17th and\t229870\n17th century\t93562
4\n17th of\t203248\n18k gold\t108682\n18th and\t279819\n18th birthday\t103972
\n18th centuries\t114624\n18th century\t1347520\n18th of\t205474\n1920s and\t
201458\n1930s and\t201470\n1940s and\t170389\n1950s and\t393926\n1960s and\t5
16205\n1970s and\t549181\n1970s to\t102387\n1980s and\t599473\n1980s to\t1165
16\n1990s and\t239890\n19th and\t397448\n19th centuries\t135465\n19th century
\t3028799\n19th of\t211562\n1px solid\t353472\n1st and\t675070\n1st century\t
114479\n1st class\t336408\n1st day\t224931\n1st ed\t564270\n1st edition\t3853
67\n1st floor\t318319\n1st for\t100767\n1st grade\t124571\n1st half\t126095\n
1st in\t204580\n1st item\t164506\n1st month\t145269\n1st of\t572039\n1st plac
```

In [3]:
```
#STEP 2:
with open('count_2w.txt') as f:
    lines=[line.rstrip()for line in f]
lines
```

Out[3]:
```
['0Uplink verified\t523545',
 '0km to\t116103',
 '1000s of\t939476',
 '100s of\t539389',
 '100th anniversary\t158621',
 '10am to\t376141',
 '10th and\t183715',
 '10th anniversary\t242830',
 '10th century\t117755',
 '10th grade\t174046',
 '10th in\t107194',
 '10th of\t277970',
 '11am to\t127624',
 '11th and\t178884',
 '11th century\t168601',
 '11th grade\t126301',
 '11th of\t189501',
 '125Mbps w\t108645',
 '12th and\t136706',
```

In [4]:
```
mini=lines[:10]
```

In [5]:
```
mini
```

Out[5]:
```
['0Uplink verified\t523545',
 '0km to\t116103',
 '1000s of\t939476',
 '100s of\t539389',
 '100th anniversary\t158621',
 '10am to\t376141',
 '10th and\t183715',
 '10th anniversary\t242830',
 '10th century\t117755',
 '10th grade\t174046']
```

In [6]:
```
mini[0]
```

Out[6]:
```
'0Uplink verified\t523545'
```

In [7]:
```
mini[0].split()
```

Out[7]:
```
['0Uplink', 'verified', '523545']
```

In [8]:
```
mini_list=[]
```

In [9]:
```
for m in mini:
    (w1,w2,count)=m.split()
    count=int(count)
    mini_list.append(((w1,w2),count))
```

In [10]:
```
mini_list
```

Out[10]:
```
[(('0Uplink', 'verified'), 523545),
 (('0km', 'to'), 116103),
 (('1000s', 'of'), 939476),
 (('100s', 'of'), 539389),
 (('100th', 'anniversary'), 158621),
 (('10am', 'to'), 376141),
 (('10th', 'and'), 183715),
 (('10th', 'anniversary'), 242830),
 (('10th', 'century'), 117755),
 (('10th', 'grade'), 174046)]
```

In [11]:
```
mini_list[0]
```

Out[11]:
```
(('0Uplink', 'verified'), 523545)
```

In [12]:
```
#STEP 3: build goog2w_fd
import nltk
goog2w_fd=nltk.FreqDist()
for i in lines:
    w1,w2,count=i.split()
    goog2w_fd[w1,w2]=count
```

In [13]:
```
goog2w_fd[('of','the')]
```

Out[13]:
```
'2766332391'
```

In [14]:
```
goog2w_fd[('so','beautiful')]
```

Out[14]:
```
'612472'
```

In [15]:
```
#STEP 4:Explore
#1.Top-10 bigrams
goog2w_fd.most_common(10)
```

Out[15]:
```
[(('You', 'think'), '999988'),
 (('a', 'middle'), '999987'),
 (('his', 'wife'), '9999448'),
 (('traditional', 'and'), '999927'),
 (('Ask', 'your'), '999907'),
 (('towards', 'the'), '9998989'),
 (('<S>', 'central'), '999848'),
 (('no', 'man'), '999833'),
 (('committee', 'members'), '999819'),
 (('each', 'country'), '999818')]
```

In [16]:
```
#2. Top-so bigrams
text=[]
for t in lines:
    (w1,w2,count)=t.split()
    count=int(count)
    if w1=='so':
        text.append(((w1,w2),count))
text
```

Out[16]:
```
[(('so', 'a'), 1565933),
 (('so', 'afraid'), 181401),
 (('so', 'after'), 400665),
 (('so', 'again'), 197409),
 (('so', 'ago'), 226156),
 (('so', 'all'), 894606),
 (('so', 'already'), 101152),
 (('so', 'also'), 233562),
 (('so', 'am'), 206896),
 (('so', 'amazing'), 165724),
 (('so', 'an'), 229478),
 (('so', 'and'), 905653),
 (('so', 'angry'), 217654),
 (('so', 'any'), 429057),
 (('so', 'anyone'), 118496),
 (('so', 'are'), 949912),
 (('so', 'as'), 6866078),
 (('so', 'at'), 1044557),
 (('so', 'awesome'), 193277),
```

In [17]:
```
#Pickle
import pickle
with open('goog2w_list.pkl','wb') as handle:
    pickle.dump(goog2w_fd,handle,protocol=pickle.HIGHEST_PROTOCOL)
```

In [18]:
```
handle
```

Out[18]:
```
<_io.BufferedWriter name='goog2w_list.pkl'>
```

## Exercise 2: Frequency distribution from Jane Austen Novels

In [19]:
```
with open('austen-emma.txt','r')as fe:
    ae=fe.read(600)
```

In [20]:
```
with open('austen-persuasion.txt','r')as fp:
    ap=fp.read(900)
```

In [21]:
```
with open('austen-sense.txt','r')as fe:
    ase=fe.read(1000)
```

In [22]:
```
from nltk.tokenize import sent_tokenize as st
```

In [23]:
```
st(ae)
```

Out[23]:
```
['[Emma by Jane Austen 1816]\n\nVOLUME I\n\nCHAPTER I\n\n\nEmma Woodhouse, hand
some, clever, and rich, with a comfortable home\nand happy disposition, seemed
to unite some of the best blessings\nof existence; and had lived nearly twenty-
one years in the world\nwith very little to distress or vex her.',
 "She was the youngest of the two daughters of a most affectionate,\nindulgent
father; and had, in consequence of her sister's marriage,\nbeen mistress of his
house from a very early period.",
 'Her mother\nhad died too long ago for her to have more than an indistinct\nre
membrance of her caresses; and her place had b']
```

In [24]:
```
st(ap)
```

Out[24]:
```
['[Persuasion by Jane Austen 1818]\n\n\nChapter 1\n\n\nSir Walter Elliot, of Ke
llynch Hall, in Somersetshire, was a man who,\nfor his own amusement, never too
k up any book but the Baronetage;\nthere he found occupation for an idle hour,
and consolation in a\ndistressed one; there his faculties were roused into admi
ration and\nrespect, by contemplating the limited remnant of the earliest paten
ts;\nthere any unwelcome sensations, arising from domestic affairs\nchanged nat
urally into pity and contempt as he turned over\nthe almost endless creations o
f the last century; and there,\nif every other leaf were powerless, he could re
ad his own history\nwith an interest which never failed.',
 'This was the page at which\nthe favourite volume always opened:\n\n
"ELLIOT OF KELLYNCH HALL.',
 '"Walter Elliot, born March 1, 1760, married, July 15, 1784, Elizabeth,\ndaugh
ter of James Stevenson, Esq.',
 'of South Park, in th']
```

In [25]:
```
st(ase)
```

Out[25]:
```
['[Sense and Sensibility by Jane Austen 1811]\n\nCHAPTER 1\n\n\nThe family of D
ashwood had long been settled in Sussex.',
 'Their estate was large, and their residence was at Norland Park,\nin the cent
re of their property, where, for many generations,\nthey had lived in so respec
table a manner as to engage\nthe general good opinion of their surrounding acqu
aintance.',
 'The late owner of this estate was a single man, who lived\nto a very advanced
age, and who for many years of his life,\nhad a constant companion and housekee
per in his sister.',
 'But her death, which happened ten years before his own,\nproduced a great alt
eration in his home; for to supply\nher loss, he invited and received into his
house the family\nof his nephew Mr. Henry Dashwood, the legal inheritor\nof the
Norland estate, and the person to whom he intended\nto bequeath it.',
 "In the society of his nephew and niece,\nand their children, the old Gentlema
n's days were\ncomfortably spent.",
 'His attachment to them all increased.',
 'The constant attention']
```

In [26]:
```
len(st(ae))
```

Out[26]:
```
3
```

In [27]:
```
len(st(ap))
```

Out[27]:
```
4
```

In [28]:
```
len(st(ase))
```

Out[28]:
```
7
```

In [29]:
```
from nltk.tokenize import word_tokenize
```

In [30]:
```
t1=word_tokenize(ae)
print(t1)
```

```
['[', 'Emma', 'by', 'Jane', 'Austen', '1816', ']', 'VOLUME', 'I', 'CHAPTER',
'I', 'Emma', 'Woodhouse', ',', 'handsome', ',', 'clever', ',', 'and', 'rich',
',', 'with', 'a', 'comfortable', 'home', 'and', 'happy', 'disposition', ',', 's
eemed', 'to', 'unite', 'some', 'of', 'the', 'best', 'blessings', 'of', 'existen
ce', ';', 'and', 'had', 'lived', 'nearly', 'twenty-one', 'years', 'in', 'the',
'world', 'with', 'very', 'little', 'to', 'distress', 'or', 'vex', 'her', '.',
'She', 'was', 'the', 'youngest', 'of', 'the', 'two', 'daughters', 'of', 'a', 'm
ost', 'affectionate', ',', 'indulgent', 'father', ';', 'and', 'had', ',', 'in',
'consequence', 'of', 'her', 'sister', "'s", 'marriage', ',', 'been', 'mistres
s', 'of', 'his', 'house', 'from', 'a', 'very', 'early', 'period', '.', 'Her',
'mother', 'had', 'died', 'too', 'long', 'ago', 'for', 'her', 'to', 'have', 'mor
e', 'than', 'an', 'indistinct', 'remembrance', 'of', 'her', 'caresses', ';', 'a
nd', 'her', 'place', 'had', 'b']
```

In [31]:
```
t2=word_tokenize(ap)
print(t2)
```

```
['[', 'Persuasion', 'by', 'Jane', 'Austen', '1818', ']', 'Chapter', '1', 'Sir',
'Walter', 'Elliot', ',', 'of', 'Kellynch', 'Hall', ',', 'in', 'Somersetshire',
',', 'was', 'a', 'man', 'who', ',', 'for', 'his', 'own', 'amusement', ',', 'nev
er', 'took', 'up', 'any', 'book', 'but', 'the', 'Baronetage', ';', 'there', 'h
e', 'found', 'occupation', 'for', 'an', 'idle', 'hour', ',', 'and', 'consolatio
n', 'in', 'a', 'distressed', 'one', ';', 'there', 'his', 'faculties', 'were',
'roused', 'into', 'admiration', 'and', 'respect', ',', 'by', 'contemplating',
'the', 'limited', 'remnant', 'of', 'the', 'earliest', 'patents', ';', 'there',
'any', 'unwelcome', 'sensations', ',', 'arising', 'from', 'domestic', 'affair
s', 'changed', 'naturally', 'into', 'pity', 'and', 'contempt', 'as', 'he', 'tur
ned', 'over', 'the', 'almost', 'endless', 'creations', 'of', 'the', 'last', 'ce
ntury', ';', 'and', 'there', ',', 'if', 'every', 'other', 'leaf', 'were', 'powe
rless', ',', 'he', 'could', 'read', 'his', 'own', 'history', 'with', 'an', 'int
erest', 'which', 'never', 'failed', '.', 'This', 'was', 'the', 'page', 'at', 'w
hich', 'the', 'favourite', 'volume', 'always', 'opened', ':', '``', 'ELLIOT',
'OF', 'KELLYNCH', 'HALL', '.', '``', 'Walter', 'Elliot', ',', 'born', 'March',
'1', ',', '1760', ',', 'married', ',', 'July', '15', ',', '1784', ',', 'Elizabe
th', ',', 'daughter', 'of', 'James', 'Stevenson', ',', 'Esq', '.', 'of', 'Sout
h', 'Park', ',', 'in', 'th']
```

In [32]:
```
t3=word_tokenize(ase)
print(t3)
```

```
['[', 'Sense', 'and', 'Sensibility', 'by', 'Jane', 'Austen', '1811', ']', 'CHAP
TER', '1', 'The', 'family', 'of', 'Dashwood', 'had', 'long', 'been', 'settled',
'in', 'Sussex', '.', 'Their', 'estate', 'was', 'large', ',', 'and', 'their', 'r
esidence', 'was', 'at', 'Norland', 'Park', ',', 'in', 'the', 'centre', 'of', 't
heir', 'property', ',', 'where', ',', 'for', 'many', 'generations', ',', 'the
y', 'had', 'lived', 'in', 'so', 'respectable', 'a', 'manner', 'as', 'to', 'enga
ge', 'the', 'general', 'good', 'opinion', 'of', 'their', 'surrounding', 'acquai
ntance', '.', 'The', 'late', 'owner', 'of', 'this', 'estate', 'was', 'a', 'sing
le', 'man', ',', 'who', 'lived', 'to', 'a', 'very', 'advanced', 'age', ',', 'an
d', 'who', 'for', 'many', 'years', 'of', 'his', 'life', ',', 'had', 'a', 'const
ant', 'companion', 'and', 'housekeeper', 'in', 'his', 'sister', '.', 'But', 'he
r', 'death', ',', 'which', 'happened', 'ten', 'years', 'before', 'his', 'own',
',', 'produced', 'a', 'great', 'alteration', 'in', 'his', 'home', ';', 'for',
'to', 'supply', 'her', 'loss', ',', 'he', 'invited', 'and', 'received', 'into',
'his', 'house', 'the', 'family', 'of', 'his', 'nephew', 'Mr.', 'Henry', 'Dashwo
od', ',', 'the', 'legal', 'inheritor', 'of', 'the', 'Norland', 'estate', ',',
'and', 'the', 'person', 'to', 'whom', 'he', 'intended', 'to', 'bequeath', 'it',
'.', 'In', 'the', 'society', 'of', 'his', 'nephew', 'and', 'niece', ',', 'and',
'their', 'children', ',', 'the', 'old', 'Gentleman', "'s", 'days', 'were', 'com
fortably', 'spent', '.', 'His', 'attachment', 'to', 'them', 'all', 'increased',
'.', 'The', 'constant', 'attention']
```

In [33]:
```
from nltk import *
```

In [34]:
```
d1=FreqDist(t1)
d1
```

Out[34]:
```
FreqDist({"'s": 1,
          ',': 8,
          '.': 2,
          '1816': 1,
          ';': 3,
          'Austen': 1,
          'CHAPTER': 1,
          'Emma': 2,
          'Her': 1,
          'I': 2,
          'Jane': 1,
          'She': 1,
          'VOLUME': 1,
          'Woodhouse': 1,
          '[': 1,
          ']': 1,
          'a': 3,
          'affectionate': 1,
          'ago': 1,
          'an': 1,
          'and': 5,
          'b': 1,
          'been': 1,
          'best': 1,
          'blessings': 1,
          'by': 1,
          'caresses': 1,
          'clever': 1,
          'comfortable': 1,
          'consequence': 1,
          'daughters': 1,
          'died': 1,
          'disposition': 1,
          'distress': 1,
          'early': 1,
          'existence': 1,
          'father': 1,
          'for': 1,
          'from': 1,
          'had': 4,
          'handsome': 1,
          'happy': 1,
          'have': 1,
          'her': 5,
          'his': 1,
          'home': 1,
          'house': 1,
          'in': 2,
          'indistinct': 1,
          'indulgent': 1,
          'little': 1,
          'lived': 1,
          'long': 1,
          'marriage': 1,
```

```
                  'mistress': 1,
                  'more': 1,
                  'most': 1,
                  'mother': 1,
                  'nearly': 1,
                  'of': 7,
                  'or': 1,
                  'period': 1,
                  'place': 1,
                  'remembrance': 1,
                  'rich': 1,
                  'seemed': 1,
                  'sister': 1,
                  'some': 1,
                  'than': 1,
                  'the': 4,
                  'to': 3,
                  'too': 1,
                  'twenty-one': 1,
                  'two': 1,
                  'unite': 1,
                  'very': 2,
                  'vex': 1,
                  'was': 1,
                  'with': 2,
                  'world': 1,
                  'years': 1,
                  'youngest': 1})
```

In [35]:
```
d2=FreqDist(t2)
d2
```

Out[35]:
```
FreqDist({',': 19,
          '.': 3,
          '1': 2,
          '15': 1,
          '1760': 1,
          '1784': 1,
          '1818': 1,
          ':': 1,
          ';': 4,
          'Austen': 1,
          'Baronetage': 1,
          'Chapter': 1,
          'ELLIOT': 1,
          'Elizabeth': 1,
          'Elliot': 2,
          'Esq': 1,
          'HALL': 1,
          'Hall': 1,
          'James': 1,
```

In [36]:
```
d3=FreqDist(t3)
d3
```

Out[36]:
```
FreqDist({"'s": 1,
          ',': 15,
          '.': 6,
          '1': 1,
          '1811': 1,
          ';': 1,
          'Austen': 1,
          'But': 1,
          'CHAPTER': 1,
          'Dashwood': 2,
          'Gentleman': 1,
          'Henry': 1,
          'His': 1,
          'In': 1,
          'Jane': 1,
          'Mr.': 1,
          'Norland': 2,
          'Park': 1,
          'Sense': 1,
```

In [37]:
```
print(d1.most_common(50))
```

```
[(',', 8), ('of', 7), ('and', 5), ('her', 5), ('the', 4), ('had', 4), ('a', 3),
('to', 3), (';', 3), ('Emma', 2), ('I', 2), ('with', 2), ('in', 2), ('very',
2), ('.', 2), ('[', 1), ('by', 1), ('Jane', 1), ('Austen', 1), ('1816', 1),
(']', 1), ('VOLUME', 1), ('CHAPTER', 1), ('Woodhouse', 1), ('handsome', 1), ('c
lever', 1), ('rich', 1), ('comfortable', 1), ('home', 1), ('happy', 1), ('dispo
sition', 1), ('seemed', 1), ('unite', 1), ('some', 1), ('best', 1), ('blessing
s', 1), ('existence', 1), ('lived', 1), ('nearly', 1), ('twenty-one', 1), ('yea
rs', 1), ('world', 1), ('little', 1), ('distress', 1), ('or', 1), ('vex', 1),
('She', 1), ('was', 1), ('youngest', 1), ('two', 1)]
```

In [38]:
```
print(d2.most_common(50))
```

```
[(',', 19), ('the', 7), ('of', 5), (';', 4), ('there', 4), ('and', 4), ('in',
3), ('his', 3), ('he', 3), ('.', 3), ('by', 2), ('1', 2), ('Walter', 2), ('Elli
ot', 2), ('was', 2), ('a', 2), ('for', 2), ('own', 2), ('never', 2), ('any',
2), ('an', 2), ('were', 2), ('into', 2), ('which', 2), ('``', 2), ('[', 1), ('P
ersuasion', 1), ('Jane', 1), ('Austen', 1), ('1818', 1), (']', 1), ('Chapter',
1), ('Sir', 1), ('Kellynch', 1), ('Hall', 1), ('Somersetshire', 1), ('man', 1),
('who', 1), ('amusement', 1), ('took', 1), ('up', 1), ('book', 1), ('but', 1),
('Baronetage', 1), ('found', 1), ('occupation', 1), ('idle', 1), ('hour', 1),
('consolation', 1), ('distressed', 1)]
```

In [39]:
```
print(d3.most_common(50))
```

```
[(',', 15), ('and', 8), ('of', 8), ('the', 8), ('his', 7), ('.', 6), ('to', 6),
('in', 5), ('a', 5), ('their', 4), ('The', 3), ('had', 3), ('estate', 3), ('wa
s', 3), ('for', 3), ('family', 2), ('Dashwood', 2), ('Norland', 2), ('many',
2), ('lived', 2), ('who', 2), ('years', 2), ('constant', 2), ('her', 2), ('he',
2), ('nephew', 2), ('[', 1), ('Sense', 1), ('Sensibility', 1), ('by', 1), ('Jan
e', 1), ('Austen', 1), ('1811', 1), (']', 1), ('CHAPTER', 1), ('1', 1), ('lon
g', 1), ('been', 1), ('settled', 1), ('Sussex', 1), ('Their', 1), ('large', 1),
('residence', 1), ('at', 1), ('Park', 1), ('centre', 1), ('property', 1), ('whe
re', 1), ('generations', 1), ('they', 1)]
```

## Excercise 3: Bigram frequencies of Jane Austen Novels

In [40]:
```
with open("austen-emma.txt") as fn:
    nov=fn.read(500)
    print(nov)
```

```
[Emma by Jane Austen 1816]

VOLUME I

CHAPTER I


Emma Woodhouse, handsome, clever, and rich, with a comfortable home
and happy disposition, seemed to unite some of the best blessings
of existence; and had lived nearly twenty-one years in the world
with very little to distress or vex her.

She was the youngest of the two daughters of a most affectionate,
indulgent father; and had, in consequence of her sister's marriage,
been mistress of his house from a very early period.  Her mother
had died t
```

In [41]:
```
tokenizer=nltk.tokenize.WhitespaceTokenizer()
tok=tokenizer.tokenize(nov)
print(tok)
```

```
['[Emma', 'by', 'Jane', 'Austen', '1816]', 'VOLUME', 'I', 'CHAPTER', 'I', 'Emm
a', 'Woodhouse,', 'handsome,', 'clever,', 'and', 'rich,', 'with', 'a', 'comfort
able', 'home', 'and', 'happy', 'disposition,', 'seemed', 'to', 'unite', 'some',
'of', 'the', 'best', 'blessings', 'of', 'existence;', 'and', 'had', 'lived', 'n
early', 'twenty-one', 'years', 'in', 'the', 'world', 'with', 'very', 'little',
'to', 'distress', 'or', 'vex', 'her.', 'She', 'was', 'the', 'youngest', 'of',
'the', 'two', 'daughters', 'of', 'a', 'most', 'affectionate,', 'indulgent', 'fa
ther;', 'and', 'had,', 'in', 'consequence', 'of', 'her', "sister's", 'marriag
e,', 'been', 'mistress', 'of', 'his', 'house', 'from', 'a', 'very', 'early', 'p
eriod.', 'Her', 'mother', 'had', 'died', 't']
```

In [42]:
```
tokenizer=nltk.tokenize.WhitespaceTokenizer()
a_tok=tokenizer.tokenize(nov.lower())
print(a_tok)
```

```
['[emma', 'by', 'jane', 'austen', '1816]', 'volume', 'i', 'chapter', 'i', 'emm
a', 'woodhouse,', 'handsome,', 'clever,', 'and', 'rich,', 'with', 'a', 'comfort
able', 'home', 'and', 'happy', 'disposition,', 'seemed', 'to', 'unite', 'some',
'of', 'the', 'best', 'blessings', 'of', 'existence;', 'and', 'had', 'lived', 'n
early', 'twenty-one', 'years', 'in', 'the', 'world', 'with', 'very', 'little',
'to', 'distress', 'or', 'vex', 'her.', 'she', 'was', 'the', 'youngest', 'of',
'the', 'two', 'daughters', 'of', 'a', 'most', 'affectionate,', 'indulgent', 'fa
ther;', 'and', 'had,', 'in', 'consequence', 'of', 'her', "sister's", 'marriag
e,', 'been', 'mistress', 'of', 'his', 'house', 'from', 'a', 'very', 'early', 'p
eriod.', 'her', 'mother', 'had', 'died', 't']
```

In [43]:
```
b2=list(nltk.bigrams(tok))
b2fd=nltk.FreqDist(b2)
b2fd
```

Out[43]:
```
FreqDist({('1816]', 'VOLUME'): 1,
          ('Austen', '1816]'): 1,
          ('CHAPTER', 'I'): 1,
          ('Emma', 'Woodhouse,'): 1,
          ('Her', 'mother'): 1,
          ('I', 'CHAPTER'): 1,
          ('I', 'Emma'): 1,
          ('Jane', 'Austen'): 1,
          ('She', 'was'): 1,
          ('VOLUME', 'I'): 1,
          ('Woodhouse,', 'handsome,'): 1,
          ('[Emma', 'by'): 1,
          ('a', 'comfortable'): 1,
          ('a', 'most'): 1,
          ('a', 'very'): 1,
          ('affectionate,', 'indulgent'): 1,
          ('and', 'had'): 1,
          ('and', 'had,'): 1,
          ('and', 'happy'): 1,
          ('and', 'rich,'): 1,
          ('been', 'mistress'): 1,
          ('best', 'blessings'): 1,
          ('blessings', 'of'): 1,
          ('by', 'Jane'): 1,
          ('clever,', 'and'): 1,
          ('comfortable', 'home'): 1,
          ('consequence', 'of'): 1,
          ('daughters', 'of'): 1,
          ('died', 't'): 1,
          ('disposition,', 'seemed'): 1,
          ('distress', 'or'): 1,
          ('early', 'period.'): 1,
          ('existence;', 'and'): 1,
          ('father;', 'and'): 1,
          ('from', 'a'): 1,
          ('had', 'died'): 1,
          ('had', 'lived'): 1,
          ('had,', 'in'): 1,
          ('handsome,', 'clever,'): 1,
          ('happy', 'disposition,'): 1,
          ('her', "sister's"): 1,
          ('her.', 'She'): 1,
          ('his', 'house'): 1,
          ('home', 'and'): 1,
          ('house', 'from'): 1,
          ('in', 'consequence'): 1,
          ('in', 'the'): 1,
          ('indulgent', 'father;'): 1,
          ('little', 'to'): 1,
          ('lived', 'nearly'): 1,
          ('marriage,', 'been'): 1,
          ('mistress', 'of'): 1,
          ('most', 'affectionate,'): 1,
```

```
('mother', 'had'): 1,
('nearly', 'twenty-one'): 1,
('of', 'a'): 1,
('of', 'existence;'): 1,
('of', 'her'): 1,
('of', 'his'): 1,
('of', 'the'): 2,
('or', 'vex'): 1,
('period.', 'Her'): 1,
('rich,', 'with'): 1,
('seemed', 'to'): 1,
("sister's", 'marriage,'): 1,
('some', 'of'): 1,
('the', 'best'): 1,
('the', 'two'): 1,
('the', 'world'): 1,
('the', 'youngest'): 1,
('to', 'distress'): 1,
('to', 'unite'): 1,
('twenty-one', 'years'): 1,
('two', 'daughters'): 1,
('unite', 'some'): 1,
('very', 'early'): 1,
('very', 'little'): 1,
('vex', 'her.'): 1,
('was', 'the'): 1,
('with', 'a'): 1,
('with', 'very'): 1,
('world', 'with'): 1,
('years', 'in'): 1,
('youngest', 'of'): 1})
```

In [44]:
```
import re
from collections import Counter
```

In [45]:
```
words=re.findall(r'so+ \w+',open('austen-emma.txt').read())
ab=Counter(zip(words))
print(ab)
```

```
Counter({('so much',): 95, ('so very',): 76, ('so well',): 30, ('so many',): 2
7, ('so long',): 27, ('so little',): 20, ('so far',): 17, ('so I',): 14, ('so k
ind',): 13, ('so good',): 12, ('so often',): 10, ('so soon',): 9, ('so grea
t',): 8, ('so to',): 7, ('so fond',): 7, ('so she',): 7, ('so it',): 6, ('so an
xious',): 6, ('so as',): 6, ('so you',): 6, ('so truly',): 6, ('so completel
y',): 5, ('so obliging',): 5, ('so extremely',): 5, ('so entirely',): 4, ('so h
appy',): 4, ('so interesting',): 4, ('so fast',): 4, ('so near',): 4, ('so plea
sed',): 4, ('so few',): 4, ('so that',): 4, ('so strong',): 4, ('so liberal',):
4, ('so miserable',): 4, ('so happily',): 3, ('so proper',): 3, ('so pleasantl
y',): 3, ('so superior',): 3, ('so warmly',): 3, ('so bad',): 3, ('so odd',):
3, ('so ill',): 3, ('so delighted',): 3, ('so particularly',): 3, ('so easil
y',): 3, ('so on',): 3, ('so attentive',): 3, ('so fortunate',): 3, ('so gla
d',): 3, ('so shocked',): 3, ('so at',): 3, ('so obliged',): 2, ('so perfectl
y',): 2, ('so dear',): 2, ('so busy',): 2, ('so did',): 2, ('so forth',): 2,
('so totally',): 2, ('so remarkably',): 2, ('so plainly',): 2, ('so charmin
g',): 2, ('so surprized',): 2, ('so early',): 2, ('so too',): 2, ('so easy',):
2, ('so decidedly',): 2, ('so absolutely',): 2, ('so particular',): 2, ('so dec
eived',): 2, ('so palpably',): 2, ('so clever',): 2, ('so short',): 2, ('so col
d',): 2, ('so high',): 2, ('so happened',): 2, ('so full',): 2, ('so thoroughl
y',): 2, ('so equal',): 2, ('so off',): 2, ('so naturally',): 2, ('so afrai
d',): 2, ('so deep',): 2, ('so kindly',): 2, ('so pale',): 2, ('so noble',): 2,
('so lovely',): 2, ('so mad',): 2, ('so nearly',): 2, ('so sorry',): 2, ('so ch
eerful',): 2, ('so unfeeling',): 2, ('so ready',): 2, ('so unperceived',): 1,
('so mild',): 1, ('so constantly',): 1, ('so comfortably',): 1, ('so avowed',):
1, ('so deservedly',): 1, ('so convenient',): 1, ('so just',): 1, ('so apparen
t',): 1, ('so sorrowful',): 1, ('so spent',): 1, ('so artlessly',): 1, ('so pla
in',): 1, ('so firmly',): 1, ('so genteel',): 1, ('so _then_',): 1, ('so brilli
ant',): 1, ('so seldom',): 1, ('so nervous',): 1, ('so indeed',): 1, ('so pac
k',): 1, ('so doubtful',): 1, ('so with',): 1, ('so contemptible',): 1, ('so sl
ightingly',): 1, ('so by',): 1, ('so loudly',): 1, ('so materially',): 1, ('so
hard',): 1, ('so delightful',): 1, ('so pointed',): 1, ('so equalled',): 1, ('s
o evidently',): 1, ('so immediately',): 1, ('so sought',): 1, ('so excellen
t',): 1, ('so prettily',): 1, ('so extreme',): 1, ('so wonder',): 1, ('so alway
s',): 1, ('so silly',): 1, ('so satisfied',): 1, ('so smiling',): 1, ('so prosi
ng',): 1, ('so undistinguishing',): 1, ('so apt',): 1, ('so dreadful',): 1, ('s
o respected',): 1, ('so tenderly',): 1, ('so grieved',): 1, ('so shocking',):
1, ('so conceited',): 1, ('so before',): 1, ('so prevalent',): 1, ('so heav
y',): 1, ('so swiftly',): 1, ('so spoken',): 1, ('so or',): 1, ('so overcharge
d',): 1, ('so pleasant',): 1, ('so fenced',): 1, ('so hospitable',): 1, ('so in
terested',): 1, ('so sanguine',): 1, ('so sure',): 1, ('so careless',): 1, ('so
rapidly',): 1, ('so frequent',): 1, ('so sensible',): 1, ('so misled',): 1, ('s
o blind',): 1, ('so complaisant',): 1, ('so misinterpreted',): 1, ('so activ
e',): 1, ('so pointedly',): 1, ('so striking',): 1, ('so sudden',): 1, ('so ind
ustriously',): 1, ('so partial',): 1, ('so natural',): 1, ('so inevitable',):
1, ('so lately',): 1, ('so beautifully',): 1, ('so distinct',): 1, ('so conside
rate',): 1, ('so light',): 1, ('so intimate',): 1, ('so magnified',): 1, ('so c
autious',): 1, ('so confined',): 1, ('so wish',): 1, ('so he',): 1, ('so glorio
us',): 1, ('so quick',): 1, ('so sweetly',): 1, ('so inseparably',): 1, ('so de
serving',): 1, ('so disappointed',): 1, ('so ended',): 1, ('so sluggish',): 1,
('so amiable',): 1, ('so quiet',): 1, ('so idolized',): 1, ('so cried',): 1,
('so acceptable',): 1, ('so properly',): 1, ('so reasonable',): 1, ('so delight
fully',): 1, ('so rich',): 1, ('so warm',): 1, ('so large',): 1, ('so handsomel
y',): 1, ('so abundant',): 1, ('so outree',): 1, ('so thoughtful',): 1, ('so mu
```

```
st',): 1, ('so effectually',): 1, ('so beautiful',): 1, ('so Patty',): 1, ('so
honoured',): 1, ('so close',): 1, ('so imprudent',): 1, ('so limited',): 1, ('s
o from',): 1, ('so amusing',): 1, ('so indifferent',): 1, ('so indignant',): 1,
('so said',): 1, ('so right',): 1, ('so wretched',): 1, ('so now',): 1, ('so oc
cupied',): 1, ('so unhappy',): 1, ('so highly',): 1, ('so generally',): 1, ('so
exactly',): 1, ('so double',): 1, ('so secluded',): 1, ('so regular',): 1, ('so
determined',): 1, ('so motherly',): 1, ('so the',): 1, ('so glibly',): 1, ('so
calculated',): 1, ('so thrown',): 1, ('so exclusively',): 1, ('so disgustingl
y',): 1, ('so needlessly',): 1, ('so does',): 1, ('so resolutely',): 1, ('so wo
uld',): 1, ('so infinitely',): 1, ('so fluently',): 1, ('so they',): 1, ('so im
patient',): 1, ('so briskly',): 1, ('so vigorously',): 1, ('so young',): 1, ('s
o hardened',): 1, ('so gratified',): 1, ('so received',): 1, ('so then',): 1,
('so and',): 1, ('so gratefully',): 1, ('so found',): 1, ('so placed',): 1, ('s
o lain',): 1, ('so his',): 1, ('so arranged',): 1, ('so moving',): 1, ('so walk
ing',): 1, ('so when',): 1, ('so favourable',): 1, ('so late',): 1, ('so silen
t',): 1, ('so dull',): 1, ('so irksome',): 1, ('so agitated',): 1, ('so bruta
l',): 1, ('so cruel',): 1, ('so depressed',): 1, ('so no',): 1, ('so justly',):
1, ('so astonished',): 1, ('so will',): 1, ('so simple',): 1, ('so dignifie
d',): 1, ('so suddenly',): 1, ('so a',): 1, ('so herself',): 1, ('so peremptori
ly',): 1, ('so uneasy',): 1, ('so wonderful',): 1, ('so _very_',): 1, ('so expr
essly',): 1, ('so angry',): 1, ('so anxiously',): 1, ('so strange',): 1, ('so s
toutly',): 1, ('so mistake',): 1, ('so mistaken',): 1, ('so dreadfully',): 1,
('so voluntarily',): 1, ('so satisfactory',): 1, ('so disinterested',): 1, ('so
foolishly',): 1, ('so ingeniously',): 1, ('so entreated',): 1, ('so like',): 1,
('so cordially',): 1, ('so essential',): 1, ('so designedly',): 1, ('so hast
y',): 1, ('so richly',): 1, ('so grateful',): 1, ('so tenaciously',): 1, ('so f
eeling',): 1, ('so engaging',): 1, ('so engaged',): 1, ('so hot',): 1, ('so use
ful',): 1, ('so attached',): 1, ('so peculiarly',): 1, ('so singularly',): 1,
('so taken',): 1, ('so recently',): 1, ('so fresh',): 1, ('so hateful',): 1,
('so heartily',): 1, ('so steady',): 1, ('so complete',): 1, ('so in',): 1, ('s
o suffered',): 1})
```

In [46]:
```
a_tokfd=FreqDist(a_tok)
a_tokfd
```

Out[46]:
```
FreqDist({'1816]': 1,
          '[emma': 1,
          'a': 3,
          'affectionate,': 1,
          'and': 4,
          'austen': 1,
          'been': 1,
          'best': 1,
          'blessings': 1,
          'by': 1,
          'chapter': 1,
          'clever,': 1,
          'comfortable': 1,
          'consequence': 1,
          'daughters': 1,
          'died': 1,
          'disposition,': 1,
          'distress': 1,
          'early': 1,
          'emma': 1,
          'existence;': 1,
          'father;': 1,
          'from': 1,
          'had': 2,
          'had,': 1,
          'handsome,': 1,
          'happy': 1,
          'her': 2,
          'her.': 1,
          'his': 1,
          'home': 1,
          'house': 1,
          'i': 2,
          'in': 2,
          'indulgent': 1,
          'jane': 1,
          'little': 1,
          'lived': 1,
          'marriage,': 1,
          'mistress': 1,
          'most': 1,
          'mother': 1,
          'nearly': 1,
          'of': 6,
          'or': 1,
          'period.': 1,
          'rich,': 1,
          'seemed': 1,
          'she': 1,
          "sister's": 1,
          'some': 1,
          't': 1,
          'the': 4,
          'to': 2,
```

```
'twenty-one': 1,
'two': 1,
'unite': 1,
'very': 2,
'vex': 1,
'volume': 1,
'was': 1,
'with': 2,
'woodhouse,': 1,
'world': 1,
'years': 1,
'youngest': 1})
```

In [47]:
```
a_bigrams=list(nltk.bigrams(a_tok))
a_bigrams
```

Out[47]:
```
[('[emma', 'by'),
 ('by', 'jane'),
 ('jane', 'austen'),
 ('austen', '1816]'),
 ('1816]', 'volume'),
 ('volume', 'i'),
 ('i', 'chapter'),
 ('chapter', 'i'),
 ('i', 'emma'),
 ('emma', 'woodhouse,'),
 ('woodhouse,', 'handsome,'),
 ('handsome,', 'clever,'),
 ('clever,', 'and'),
 ('and', 'rich,'),
 ('rich,', 'with'),
 ('with', 'a'),
 ('a', 'comfortable'),
 ('comfortable', 'home'),
 ('home', 'and'),
 ('and', 'happy'),
 ('happy', 'disposition,'),
 ('disposition,', 'seemed'),
 ('seemed', 'to'),
 ('to', 'unite'),
 ('unite', 'some'),
 ('some', 'of'),
 ('of', 'the'),
 ('the', 'best'),
 ('best', 'blessings'),
 ('blessings', 'of'),
 ('of', 'existence;'),
 ('existence;', 'and'),
 ('and', 'had'),
 ('had', 'lived'),
 ('lived', 'nearly'),
 ('nearly', 'twenty-one'),
 ('twenty-one', 'years'),
 ('years', 'in'),
 ('in', 'the'),
 ('the', 'world'),
 ('world', 'with'),
 ('with', 'very'),
 ('very', 'little'),
 ('little', 'to'),
 ('to', 'distress'),
 ('distress', 'or'),
 ('or', 'vex'),
 ('vex', 'her.'),
 ('her.', 'she'),
 ('she', 'was'),
 ('was', 'the'),
 ('the', 'youngest'),
 ('youngest', 'of'),
 ('of', 'the'),
```

```
('the', 'two'),
('two', 'daughters'),
('daughters', 'of'),
('of', 'a'),
('a', 'most'),
('most', 'affectionate,'),
('affectionate,', 'indulgent'),
('indulgent', 'father;'),
('father;', 'and'),
('and', 'had,'),
('had,', 'in'),
('in', 'consequence'),
('consequence', 'of'),
('of', 'her'),
('her', "sister's"),
("sister's", 'marriage,'),
('marriage,', 'been'),
('been', 'mistress'),
('mistress', 'of'),
('of', 'his'),
('his', 'house'),
('house', 'from'),
('from', 'a'),
('a', 'very'),
('very', 'early'),
('early', 'period.'),
('period.', 'her'),
('her', 'mother'),
('mother', 'had'),
('had', 'died'),
('died', 't')]
```

In [48]:
```
a_bigramfd=nltk.FreqDist(a_bigrams)
a_bigramfd
```

Out[48]:
```
FreqDist({('1816]', 'volume'): 1,
          ('[emma', 'by'): 1,
          ('a', 'comfortable'): 1,
          ('a', 'most'): 1,
          ('a', 'very'): 1,
          ('affectionate,', 'indulgent'): 1,
          ('and', 'had'): 1,
          ('and', 'had,'): 1,
          ('and', 'happy'): 1,
          ('and', 'rich,'): 1,
          ('austen', '1816]'): 1,
          ('been', 'mistress'): 1,
          ('best', 'blessings'): 1,
          ('blessings', 'of'): 1,
          ('by', 'jane'): 1,
          ('chapter', 'i'): 1,
          ('clever,', 'and'): 1,
          ('comfortable', 'home'): 1,
          ('consequence', 'of'): 1,
          ('daughters', 'of'): 1,
          ('died', 't'): 1,
          ('disposition,', 'seemed'): 1,
          ('distress', 'or'): 1,
          ('early', 'period.'): 1,
          ('emma', 'woodhouse,'): 1,
          ('existence;', 'and'): 1,
          ('father;', 'and'): 1,
          ('from', 'a'): 1,
          ('had', 'died'): 1,
          ('had', 'lived'): 1,
          ('had,', 'in'): 1,
          ('handsome,', 'clever,'): 1,
          ('happy', 'disposition,'): 1,
          ('her', 'mother'): 1,
          ('her', "sister's"): 1,
          ('her.', 'she'): 1,
          ('his', 'house'): 1,
          ('home', 'and'): 1,
          ('house', 'from'): 1,
          ('i', 'chapter'): 1,
          ('i', 'emma'): 1,
          ('in', 'consequence'): 1,
          ('in', 'the'): 1,
          ('indulgent', 'father;'): 1,
          ('jane', 'austen'): 1,
          ('little', 'to'): 1,
          ('lived', 'nearly'): 1,
          ('marriage,', 'been'): 1,
          ('mistress', 'of'): 1,
          ('most', 'affectionate,'): 1,
          ('mother', 'had'): 1,
          ('nearly', 'twenty-one'): 1,
          ('of', 'a'): 1,
          ('of', 'existence;'): 1,
```

```
                  ('of', 'her'): 1,
                  ('of', 'his'): 1,
                  ('of', 'the'): 2,
                  ('or', 'vex'): 1,
                  ('period.', 'her'): 1,
                  ('rich,', 'with'): 1,
                  ('seemed', 'to'): 1,
                  ('she', 'was'): 1,
                  ("sister's", 'marriage,'): 1,
                  ('some', 'of'): 1,
                  ('the', 'best'): 1,
                  ('the', 'two'): 1,
                  ('the', 'world'): 1,
                  ('the', 'youngest'): 1,
                  ('to', 'distress'): 1,
                  ('to', 'unite'): 1,
                  ('twenty-one', 'years'): 1,
                  ('two', 'daughters'): 1,
                  ('unite', 'some'): 1,
                  ('very', 'early'): 1,
                  ('very', 'little'): 1,
                  ('vex', 'her.'): 1,
                  ('volume', 'i'): 1,
                  ('was', 'the'): 1,
                  ('with', 'a'): 1,
                  ('with', 'very'): 1,
                  ('woodhouse,', 'handsome,'): 1,
                  ('world', 'with'): 1,
                  ('years', 'in'): 1,
                  ('youngest', 'of'): 1})
```

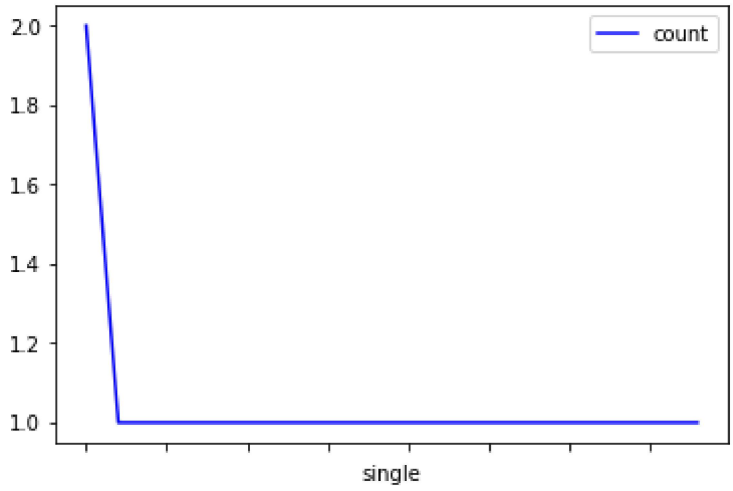
In [49]:
```
from nltk.probability import ConditionalFreqDist
from nltk.tokenize import word_tokenize
```

In [62]:
```
import pandas as pd
df=pd.DataFrame(list(m.items()))
df.columns=['single','count']
df
```

Out[62]:

| | single | count |
|---|---|---|
| **0** | (of, the) | 2 |
| **1** | ([emma, by) | 1 |
| **2** | (by, jane) | 1 |
| **3** | (jane, austen) | 1 |
| **4** | (austen, 1816]) | 1 |
| **5** | (1816], volume) | 1 |
| **6** | (volume, i) | 1 |
| **7** | (i, chapter) | 1 |
| **8** | (chapter, i) | 1 |
| **9** | (i, emma) | 1 |
| **10** | (emma, woodhouse,) | 1 |
| **11** | (woodhouse,, handsome,) | 1 |
| **12** | (handsome,, clever,) | 1 |
| **13** | (clever,, and) | 1 |
| **14** | (and, rich,) | 1 |
| **15** | (rich,, with) | 1 |
| **16** | (with, a) | 1 |
| **17** | (a, comfortable) | 1 |
| **18** | (comfortable, home) | 1 |
| **19** | (home, and) | 1 |

In [63]:
```
import matplotlib.pyplot as plt
df.plot(kind='line',x='single',y='count',color='blue')
plt.show()
```




In [53]:
```
v=a_bigramfd.most_common(20)
m=dict(v)
m
```

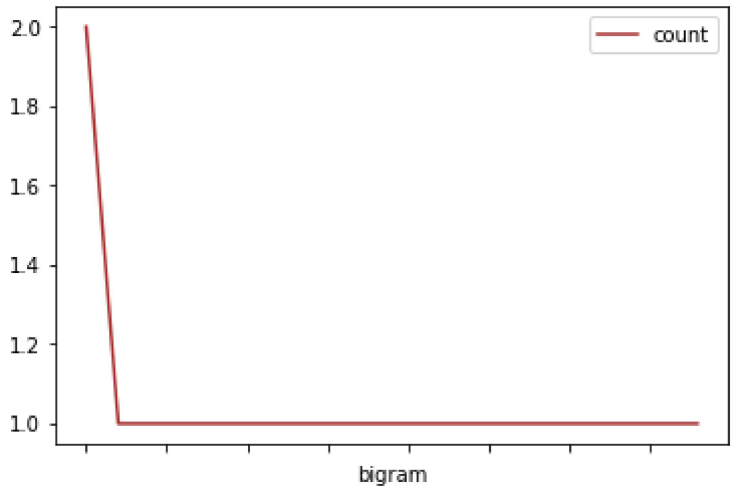
Out[53]:
```
{('1816]', 'volume'): 1,
 ('[emma', 'by'): 1,
 ('a', 'comfortable'): 1,
 ('and', 'rich,'): 1,
 ('austen', '1816]'): 1,
 ('by', 'jane'): 1,
 ('chapter', 'i'): 1,
 ('clever,', 'and'): 1,
 ('comfortable', 'home'): 1,
 ('emma', 'woodhouse,'): 1,
 ('handsome,', 'clever,'): 1,
 ('home', 'and'): 1,
 ('i', 'chapter'): 1,
 ('i', 'emma'): 1,
 ('jane', 'austen'): 1,
 ('of', 'the'): 2,
 ('rich,', 'with'): 1,
 ('volume', 'i'): 1,
 ('with', 'a'): 1,
 ('woodhouse,', 'handsome,'): 1}
```

In [54]:
```
df2=pd.DataFrame(list(m.items()))
df2.columns=['bigram','count']
df2
```

Out[54]:

| | bigram | count |
|---|---|---|
| **0** | (of, the) | 2 |
| **1** | ([emma, by) | 1 |
| **2** | (by, jane) | 1 |
| **3** | (jane, austen) | 1 |
| **4** | (austen, 1816]) | 1 |
| **5** | (1816], volume) | 1 |
| **6** | (volume, i) | 1 |
| **7** | (i, chapter) | 1 |
| **8** | (chapter, i) | 1 |
| **9** | (i, emma) | 1 |
| **10** | (emma, woodhouse,) | 1 |
| **11** | (woodhouse,, handsome,) | 1 |
| **12** | (handsome,, clever,) | 1 |
| **13** | (clever,, and) | 1 |
| **14** | (and, rich,) | 1 |
| **15** | (rich,, with) | 1 |
| **16** | (with, a) | 1 |
| **17** | (a, comfortable) | 1 |
| **18** | (comfortable, home) | 1 |
| **19** | (home, and) | 1 |

In [55]:
```
df2.plot(kind='line',x='bigram',y='count',color='brown')
plt.show()
```




In [56]:
```
so_count=a_tokfd['so']
print(so_count)
tot=len(a_tokfd)
print(tot)
rel_freq=so_count/tot
rel_freq
```

```
0
66
```

Out[56]:
```
0.0
```

In [57]:
```
ab.most_common(20)
```

Out[57]:
```
[(('so much',), 95),
 (('so very',), 76),
 (('so well',), 30),
 (('so many',), 27),
 (('so long',), 27),
 (('so little',), 20),
 (('so far',), 17),
 (('so I',), 14),
 (('so kind',), 13),
 (('so good',), 12),
 (('so often',), 10),
 (('so soon',), 9),
 (('so great',), 8),
 (('so to',), 7),
 (('so fond',), 7),
 (('so she',), 7),
 (('so it',), 6),
 (('so anxious',), 6),
 (('so as',), 6),
 (('so you',), 6)]
```

In [58]:
```
ab_dict=dict(ab)
ab_dict
```

Out[58]:
```
{('so I',): 14,
 ('so Patty',): 1,
 ('so _then_',): 1,
 ('so _very_',): 1,
 ('so a',): 1,
 ('so absolutely',): 2,
 ('so abundant',): 1,
 ('so acceptable',): 1,
 ('so active',): 1,
 ('so afraid',): 2,
 ('so agitated',): 1,
 ('so always',): 1,
 ('so amiable',): 1,
 ('so amusing',): 1,
 ('so and',): 1,
 ('so angry',): 1,
 ('so anxious',): 6,
 ('so anxiously',): 1,
 ('so apparent',): 1,
```

In [59]:
```
tot_occ=len(ab_dict)
tot_occ
```

Out[59]:
```
326
```

In [60]:
```
for i,j in ab_dict.items():
    if i==('so much',):
        print(i,j)
        print(j/tot_occ)
```

```
('so much',) 95
0.29141104294478526
```

In [61]:
```
for i,j in ab_dict.items():
    if i==('so will',):
        print(i,j)
        print(j/tot_occ)
```

```
('so will',) 1
0.003067484662576687
```