IHLT Lab 1: Word Frequency Analysis

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Instructions: Develop a colab notebook that show the 25 non-stopwords with more number of occurrences in the file 'blake-poems.txt' of Gutenberg corpus.

In [ ]:

```python
import nltk
from nltk.corpus import stopwords, words
from nltk.tokenize import word_tokenize
import pandas as pd
import matplotlib.pyplot as plt

# Download necessary NLTK data
nltk.download('stopwords')
nltk.download('gutenberg')
```

```
[nltk_data] Downloading package stopwords to
[nltk_data]     /Users/zachparent/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
[nltk_data] Downloading package gutenberg to
[nltk_data]     /Users/zachparent/nltk_data...
[nltk_data]   Package gutenberg is already up-to-date!
```

Out[ ]:

```
True
```

In [ ]:

```python
# Get stop words
stop_words = stopwords.words('english')
pd.Series(stop_words).head(10)
```

Out[ ]:

```
0            i
1           me
2           my
3       myself
4           we
5          our
6         ours
7    ourselves
8          you
9       you're
dtype: object
```

In [ ]:

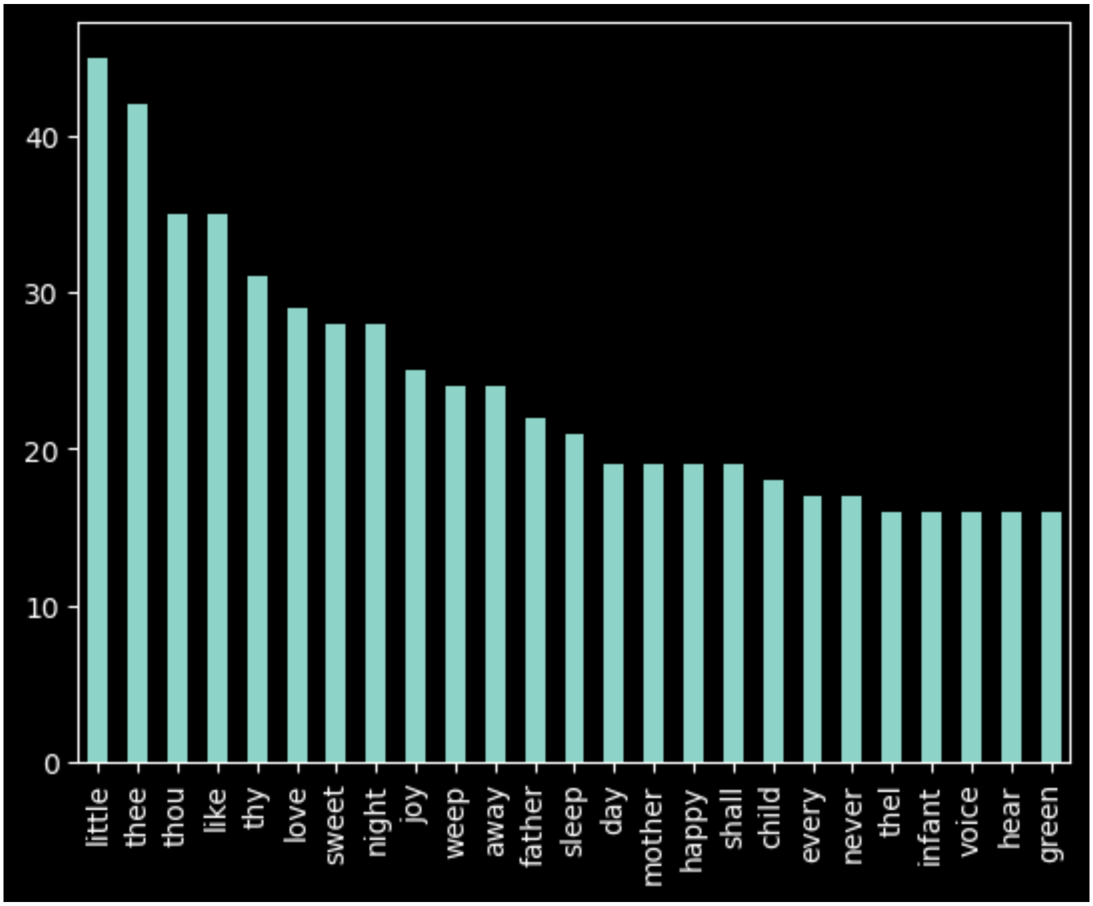
```python
# Get the gutenberg corpus
gutenberg = nltk.corpus.gutenberg
gutenberg.fileids()
```

Out[ ]:

```
['austen-emma.txt',
 'austen-persuasion.txt',
 'austen-sense.txt',
 'bible-kjv.txt',
 'blake-poems.txt',
 'bryant-stories.txt',
 'burgess-busterbrown.txt',
 'carroll-alice.txt',
 'chesterton-ball.txt',
 'chesterton-brown.txt',
 'chesterton-thursday.txt',
 'edgeworth-parents.txt',
 'melville-moby_dick.txt',
 'milton-paradise.txt',
 'shakespeare-caesar.txt',
 'shakespeare-hamlet.txt',
 'shakespeare-macbeth.txt',
 'whitman-leaves.txt']
```

In [ ]:

```python
# Get the words from the blake-poems.txt file, filter to only alpha words,
# then make them lowercase, and remove stop words.
# Count the occurrences of each word and plot the 25 most common.
words = gutenberg.words('blake-poems.txt')
non_stop_words = [word.lower() for word in words if word.isalpha()]
non_stop_words = [word for word in non_stop_words if word not in stop_words]
words_series = pd.Series(non_stop_words).value_counts()
words_series.head(25).plot(kind='bar')
plt.show()
words_series.head(25)
```



```
Out[ ]: little    45
        thee      42
        thou      35
        like      35
        thy       31
        love      29
        sweet     28
        night     28
        joy       25
        weep      24
        away      24
        father    22
        sleep     21
        day       19
        mother    19
        happy     19
        shall     19
        child     18
        every     17
        never     17
        thel      16
        infant    16
        voice     16
        hear      16
        green     16
        Name: count, dtype: int64
```

Stop words investigation

We noticed that among the top 25 most common words, there were a number of old english words that should be considered stop words but were not in the NLTK stop words list. We decided to add them to the list and re-run the analysis.

These words were:

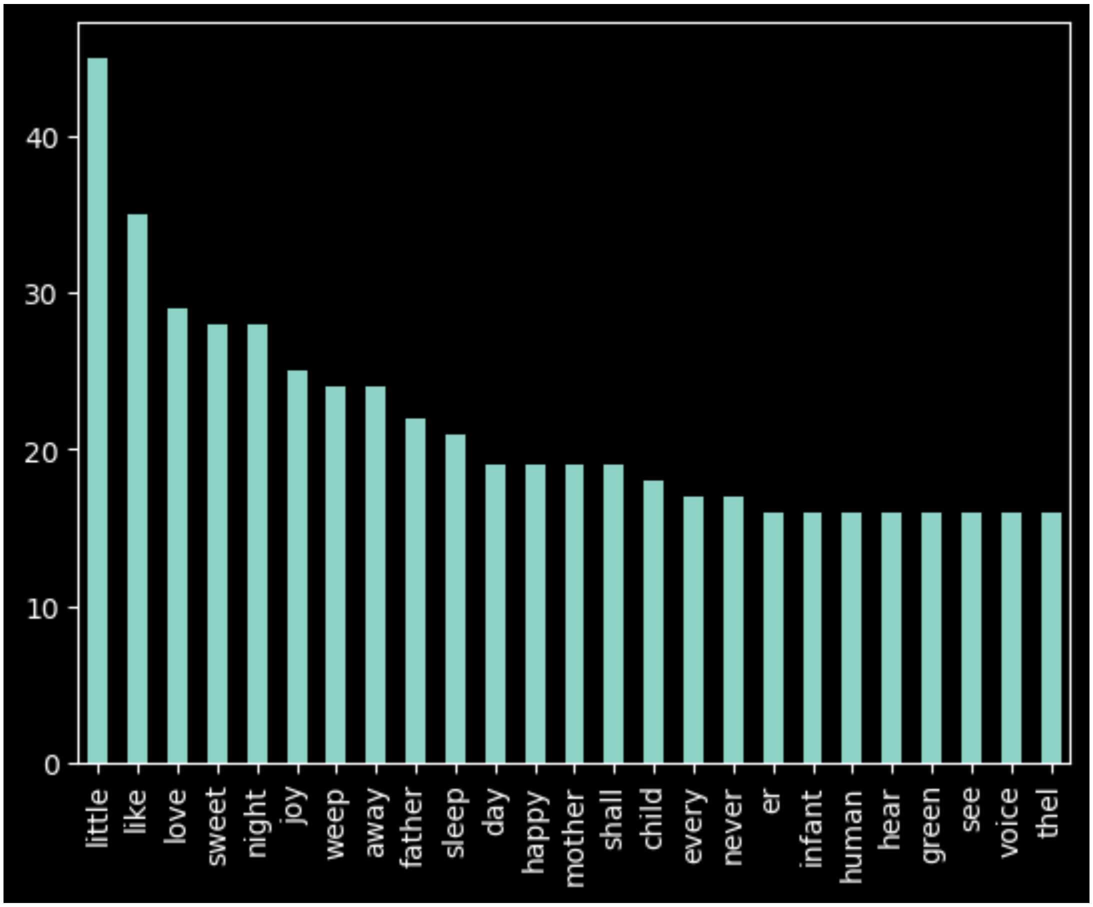
```
thee
thou
thy
```

These words mean "you" (subject), "you" (object), and "your" (possessive) respectively, which are all stop words in modern english. We filtered these.

We noticed `thel`, but after some research, we learned it's a character in the text, so we decided to keep it.

In [ ]:

```
# Filter out additional stop words, and re-run the analysis
stop_words.extend(['thou', 'thee', 'thy'])
non_stop_words = [word.lower() for word in words if word.isalpha()]
non_stop_words = [word for word in non_stop_words if word not in stop_words]
words_series = pd.Series(non_stop_words).value_counts()
words_series.head(25).plot(kind='bar')
plt.show()
words_series.head(25)
```



```
Out[ ]: little    45
        like      35
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        joy       25
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        away      24
        father    22
        sleep     21
        day       19
        happy     19
        mother    19
        shall     19
        child     18
        every     17
        never     17
        er        16
        infant    16
        human     16
        hear      16
        green     16
        see       16
        voice     16
        thel      16
        Name: count, dtype: int64
```

Dealing with "er"

We didn't know what "er" meant, so we decided to look for instances with context in the text.

It seems that this often occurs after `o` and `'` in the text. It also occurs after `whate` . This made us think it was typically used as a shortening of 'ver', e.g. to mean 'over', 'whatever', 'wherever', or 'never'.

We decided to filter it out.

Future work

We could use a different preprocessing approach to identify and preserve these contractions, showing their original meaning.

```
In [ ]: # Find all instances of "er" in the text, and print the surrounding 10 words
        er_idxs = [i for i, word in enumerate(words) if word == 'er']
        for er_idx in er_idxs:
            print(' '.join(words[er_idx - 10:er_idx + 10]))
```

```
and bid thee feed By the stream and o ' er the mead ; Gave thee clothing of
delight ,
A SONG Sweet dreams , form a shade O ' er my lovely infant ' s head ! Sweet
dreams
crown Sweet Sleep , angel mild , Hover o ' er my happy child ! Sweet smiles
, in the
Sleep , sleep , happy sleep , While o ' er thee doth mother weep . Sweet bab
e , in
shine like the gold , As I guard o ' er the fold ." SPRING Sound the flute !
Now
DREAM Once a dream did weave a shade O ' er my angel - guarded bed , That an
emmet
: It is eternal winter there . For where ' er the sun does shine , And where
' er
' er the sun does shine , And where ' er the rain does fall , Babes should n
ever hunger
weep . " Frowning , frowning night , O ' er this desert bright Let thy moon
arise , While
the virgin viewed : Then he gambolled round O ' er the hallowed ground . Leo
pards , tigers , play
by an Angel mild : Witless woe was ne ' er beguiled ! And I wept both night
and day
tree ," And I passed the sweet flower o ' er . Then I went to my pretty rose
tree
agree to meet When the silent sleep Waves o ' er heaven ' s deep , And the w
eary tired
the blasts of winter appear ? TO TERZAH Whate ' er is born of mortal birth M
ust be consumed with
that cannot crave , the voiceless , the o ' er tired The breath doth nourish
the innocent lamb ,
thy sighs . And all thy moans flew o ' er my roof , but I have call ' d
```

Final list of 25 most common non-stopwords in Gutenberg Blake poems

In [ ]:

```
# Filter out "er" and re-run the analysis.
stop_words.extend(['thou', 'thee', 'thy', 'er'])
non_stop_words = [word.lower() for word in words if word.isalpha()]
non_stop_words = [word for word in non_stop_words if word not in stop_words]
words_series = pd.Series(non_stop_words).value_counts()
words_series.head(25).plot(kind='bar')
plt.show()
words_series.head(25)
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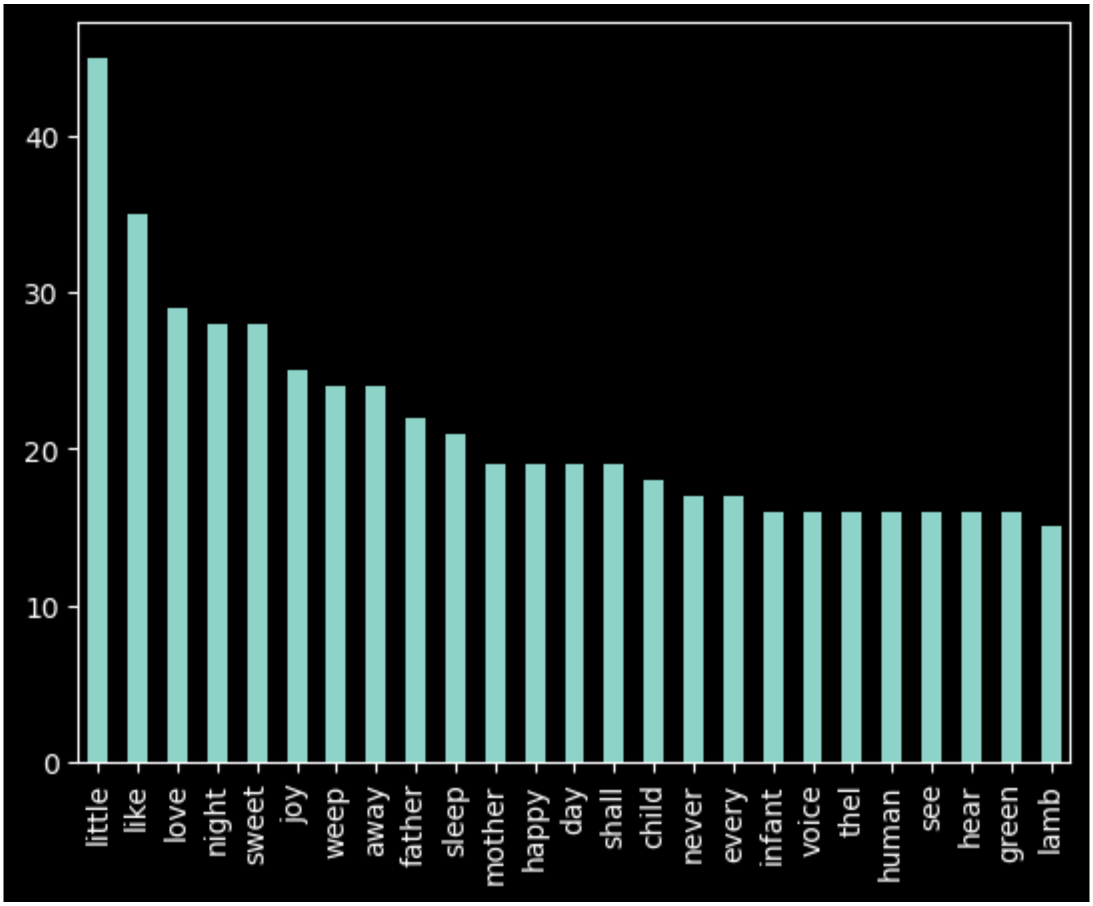

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        shall     19
        child     18
        never     17
        every     17
        infant    16
        voice     16
        thel      16
        human     16
        see       16
        hear      16
        green     16
        lamb      15
        Name: count, dtype: int64
```