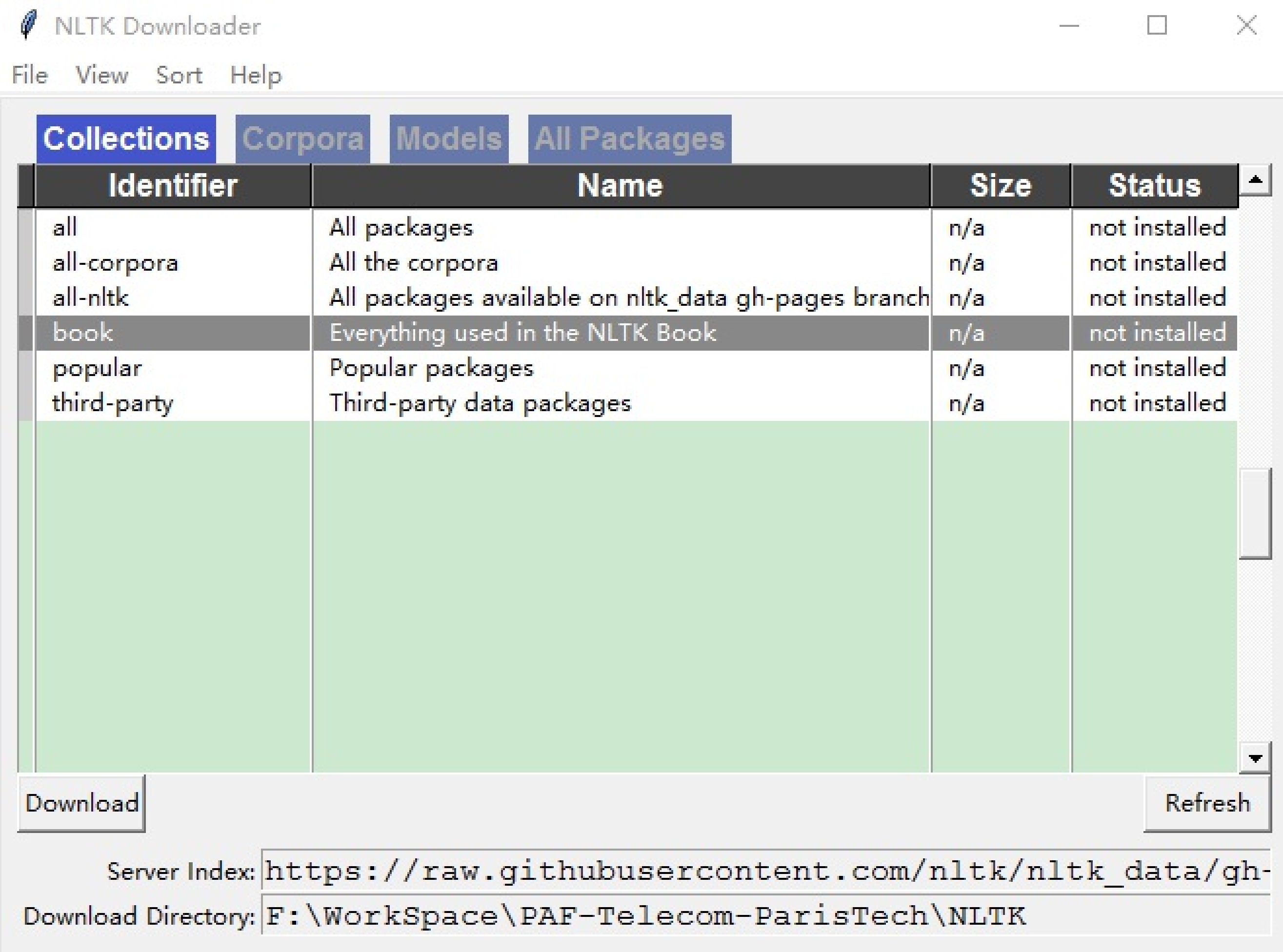
Chapiter_1 Language Processing and Python

Getting Started with NLTK

```
import nltk
nltk.download() # Downloading the NLTK Book Collection
```

Here what we see



Identifier	Name	Size	Status
all	All packages	n/a	not installed
all-corpora	All the corpora	n/a	not installed
all-nltk	All packages available on nltk_data gh-pages branch	n/a	not installed
book	Everything used in the NLTK Book	n/a	not installed
popular	Popular packages	n/a	not installed
third-party	Third-party data packages	n/a	not installed

Server Index: https://raw.githubusercontent.com/nltk/nltk_data/gh-

Download Directory: F:\WorkSpace\PAF-Telecom-ParisTech\NLTK

```
from nltk.book import * # load some texts for us to explore from book module
```

```
text1
```

```
<Text: Moby Dick by Herman Melville 1851>
```

Searching Text

- **concordance** shows us every occurrence of a given word, together with some context.

```
text1.concordance('monstrous')
```

```
Displaying 11 of 11 matches:
ong the former , one was of a most monstrous size . ... This came towards us ,
ON OF THE PSALMS . " Touching that monstrous bulk of the whale or ork we have r
ll over with a heathenish array of monstrous clubs and spears . Some were thick
d as you gazed , and wondered what monstrous cannibal and savage could ever hav
that has survived the flood ; most monstrous and most mountainous ! That Himmal
they might scout at Moby Dick as a monstrous fable , or still worse and more de
th of Radney .'" CHAPTER 55 Of the Monstrous Pictures of Whales . I shall ere l
ing Scenes . In connexion with the monstrous pictures of whales , I am strongly
ere to enter upon those still more monstrous stories of them which are to be fo
```

```
ght have been rummaged out of this monstrous cabinet there is no telling . But
of Whale - Bones ; for Whales of a monstrous size are oftentimes cast up dead u
```

- **similar** shows what other words appear in a similar range of contexts

```
text2.similar('monstrous')
```

```
very exceedingly so heartily extremely great as good sweet remarkably
amazingly a vast
```

- **common_contexts** allows us to examine the contexts shared by two or more words

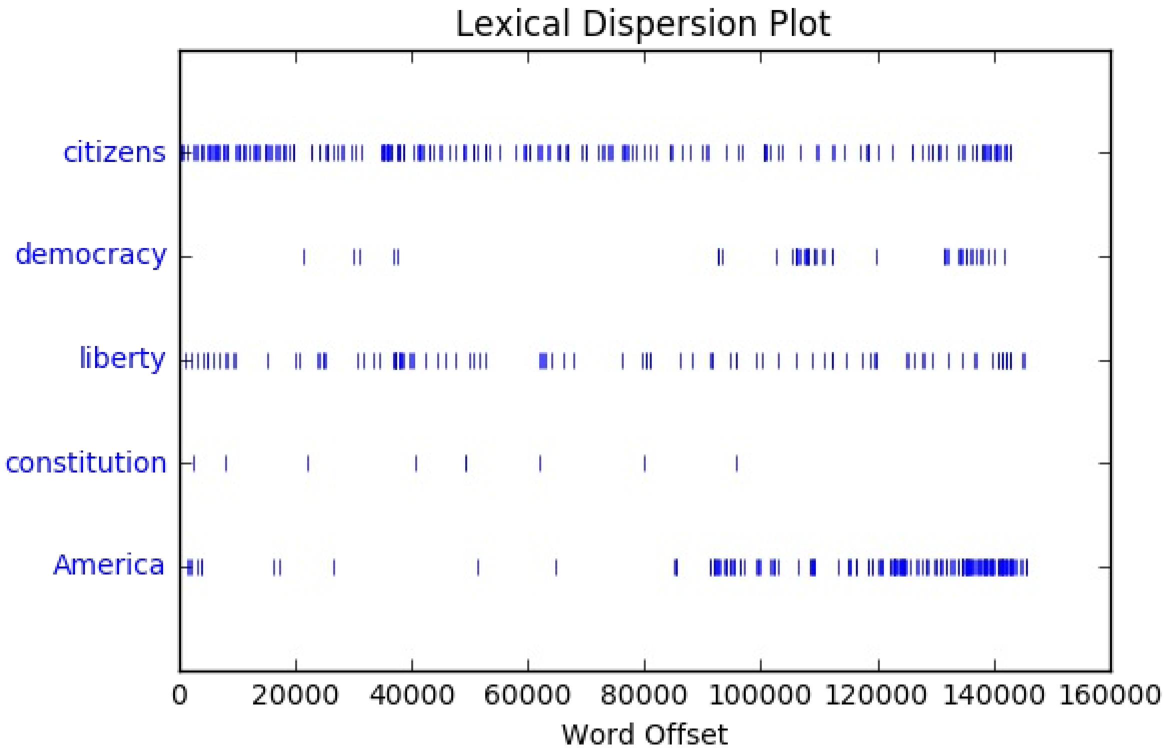
```
text2.common_contexts(['monstrous', 'very'])
```

```
is_pretty a_pretty am_glad be_glad a_lucky
```

- **dispersion_plot** determines the spatial location of a word in the text

for frequency of word usage through time, look at here

```
text4.dispersion_plot(["citizens", "democracy", "liberty", "constitution", "America"])
```



Counting Vocabulary

Use the term **len** to get the length of text.

```
len(text3)
```

```
44764
```

So it has 44,764 words and punctuation symbols, or "tokens".

Token is the technical name for a sequence of characters that we want to treat as a group.

Word type is the word considered as a unique item of vocabulary. If what we find includes punctuation symbols, then we will generally call these unique items *types* instead of *word types*.

```
len(set(text3)) # Use sorted(set(text3)) to see all types
```

```
2789
```

```
len(set(text3)) / len(text3) # measure of the lexical richness of the text
```

```
0.06230453042623537
```

```
text3.count("smote") # how often a word occurs in a text
```

```
5
```

Frequency Distributions

Frequency Distributions tells us the frequency of each vocabulary item in the text.

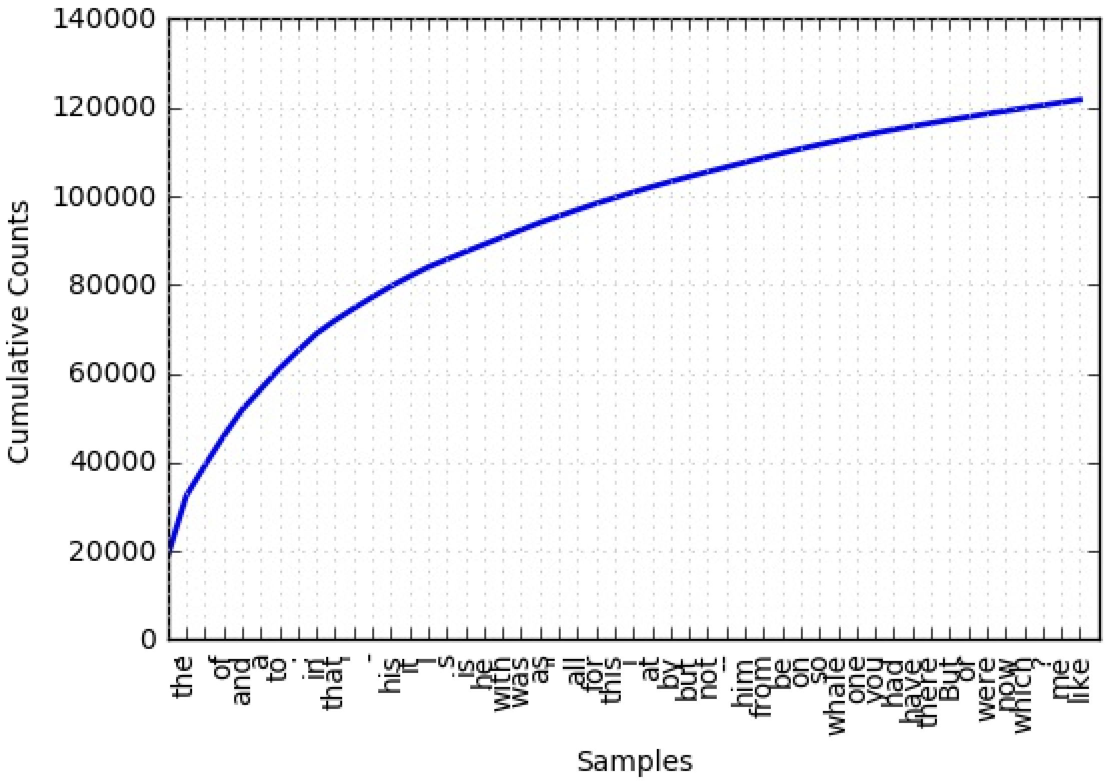
Hapaxes are the words that occur once only.

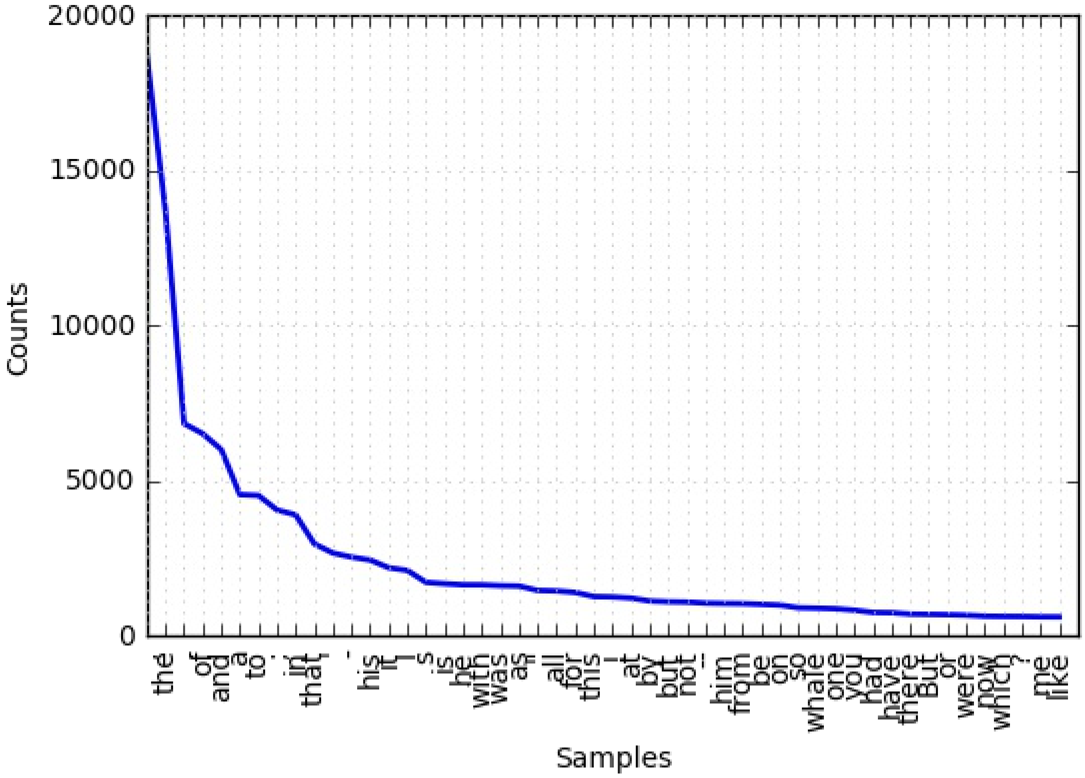
```
fdist1 = FreqDist(text1)

print(fdist1)
print (fdist1.most_common(5)) # find the 5 most frequent words
print (fdist1.hapaxes()[:5]) # show the first 5 hapaxes
print ('"or" counts ' + str(fdist1['or']) + ' times.') # show how many times the word 'or' appears

fdist1.plot(50, cumulative=True) # a cumulative frequency plot for the 50 most frequent words
fdist1.plot(50, cumulative=False) # a non-cumulative frequency plot for the 50 most frequent words
```

```
<FreqDist with 19317 samples and 260819 outcomes>
[(',', 18713), ('the', 13721), ('.', 6862), ('of', 6536), ('and', 6024)]
['fringed', 'Parallel', 'Somehow', 'Formosa', 'managed']
"or" counts 697 times.
```





Fine-grained Selection of Words

These very long words are often hapaxes and perhaps it would be better to find **frequently** occurring **long** words.

```
fdist5 = FreqDist(text5)
sorted(w for w in set(text5) if len(w) > 7 and fdist5[w] > 7)
# all words that are longer than seven characters, that occur more than seven times
```

```
 ['#14-19teens',
  '#talkcity_adults',
  '((((((((((',
  '........',
  'Question',
  'actually',
  'anything',
  'computer',
  'cute.-ass',
  'everyone',
  'football',
  'innocent',
  'listening',
  'remember',
  'seriously',
  'something',
  'together',
  'tomorrow',
  'watching']
```

Collocations and Bigrams

Collocation : a *sequence* of words that occur together **unusually often**.

Thus `red wine` is a collocation, whereas `the wine` is not. A characteristic of collocations is that they are *resistant to substitution* with words that have similar senses; for example, `maroon wine` sounds definitely odd.

bigram : start off by extracting from a text a list of **word pairs**, also known as bigrams.

```
from nltk import bigrams
print (list(bigrams(['more', 'is', 'said', 'than', 'done'])))
text8.collocations() # find bigrams based on the frequency of the individual words
```

```
[('more', 'is'), ('is', 'said'), ('said', 'than'), ('than', 'done')]
would like; medium build; social drinker; quiet nights; non smoker;
long term; age open; Would like; easy going; financially secure; fun
times; similar interests; Age open; weekends away; poss rship; well
presented; never married; single mum; permanent relationship; slim
build
```

Here is a resume of functions defined for NLTK's Frequency Distributions

Example	Description
fdist = FreqDist(samples)	create a frequency distribution containing the given samples
fdist[sample] += 1	increment the count for this sample
fdist['monstrous']	count of the number of times a given sample occurred
fdist.freq('monstrous')	frequency of a given sample
fdist.N()	total number of samples
fdist.most_common(n)	the n most common samples and their frequencies
for sample in fdist:	iterate over the samples
fdist.max()	sample with the greatest count
fdist.tabulate()	tabulate the frequency distribution
fdist.plot()	graphical plot of the frequency distribution
fdist.plot(cumulative=True)	cumulative plot of the frequency distribution
fdist1 < fdist2	test if samples in fdist1 occur less frequently than in fdist2

And here is a resume of useful word comparison operators in python

Function	Meaning
s.startswith(t)	test if s starts with t
s.endswith(t)	test if s ends with t
t in s	test if t is a substring of s
s.islower()	test if s contains cased characters and all are lowercase
s.isupper()	test if s contains cased characters and all are uppercase
s.isalpha()	test if s is non-empty and all characters in s are alphabetic
s.isalnum()	test if s is non-empty and all characters in s are alphanumeric
s.isdigit()	test if s is non-empty and all characters in s are digits
s.istitle()	test if s contains cased characters and is titlecased (i.e. all words in s have initial capitals)

Challenges in Automatic Natural Language Understanding

For more details, refer to chapiter one of this book.

- **Word Sense Disambiguation**, work out which sense of a word was intended in a given context
- **Pronoun Resolution**, work out "who did what to whom"

- **Generating Language resource/output**, `Spoken Dialog Systems` or `Machine Translation`
- **Textual Entailment**, Recognizing Textual Entailment(RTE), for exemple find evidence to support the hypothesis