# lec01

August 18, 2022

[1]:
```
# Stuff that will appear at the top of notebooks;
# You don't have to understand how this works or change it for now.

from datascience import *
import numpy as np
%matplotlib inline
import matplotlib.pyplot as plots
plots.style.use('fivethirtyeight')
import warnings
warnings.simplefilter(action="ignore", category=FutureWarning)

from urllib.request import urlopen
import re
def read_url(url):
    return re.sub('\\s+', ' ', urlopen(url).read().decode())
```

[2]:
```
2+3
```

[2]:
```
5
```

[3]:
```
# Read two books, fast!

#huck_finn_url = 'https://www.inferentialthinking.com/data/huck_finn.txt'
#huck_finn_text = read_url(huck_finn_url)
file = open("huck_finn.txt",mode='r')
huck_finn_text = file.read()
file.close()
huck_finn_chapters = huck_finn_text.split('CHAPTER ')[44:]

#little_women_url = 'https://www.inferentialthinking.com/data/little_women.txt'
#little_women_text = read_url(little_women_url)
file = open("little_women.txt",mode='r')
little_women_text = file.read()
file.close()
little_women_chapters = little_women_text.split('CHAPTER ')[1:]
```

[4]:
```
#huck_finn_chapters
```

[5]:
```
#little_women_chapters
```

[6]:
```
Table().with_column('Chapters', huck_finn_chapters)
```

[6]:
```
Chapters
I.

YOU don't know about me without you have read a book …
II.

WE went tiptoeing along a path amongst the trees ba …
III.

WELL, I got a good going-over in the morning from  …
IV.

WELL, three or four months run along, and it was we …
V.

I had shut the door to. Â Then I turned around and t …
VI.

WELL, pretty soon the old man was up and around aga …
VII.

"GIT up! Â What you 'bout?"

I opened my eyes and  …
VIII.

THE sun was up so high when I waked that I judged …
IX.

I wanted to go and look at a place right about the  …
X.

AFTER breakfast I wanted to talk about the dead man  …
… (33 rows omitted)
```

[7]:
```
np.char.count(huck_finn_chapters, 'Tom')
```

[7]:
```
array([ 6, 24,  5,  0,  0,  0,  2,  2,  0,  0,  2,  3,  1,  0,  0,  0,  3,
        5,  0,  0,  0,  0,  0,  0,  0,  0,  0,  1,  0,  0,  1,  4, 19, 15,
       14, 18,  9, 32, 11, 11,  8, 30,  6])
```

[8]:
```
np.char.count(huck_finn_chapters, 'Jim')
```

[8]:
```
array([ 0, 16,  0,  8,  0,  0,  0, 22, 11, 19,  4, 20,  9,  6, 16, 28,  0,
       10, 13, 18,  1,  0,  9,  5,  0,  0,  0,  1,  3,  5, 17,  0,  5, 17,
       18, 23,  4, 27, 10, 13,  0, 12,  6])
```

[9]:
```
counts = Table().with_columns([
    'Tom', np.char.count(huck_finn_chapters, 'Tom'),
    'Jim', np.char.count(huck_finn_chapters, 'Jim'),
    'Huck', np.char.count(huck_finn_chapters, 'Huck'),
])
counts
```

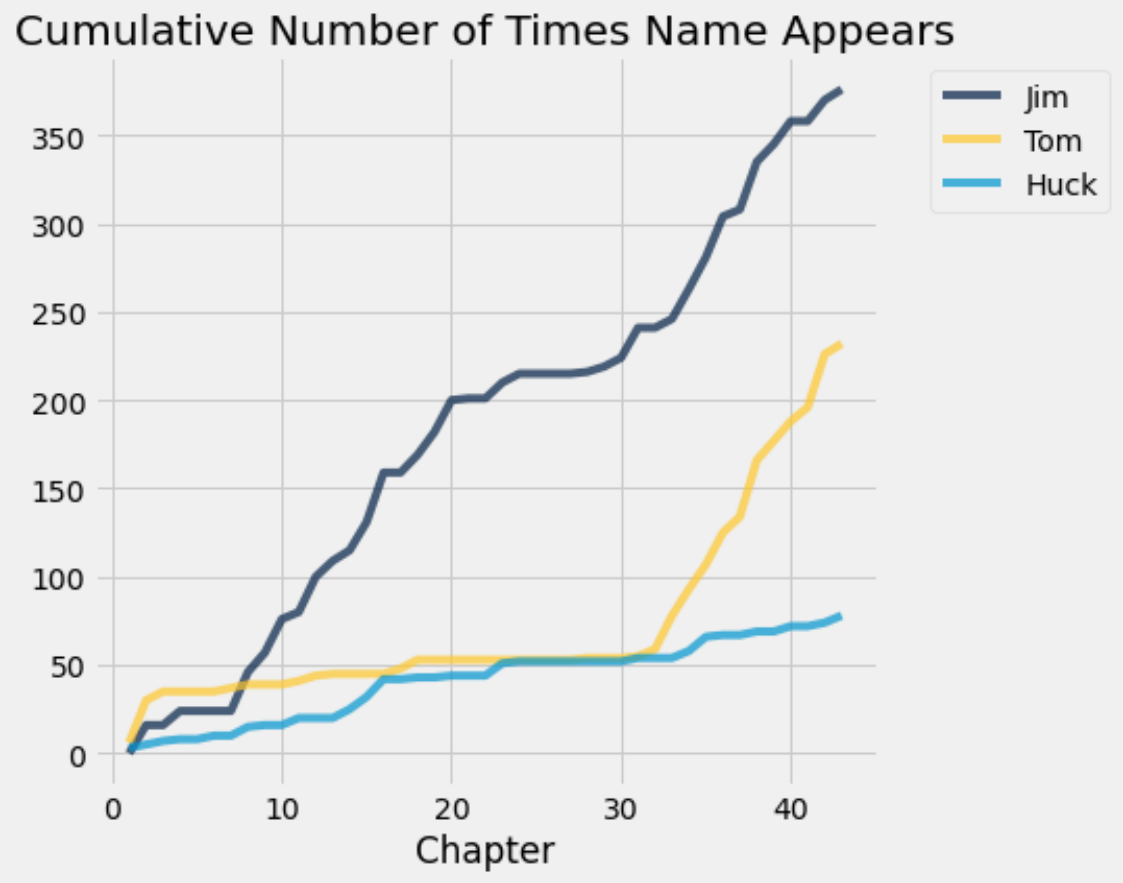
[9]:
```
Tom  | Jim  | Huck
6    | 0    | 3
24   | 16   | 2
5    | 0    | 2
0    | 8    | 1
0    | 0    | 0
0    | 0    | 2
2    | 0    | 0
2    | 22   | 5
0    | 11   | 1
0    | 19   | 0
… (33 rows omitted)
```

[10]:
```
# Count how many times the names Jim, Tom, and Huck appear in each chapter

counts = Table().with_columns([
        'Jim', np.char.count(huck_finn_chapters, 'Jim'),
        'Tom', np.char.count(huck_finn_chapters, 'Tom'),
        'Huck', np.char.count(huck_finn_chapters, 'Huck')
    ])

# Plot the cumulative counts:
# how many times in Chapter 1, how many times in Chapters 1 and 2, and so on.

cum_counts = counts.cumsum().with_column('Chapter', np.arange(1, 44, 1))
cum_counts.plot(column_for_xticks=3)
plots.title('Cumulative Number of Times Name Appears');
```




[11]:
```
# The chapters of Little Women

Table().with_column('Chapters', little_women_chapters)
```

[11]:
```
Chapters
ONE

PLAYING PILGRIMS

"Christmas won't be Christmas wit …
TWO

A MERRY CHRISTMAS

Jo was the first to wake in the  …
THREE

THE LAURENCE BOY
```

```
"Jo!  Jo!  Where are you?" crie …
FOUR

BURDENS

"Oh, dear, how hard it does seem to take  …
FIVE

BEING NEIGHBORLY

"What in the world are you going …
SIX

BETH FINDS THE PALACE BEAUTIFUL

The big house did  …
SEVEN

AMY'S VALLEY OF HUMILIATION

"That boy is a perfe …
EIGHT

JO MEETS APOLLYON

"Girls, where are you going?"  …
NINE

MEG GOES TO VANITY FAIR

"I do think it was the mo …
TEN

THE P.C. AND P.O.

As spring came on, a new set of  …
… (37 rows omitted)
```

[12]:
```
# Counts of names in the chapters of Little Women

people = ['Amy', 'Beth', 'Jo', 'Laurie', 'Meg']
people_counts = {pp: np.char.count(little_women_chapters, pp) for pp in people}

counts = Table().with_columns([
        'Amy', people_counts['Amy'],
        'Beth', people_counts['Beth'],
        'Jo', people_counts['Jo'],
```

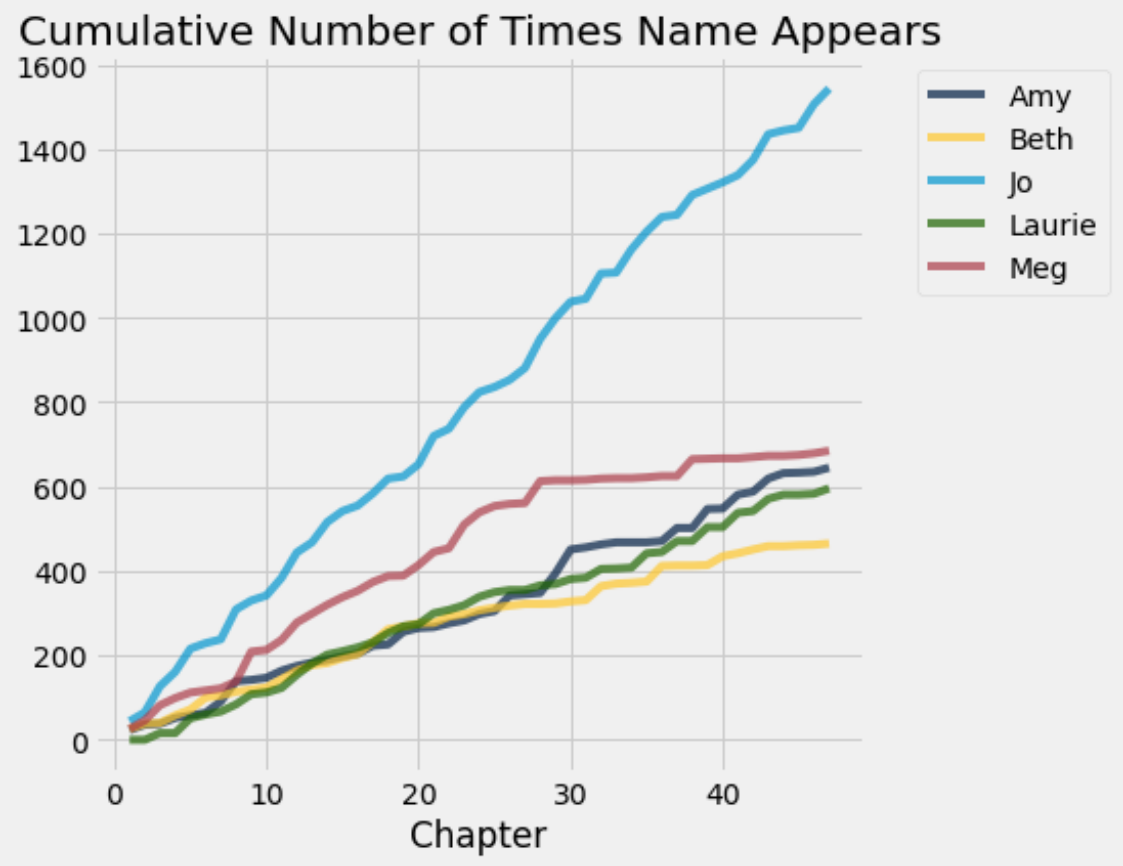
```
        'Laurie', people_counts['Laurie'],
        'Meg', people_counts['Meg']
    ])
```

[13]:
```
counts
```

[13]:
```
Amy  | Beth | Jo   | Laurie | Meg
23   | 26   | 44   | 0      | 26
13   | 12   | 21   | 0      | 20
2    | 2    | 62   | 16     | 36
14   | 18   | 34   | 0      | 17
6    | 14   | 55   | 35     | 13
6    | 28   | 13   | 9      | 5
27   | 5    | 9    | 7      | 5
48   | 9    | 71   | 17     | 16
3    | 5    | 21   | 24     | 71
5    | 5    | 12   | 4      | 4
… (37 rows omitted)
```

[14]:
```
# Plot the cumulative counts

cum_counts = counts.cumsum().with_column('Chapter', np.arange(1, 48, 1))
cum_counts.plot(column_for_xticks=5)
plots.title('Cumulative Number of Times Name Appears');
```




[15]:
```
# In each chapter, count the number of all characters;
# call this the "length" of the chapter.
# Also count the number of periods.

chars_periods_hf = Table().with_columns([
        'HF Chapter Length', [len(s) for s in huck_finn_chapters],
        'Number of Periods', np.char.count(huck_finn_chapters, '.')
    ])
chars_periods_lw = Table().with_columns([
        'LW Chapter Length', [len(s) for s in little_women_chapters],
        'Number of Periods', np.char.count(little_women_chapters, '.')
    ])
```

[16]:
```
# The counts for Huckleberry Finn

chars_periods_hf
```

[16]:
```
HF Chapter Length | Number of Periods
7137              | 66
12198             | 117
```

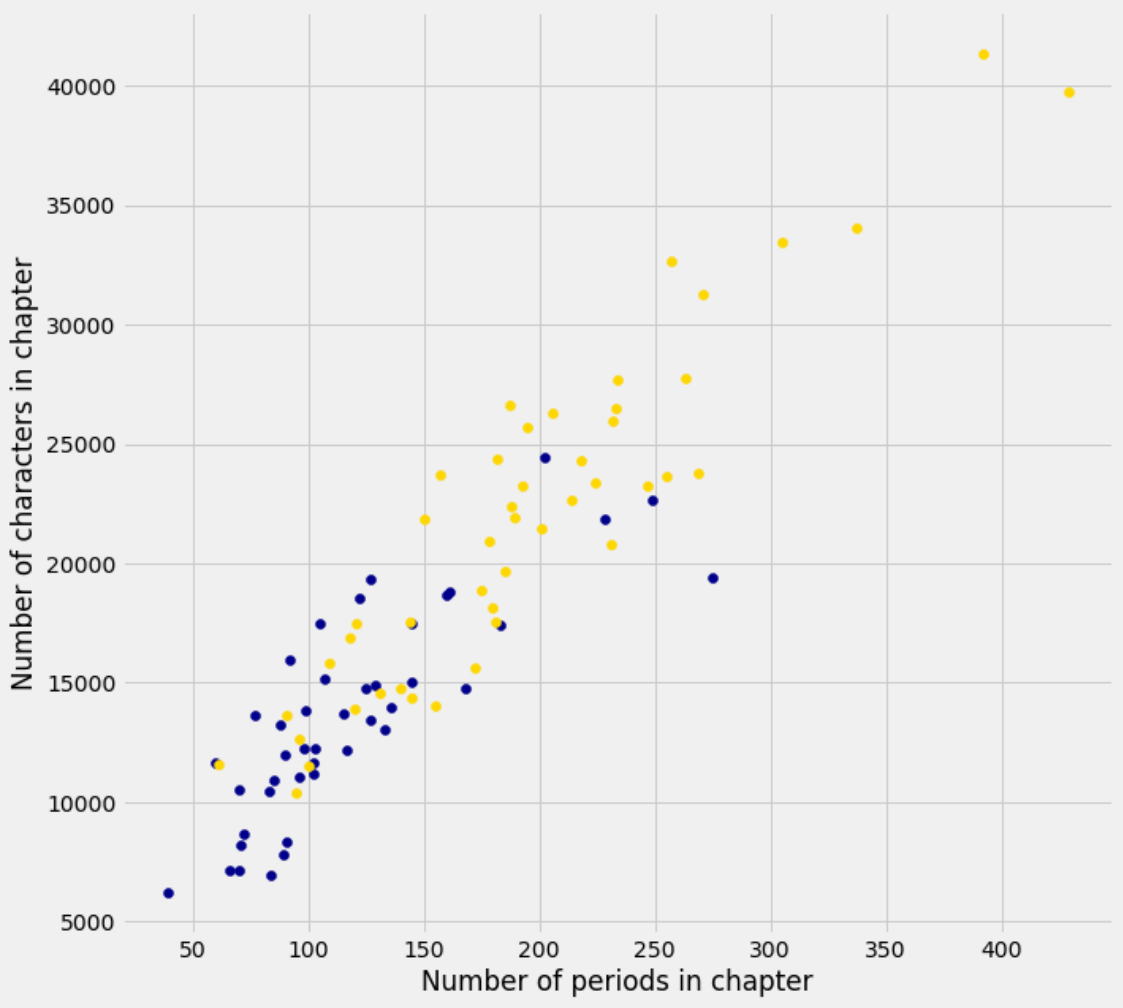
```
8674              | 72
6957              | 84
8333              | 91
14772             | 125
13446             | 127
22668             | 249
8200              | 71
7165              | 70
… (33 rows omitted)
```

[17]:
```
# The counts for Little Women

chars_periods_lw
```

[17]:
```
LW Chapter Length | Number of Periods
21952             | 189
22384             | 188
20815             | 231
25689             | 195
23657             | 255
14736             | 140
14549             | 131
22679             | 214
34054             | 337
19657             | 185
… (37 rows omitted)
```

[18]:
```
plots.figure(figsize=(10,10))
plots.scatter(chars_periods_hf[1], chars_periods_hf[0], color='darkblue')
plots.scatter(chars_periods_lw[1], chars_periods_lw[0], color='gold')
plots.xlabel('Number of periods in chapter')
plots.ylabel('Number of characters in chapter');
```


Number of characters in chapter
Number of periods in chapter
40000
35000
30000
25000
20000
15000
10000
5000
50
100
150
200
250
300
350
400