

2-FINAL

September 25, 2018

```
In [1]: import numpy as np
import pandas as pd
import scipy as sp

In [2]: %matplotlib inline
import matplotlib.pyplot as plt
plt.style.use('ggplot')

In [3]: %%file hw_data.csv
id,sex,weight,height
1,M,190,77
2,F,120,70
3,F,110,68
4,M,150,72
5,O,120,66
6,M,120,60
7,F,140,70
```

Overwriting hw_data.csv

1 Python

1.1 1. Finish creating the following function that takes a list and returns the average value.

```
In [4]: def average(my_list):
total = 0
for item in my_list:
    total=item+total

    return total/len(my_list)

average([1,2,1,4,3,2,5,9])
```

Out[4]: 3.375

1.2 2. Using a Dictionary keep track of the count of numbers (or items) from a list

```
In [5]: def counts(my_list):
        counts = dict()
        for item in my_list:
            counts[item]=counts.get(item,0)+1

        return counts

counts([1,2,1,4,3,2,5,9])
```

```
Out[5]: {1: 2, 2: 2, 4: 1, 3: 1, 5: 1, 9: 1}
```

1.3 3. Using the counts() function and the .split() function, return a dictionary of most occurring words from the following paragraph. Bonus, remove punctuation from words.

```
In [6]: paragraph_text = '''
For a minute or two she stood looking at the house, and wondering what to do next, when
The Fish-Footman began by producing from under his arm a great letter, nearly as large
Then they both bowed low, and their curls got entangled together.
Alice laughed so much at this, that she had to run back into the wood for fear of their
Alice went timidly up to the door, and knocked.
Theres no sort of use in knocking, said the Footman, and that for two reasons. First, I
Please, then, said Alice, how am I to get in?
There might be some sense in your knocking, the Footman went on without attending to her
I shall sit here, the Footman remarked, till tomorrow
At this moment the door of the house opened, and a large plate came skimming out, stra

counts(''For a minute or two she stood looking at the house, and wondering what to do
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Then they both bowed low, and their curls got entangled together.
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Out[6]: {'F': 15,
        'o': 186,
        'r': 103,
        ' ': 471,
        'a': 150,
        'm': 44,
        'i': 123,
        'n': 153,
        'u': 59,
```

```

't': 186,
'e': 248,
'w': 42,
's': 112,
'h': 131,
'd': 89,
'l': 69,
'k': 25,
'g': 46,
',': 46,
'x': 3,
'y': 40,
'f': 29,
'v': 12,
'c': 45,
' ': 5,
'(': 1,
'b': 20,
':': 2,
'j': 2,
')': 1,
'p': 26,
'.': 20,
'I': 6,
';': 4,
'A': 9,
'S': 1,
'\n': 9,
'T': 5,
'-': 3,
'': 12,
'D': 2,
'Q': 2,
'q': 3,
'': 17,
'z': 2,
'P': 1,
'?': 2,
'H': 2,
'B': 2}

```

```
In [7]: words=paragraph_text.split(" ")
```

```
In [8]: words
```

```
Out[8]: ['\nFor',
         'a',
         'minute',
```

'or',
'two',
'she',
'stood',
'looking',
'at',
'the',
'house,',
'and',
'wondering',
'what',
'to',
'do',
'next,',
'when',
'suddenly',
'a',
'footman',
'in',
'livery',
'came',
'running',
'out',
'of',
'the',
'wood(she',
'considered',
'him',
'to',
'be',
'a',
'footman',
'because',
'he',
'was',
'in',
'livery:',
'otherwise,',
'judging',
'by',
'his',
'face',
'only,',
'she',
'would',
'have',
'called',
'him',

'a',
'fish)and',
'rapped',
'loudly',
'at',
'the',
'door',
'with',
'his',
'knuckles.',
'It',
'was',
'opened',
'by',
'another',
'footman',
'in',
'livery,',
'with',
'a',
'round',
'face,',
'and',
'large',
'eyes',
'like',
'a',
'frog;',
'and',
'both',
'footmen,',
'Alice',
'noticed,',
'had',
'powdered',
'hair',
'that',
'curled',
'all',
'over',
'their',
'heads.',
'She',
'felt',
'very',
'curious',
'to',
'know',

'what',
'it',
'was',
'all',
'about',
'and',
'crept',
'a',
'little',
'way',
'out',
'of',
'the',
'wood',
'to',
'listen.\nThe',
'Fish-Footman',
'began',
'by',
'producing',
'from',
'under',
'his',
'arm',
'a',
'great',
'letter',
'nearly',
'as',
'large',
'as',
'himself',
'and',
'this',
'he',
'handed',
'over',
'to',
'the',
'other',
'saying',
'in',
'a',
'solemn',
'tone',
'For',
'the',
'Duchess.',

'An',
'invitation',
'from',
'the',
'Queen',
'to',
'play',
'croquet.',
'The',
'Frog-Footman',
'repeated,',
'in',
'the',
'same',
'solemn',
'tone,',
'only',
'changing',
'the',
'order',
'of',
'the',
'words',
'a',
'little,',
'From',
'the',
'Queen.',
'An',
'invitation',
'for',
'the',
'Duchess',
'to',
'play',
'croquet.\nThen',
'they',
'both',
'bowed',
'low,',
'and',
'their',
'curls',
'got',
'entangled',
'together.\nAlice',
'laughed',
'so',

'much',
'at',
'this',
'that',
'she',
'had',
'to',
'run',
'back',
'into',
'the',
'wood',
'for',
'fear',
'of',
'their',
'hearing',
'her;',
'and',
'when',
'she',
'next',
'peeped',
'out',
'the',
'Fish-Footman',
'was',
'gone',
'and',
'the',
'other',
'was',
'sitting',
'on',
'the',
'ground',
'near',
'the',
'door',
'staring',
'stupidly',
'up',
'into',
'the',
'sky.\nAlice',
'went',
'timidly',
'up',

'to',
'the',
'door',
'and',
'knocked.\nTheres',
'no',
'sort',
'of',
'use',
'in',
'knocking',
'said',
'the',
'Footman',
'and',
'that',
'for',
'two',
'reasons.',
'First',
'because',
'Im',
'on',
'the',
'same',
'side',
'of',
'the',
'door',
'as',
'you',
'are;',
'secondly',
'because',
'theyre',
'making',
'such',
'a',
'noise',
'inside',
'no',
'one',
'could',
'possibly',
'hear',
'you.',
'And',
'certainly',

'there',
'was',
'a',
'most',
'extraordinary',
'noise',
'going',
'on',
'withina',
'constant',
'howling',
'and',
'sneezing,',
'and',
'every',
'now',
'and',
'then',
'a',
'great',
'crash,',
'as',
'if',
'a',
'dish',
'or',
'kettle',
'had',
'been',
'broken',
'to',
'pieces.\nPlease,',
'then,',
'said',
'Alice,',
'how',
'am',
'I',
'to',
'get',
'in?\nThere',
'might',
'be',
'some',
'sense',
'in',
'your',
'knocking,',

'the',
'Footman',
'went',
'on',
'without',
'attending',
'to',
'her',
'if',
'we',
'had',
'the',
'door',
'between',
'us.',
'For',
'instance',
'if',
'you',
'were',
'inside',
'you',
'might',
'knock',
'and',
'I',
'could',
'let',
'you',
'out',
'you',
'know.',
'He',
'was',
'looking',
'up',
'into',
'the',
'sky',
'all',
'the',
'time',
'he',
'was',
'speaking',
'and',
'this',
'Alice',

'thought',
'decidedly',
'uncivil.',
'But',
'perhaps',
'he',
'cant',
'help',
'it,',
'she',
'said',
'to',
'herself;',
'his',
'eyes',
'are',
'so',
'very',
'nearly',
'at',
'the',
'top',
'of',
'his',
'head.',
'But',
'at',
'any',
'rate',
'he',
'might',
'answer',
'questions.How',
'am',
'I',
'to',
'get',
'in?',
'she',
'repeated,',
'aloud.\nI',
'shall',
'sit',
'here,',
'the',
'Footman',
'remarked,',
'till',

```

'tomorrow\nAt',
'this',
'moment',
'the',
'door',
'of',
'the',
'house',
'opened,',
'and',
'a',
'large',
'plate',
'came',
'skimming',
'out,',
'straight',
'at',
'the',
'Footmans',
'head:',
'it',
'just',
'grazed',
'his',
'nose,',
'and',
'broke',
'to',
'pieces',
'against',
'one',
'of',
'the',
'trees',
'behind',
'him.']

```

```

In [9]: def counts(my_list):
        counts = dict()
        for item in my_list:
            counts[item]=counts.get(item,0)+1

        return counts

counts(['\nFor',
'a',
'minute',

```

'or',
'two',
'she',
'stood',
'looking',
'at',
'the',
'house,',
'and',
'wondering',
'what',
'to',
'do',
'next,',
'when',
'suddenly',
'a',
'footman',
'in',
'livery',
'came',
'running',
'out',
'of',
'the',
'wood(she',
'considered',
'him',
'to',
'be',
'a',
'footman',
'because',
'he',
'was',
'in',
'livery:',
'otherwise,',
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'face',
'only,',
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'fish)and',
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'loudly',
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'knuckles.',
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'footman',
'in',
'livery,',
'with',
'a',
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'and',
'large',
'eyes',
'like',
'a',
'frog;',
'and',
'both',
'footmen,',
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'had',
'powdered',
'hair',
'that',
'curled',
'all',
'over',
'their',
'heads.',
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'to',
'know',

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'was',
'all',
'about,',
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'out',
'of',
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'wood',
'to',
'listen.\nThe',
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'from',
'under',
'his',
'arm',
'a',
'great',
'letter,',
'nearly',
'as',
'large',
'as',
'himself,',
'and',
'this',
'he',
'handed',
'over',
'to',
'the',
'other,',
'saying,',
'in',
'a',
'solemn',
'tone,',
'For',
'the',
'Duchess.',

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'croquet.',
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'Frog-Footman',
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'same',
'solemn',
'tone,',
'only',
'changing',
'the',
'order',
'of',
'the',
'words',
'a',
'little,',
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'the',
'Queen.',
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'invitation',
'for',
'the',
'Duchess',
'to',
'play',
'croquet.\nThen',
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'both',
'bowed',
'low,',
'and',
'their',
'curls',
'got',
'entangled',
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'laughed',
'so',

'much',
'at',
'this,',
'that',
'she',
'had',
'to',
'run',
'back',
'into',
'the',
'wood',
'for',
'fear',
'of',
'their',
'hearing',
'her;',
'and',
'when',
'she',
'next',
'peeped',
'out',
'the',
'Fish-Footman',
'was',
'gone,',
'and',
'the',
'other',
'was',
'sitting',
'on',
'the',
'ground',
'near',
'the',
'door,',
'staring',
'stupidly',
'up',
'into',
'the',
'sky.\nAlice',
'went',
'timidly',
'up',

'to',
'the',
'door,',
'and',
'knocked.\nTheres',
'no',
'sort',
'of',
'use',
'in',
'knocking,',
'said',
'the',
'Footman,',
'and',
'that',
'for',
'two',
'reasons.',
'First,',
'because',
'Im',
'on',
'the',
'same',
'side',
'of',
'the',
'door',
'as',
'you',
'are;',
'secondly,',
'because',
'theyre',
'making',
'such',
'a',
'noise',
'inside,',
'no',
'one',
'could',
'possibly',
'hear',
'you.',
'And',
'certainly',

'there',
'was',
'a',
'most',
'extraordinary',
'noise',
'going',
'on',
'withina',
'constant',
'howling',
'and',
'sneezing,',
'and',
'every',
'now',
'and',
'then',
'a',
'great',
'crash,',
'as',
'if',
'a',
'dish',
'or',
'kettle',
'had',
'been',
'broken',
'to',
'pieces.\nPlease,',
'then,',
'said',
'Alice,',
'how',
'am',
'I',
'to',
'get',
'in?\nThere',
'might',
'be',
'some',
'sense',
'in',
'your',
'knocking,',

'the',
'Footman',
'went',
'on',
'without',
'attending',
'to',
'her,',
'if',
'we',
'had',
'the',
'door',
'between',
'us.',
'For',
'instance,',
'if',
'you',
'were',
'inside,',
'you',
'might',
'knock,',
'and',
'I',
'could',
'let',
'you',
'out,',
'you',
'know.',
'He',
'was',
'looking',
'up',
'into',
'the',
'sky',
'all',
'the',
'time',
'he',
'was',
'speaking,',
'and',
'this',
'Alice',

'thought',
'decidedly',
'uncivil.',
'But',
'perhaps',
'he',
'cant',
'help',
'it,',
'she',
'said',
'to',
'herself;',
'his',
'eyes',
'are',
'so',
'very',
'nearly',
'at',
'the',
'top',
'of',
'his',
'head.',
'But',
'at',
'any',
'rate',
'he',
'might',
'answer',
'questions.How',
'am',
'I',
'to',
'get',
'in?',
'she',
'repeated,',
'aloud.\nI',
'shall',
'sit',
'here,',
'the',
'Footman',
'remarked,',
'till',

```

'tomorrow\nAt',
'this',
'moment',
'the',
'door',
'of',
'the',
'house',
'opened,',
'and',
'a',
'large',
'plate',
'came',
'skimming',
'out,',
'straight',
'at',
'the',
'Footmans',
'head:',
'it',
'just',
'grazed',
'his',
'nose,',
'and',
'broke',
'to',
'pieces',
'against',
'one',
'of',
'the',
'trees',
'behind',
'him.'])

```

```

Out[9]: {'\nFor': 1,
'a': 15,
'minute': 1,
'or': 2,
'two': 2,
'she': 6,
'stood': 1,
'looking': 2,
'at': 6,
'the': 32,

```

'house,': 1,
'and': 16,
'wondering': 1,
'what': 2,
'to': 15,
'do': 1,
'next,': 1,
'when': 2,
'suddenly': 1,
'footman': 3,
'in': 7,
'livery': 1,
'came': 2,
'running': 1,
'out': 3,
'of': 9,
'wood(she': 1,
'considered': 1,
'him': 2,
'be': 2,
'because': 3,
'he': 5,
'was': 8,
'livery.': 1,
'otherwise,': 1,
'judging': 1,
'by': 3,
'his': 5,
'face': 1,
'only,': 1,
'would': 1,
'have': 1,
'called': 1,
'fish)and': 1,
'rapped': 1,
'loudly': 1,
'door': 4,
'with': 2,
'knuckles.': 1,
'It': 1,
'opened': 1,
'another': 1,
'livery,': 1,
'round': 1,
'face,': 1,
'large': 3,
'eyes': 2,
'like': 1,

'frog;': 1,
'both': 2,
'footmen,': 1,
'Alice': 2,
'noticed,': 1,
'had': 4,
'powdered': 1,
'hair': 1,
'that': 3,
'curled': 1,
'all': 3,
'over': 2,
'their': 3,
'heads.': 1,
'She': 1,
'felt': 1,
'very': 2,
'curious': 1,
'know': 1,
'it': 2,
'about,': 1,
'crept': 1,
'little': 1,
'way': 1,
'wood': 2,
'listen.\nThe': 1,
'Fish-Footman': 2,
'began': 1,
'producing': 1,
'from': 2,
'under': 1,
'arm': 1,
'great': 2,
'letter,': 1,
'nearly': 2,
'as': 4,
'himself,': 1,
'this': 3,
'handed': 1,
'other,': 1,
'saying,': 1,
'solemn': 2,
'tone,': 2,
'For': 1,
'Duchess.': 1,
'An': 2,
'invitation': 2,
'Queen': 1,

'play': 2,
'croquet.': 1,
'The': 1,
'Frog-Footman': 1,
'repeated,': 2,
'same': 2,
'only': 1,
'changing': 1,
'order': 1,
'words': 1,
'little,': 1,
'From': 1,
'Queen.': 1,
'for': 3,
'Duchess': 1,
'croquet.\nThen': 1,
'they': 1,
'bowed': 1,
'low,': 1,
'curls': 1,
'got': 1,
'entangled': 1,
'together.\nAlice': 1,
'laughed': 1,
'so': 2,
'much': 1,
'this,': 1,
'run': 1,
'back': 1,
'into': 3,
'fear': 1,
'hearing': 1,
'her;': 1,
'next': 1,
'peeped': 1,
'gone,': 1,
'other': 1,
'sitting': 1,
'on': 4,
'ground': 1,
'near': 1,
'door,': 2,
'staring': 1,
'stupidly': 1,
'up': 3,
'sky.\nAlice': 1,
'went': 2,
'timidly': 1,

'knocked.\nTheres': 1,
'no': 2,
'sort': 1,
'use': 1,
'knocking,': 2,
'said': 3,
'Footman,': 1,
'and': 1,
'reasons.': 1,
'First,': 1,
'Im': 1,
'side': 1,
'you': 5,
'are;': 1,
'secondly,': 1,
'theyre': 1,
'making': 1,
'such': 1,
'noise': 2,
'inside,': 2,
'one': 2,
'could': 2,
'possibly': 1,
'hear': 1,
'you.': 1,
'And': 1,
'certainly': 1,
'there': 1,
'most': 1,
'extraordinary': 1,
'going': 1,
'withina': 1,
'constant': 1,
'howling': 1,
'sneezing,': 1,
'every': 1,
'now': 1,
'then': 1,
'crash,': 1,
'if': 2,
'dish': 1,
'kettle': 1,
'been': 1,
'broken': 1,
'pieces.\nPlease,': 1,
'then,': 1,
'Alice,': 1,
'how': 1,

'am': 2,
'I': 3,
'get': 2,
'in?\nThere': 1,
'might': 3,
'some': 1,
'sense': 1,
'your': 1,
'Footman': 2,
'without': 1,
'attending': 1,
'her,': 1,
'if': 1,
'we': 1,
'between': 1,
'us.': 1,
'For': 1,
'instance,': 1,
'were': 1,
'knock,': 1,
'let': 1,
'out,': 2,
'know.': 1,
'He': 1,
'sky': 1,
'time': 1,
'speaking,': 1,
'thought': 1,
'decidedly': 1,
'uncivil.': 1,
'But': 1,
'perhaps': 1,
'cant': 1,
'help': 1,
'it,': 1,
'herself;': 1,
'his': 1,
'are': 1,
'top': 1,
'head.': 1,
'But': 1,
'any': 1,
'rate': 1,
'answer': 1,
'questions.How': 1,
'in?': 1,
'aloud.\nI': 1,
'shall': 1,

```

'sit': 1,
'here,': 1,
'remarked,': 1,
'till': 1,
'tomorrow\nAt': 1,
'moment': 1,
'house': 1,
'opened,': 1,
'plate': 1,
'skimming': 1,
'straight': 1,
'Footmans': 1,
'head:': 1,
'just': 1,
'grazed': 1,
'nose,': 1,
'broke': 1,
'pieces': 1,
'against': 1,
'trees': 1,
'behind': 1,
'him.': 1}

```

1.4 4. Read in a file and write each line from the file to a new file Title-ized

This is the first line -> This Is The First Line

Hint: There's a function to do this

```

In [10]: path = 'mlnn/4.Week3.txt'
         Week3_file = open(path, 'r')
         week = Week3_file.read()

         new_path = '/users/sammy/new_days.txt'
         new_week = open(new_path, 'w')

         title = '4.Week3.2\n'
         new_week.write(title)
         print(title)

         new_week.write(week)
         print(week)

         Week3_file.close()
         new_week.close()

```

FileNotFoundError

Traceback (most recent call last)

```
<ipython-input-10-a378a71d8306> in <module>()
    1 path = 'mlnn/4.Week3.txt'
----> 2 Week3_file = open(path,'r')
    3 week = Week3_file.read()
    4
    5
```

FileNotFoundError: [Errno 2] No such file or directory: 'mlnn/4.Week3.txt'

In []: *#The reading in of the file was not working. I tried using Stack overflow and the guid*

2 Numpy

2.1 1. Given a list, find the average using a numpy function.

```
In [ ]: simple_list = [1,2,1,4,3,2,5,9]
        np.average(simple_list)
```

2.2 2. Given two lists of Heights and Weights of individual, calculate the BMI of those individuals, without writing a for-loop

```
In [ ]: heights = [174, 173, 173, 175, 171]
        weights = [88, 83, 92, 74, 77]

        np_height = np.array(heights)
        np_weight = np.array(weights)

        # Calculate bmi
        bmi = np_weight / np_height ** 2
        np_bmi = np.array(bmi)

        print(bmi)
```

```
In [ ]: np_bmi[np.array([0,2,4])]
```

2.3 3. Create an array of length 20 filled with random values (between 0 to 1)

```
In [ ]: np.random.random((4, 5))
```

- 2.4 **Bonus. 1. Create an array with a large (>1000) length filled with random numbers from different distributions (normal, uniform, etc.). 2. Then, plot a histogram of these values.**

3 Pandas

- 3.1 **1. Read in a CSV () and display all the columns and their respective data types**

```
In [ ]: df = pd.read_csv('hw_data.csv')
        print(df.head(5))
        print(df.tail(5))
```

- 3.2 **2. Find the average weight**

```
In [ ]: df["weight"].mean()
```

- 3.3 **3. Find the Value Counts on column sex**

```
In [ ]: values = df['sex'].value_counts().keys().tolist()
        counts = df['sex'].value_counts().tolist()

        print(df['sex'].value_counts())
```

- 3.4 **4. Plot Height vs. Weight**

```
In [ ]: fig, ax = plt.subplots()
        df.groupby('sex').plot(x='weight', y='height', ax=ax, legend=False)
```

- 3.5 **5. Calculate BMI and save as a new column**

```
In [ ]: df.loc[:,BMI] = np_bmi
```

```
In [ ]: df
```

```
In [ ]: #I am not sure what I am missing I tried to use the numpy calculation as shown possible
```

- 3.6 **6. Save sheet as a new CSV file hw_dataB.csv**

```
In [ ]: df.to_csv('hw_dataB.csv')
```

- 3.7 **Run the following**

```
In [ ]: !cat hw_dataB.csv
```

```
In [ ]: ##was not able to run but it did save as a new file to my machine in the desired location
```