SOFTWARE ENGINEERING FOR DATA SCIENTISTS IN PYTHON

Python, data science, & software engineering

Adam Spannbauer
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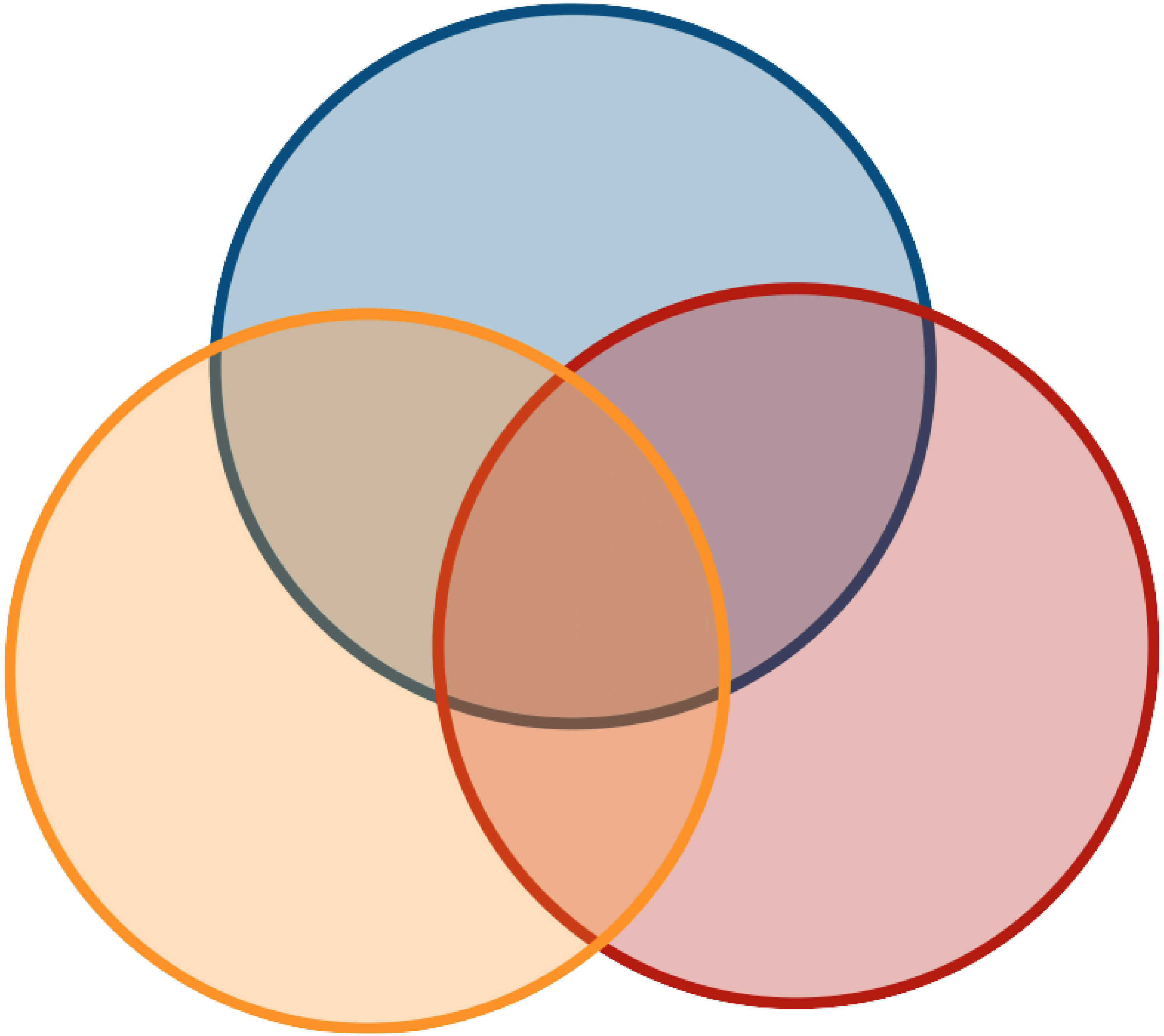
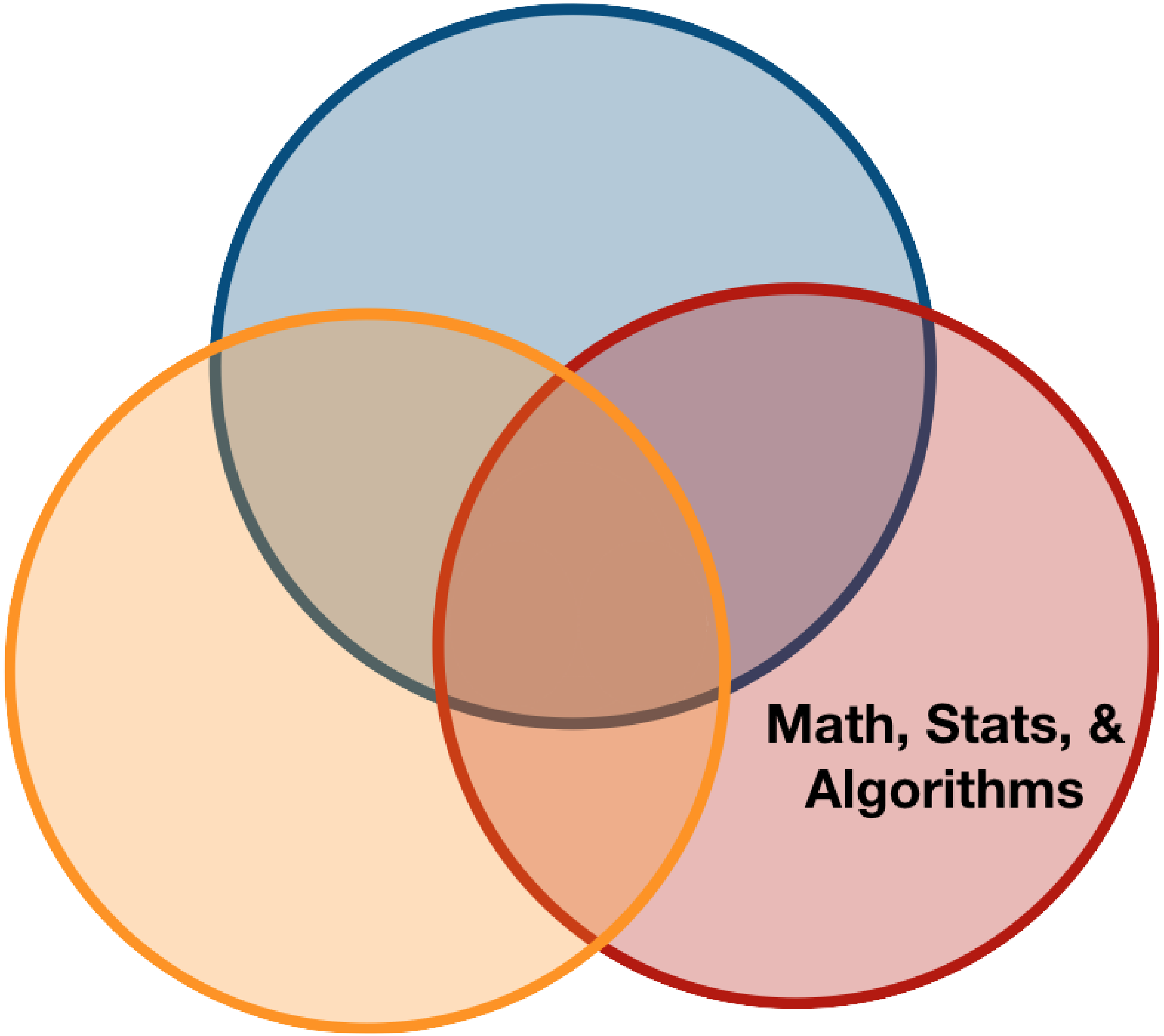
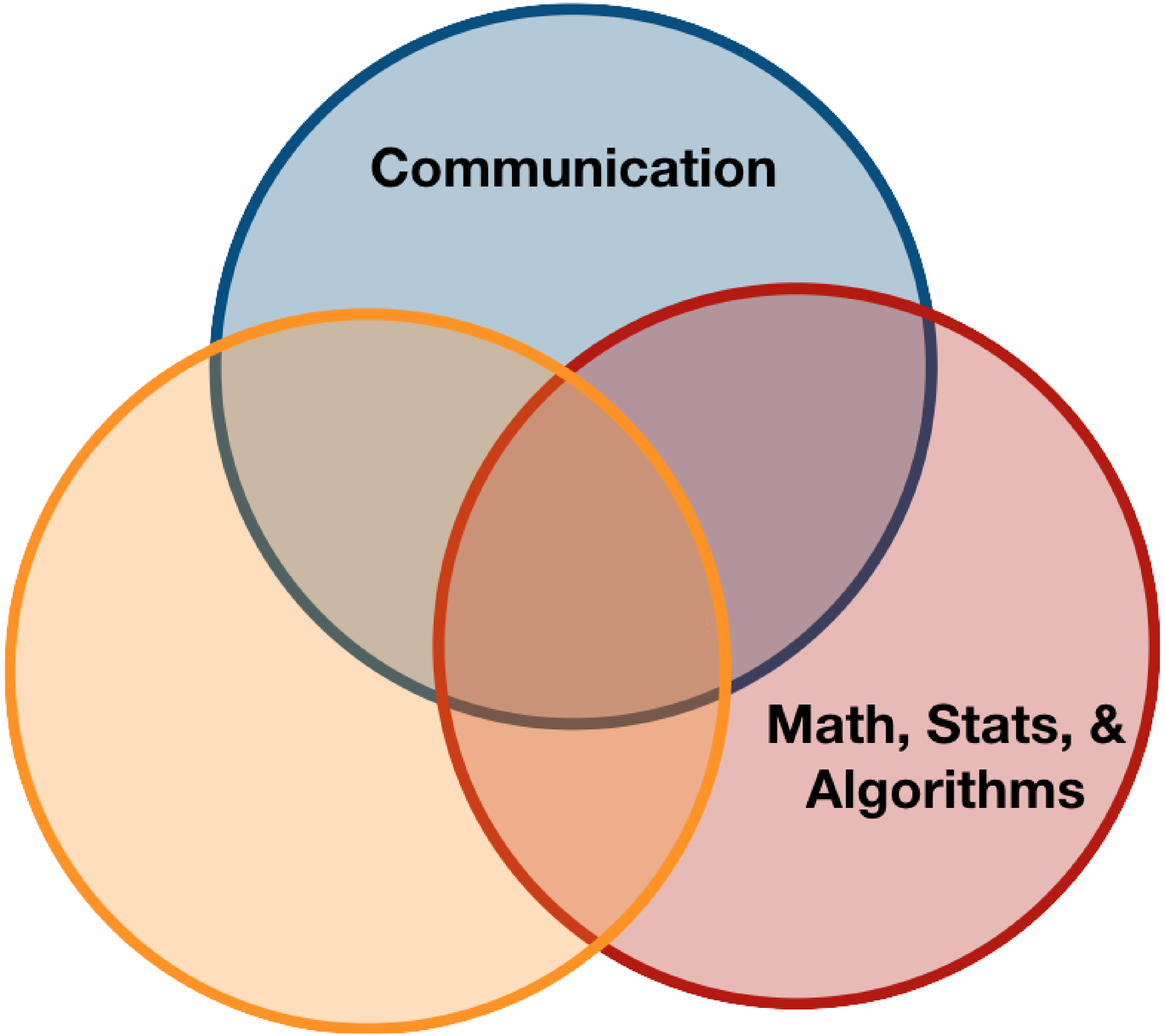
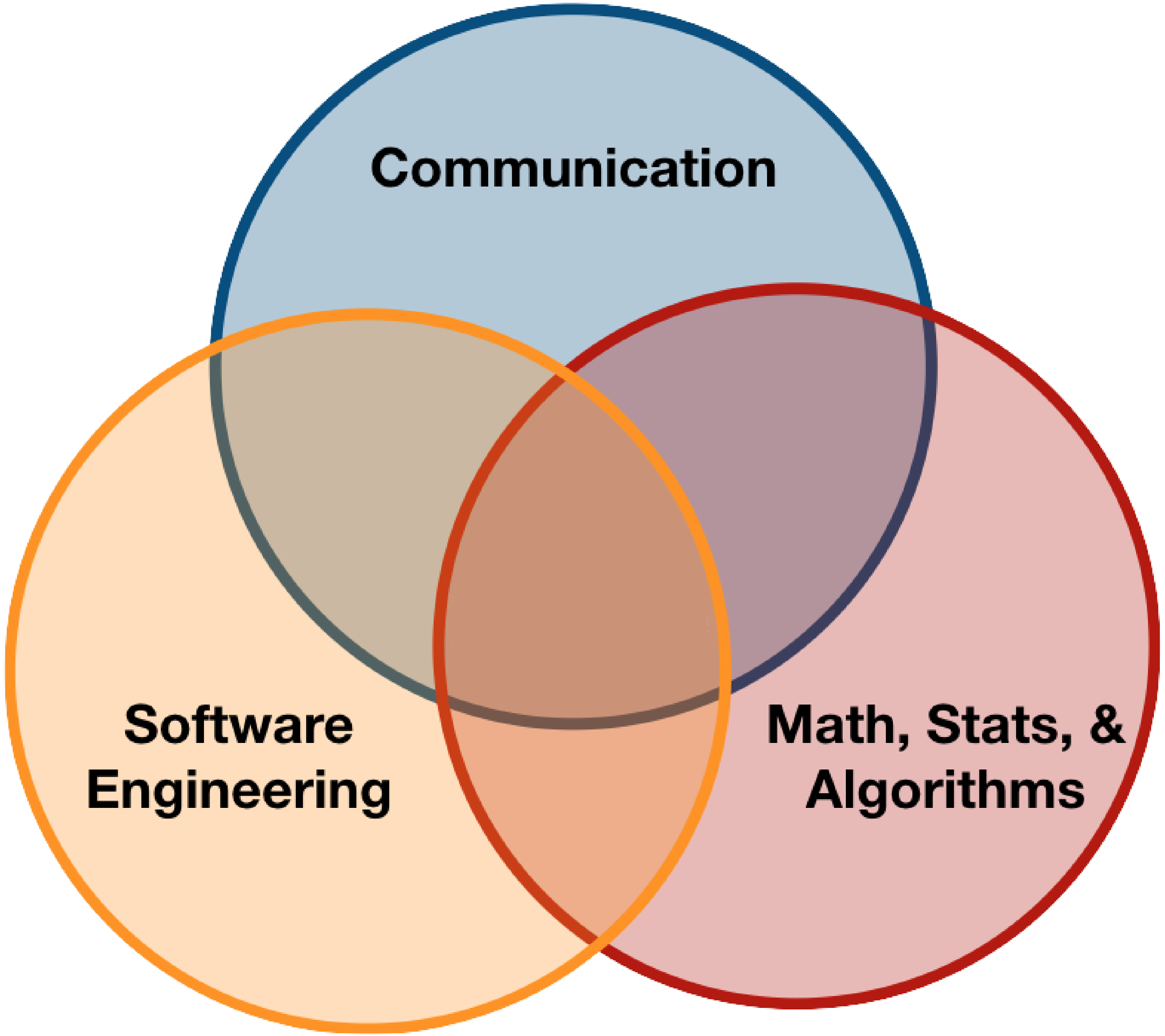



Math, Stats, &
Algorithms


Communication
Math, Stats, &
Algorithms


Communication
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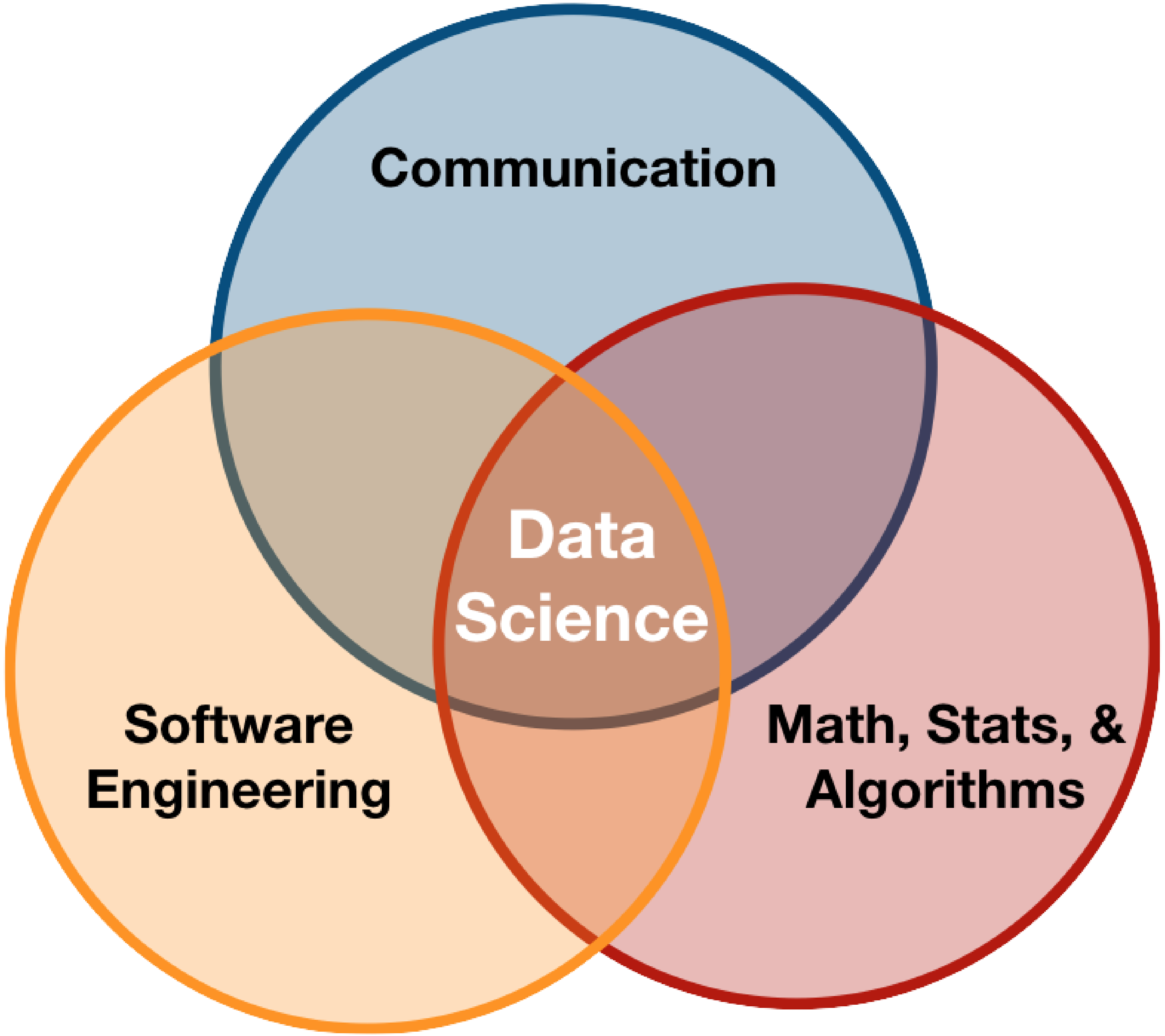
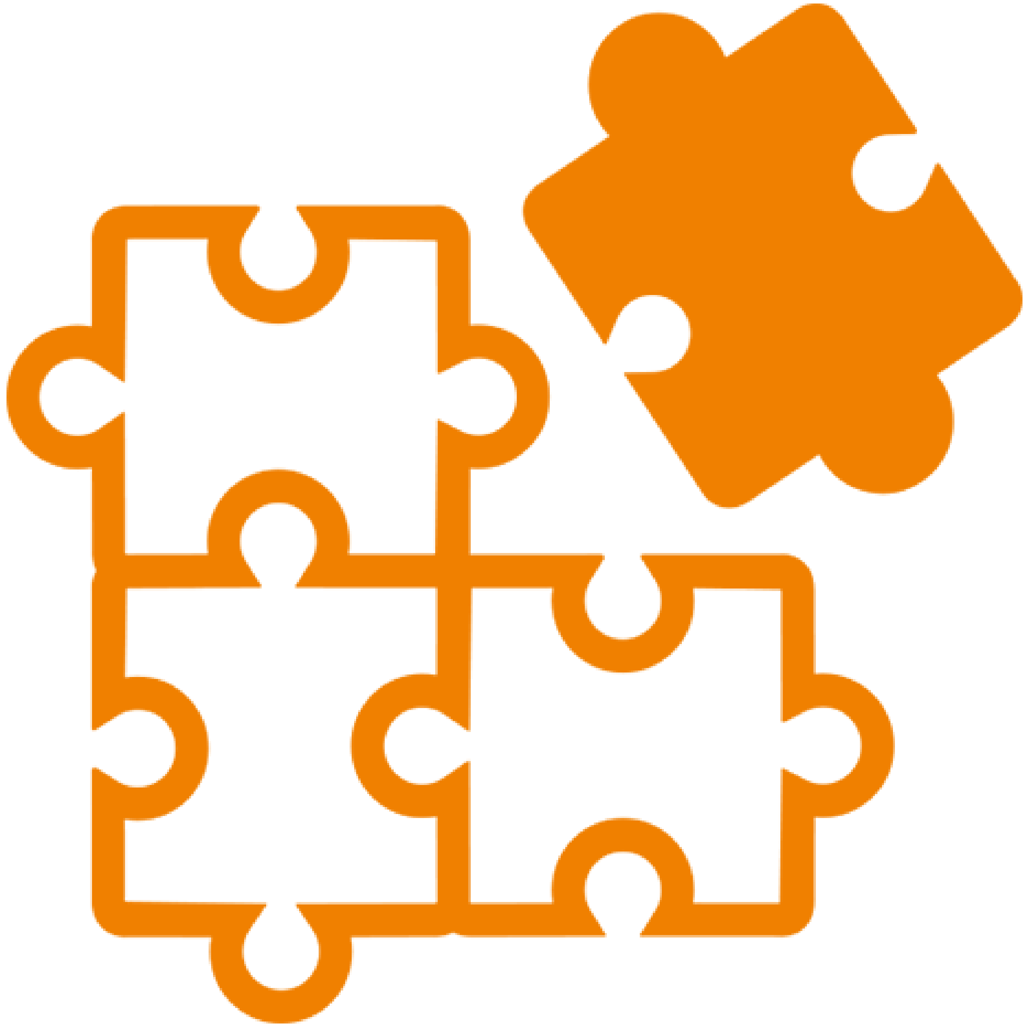

Communication
Data Science
Software Engineering
Math, Stats, & Algorithms

Software engineering concepts

- Modularity
- Documentation
- Testing
- Version Control & Git

Benefits of modularity

- Improve readability
- Improve maintainability
- Solve problems only once

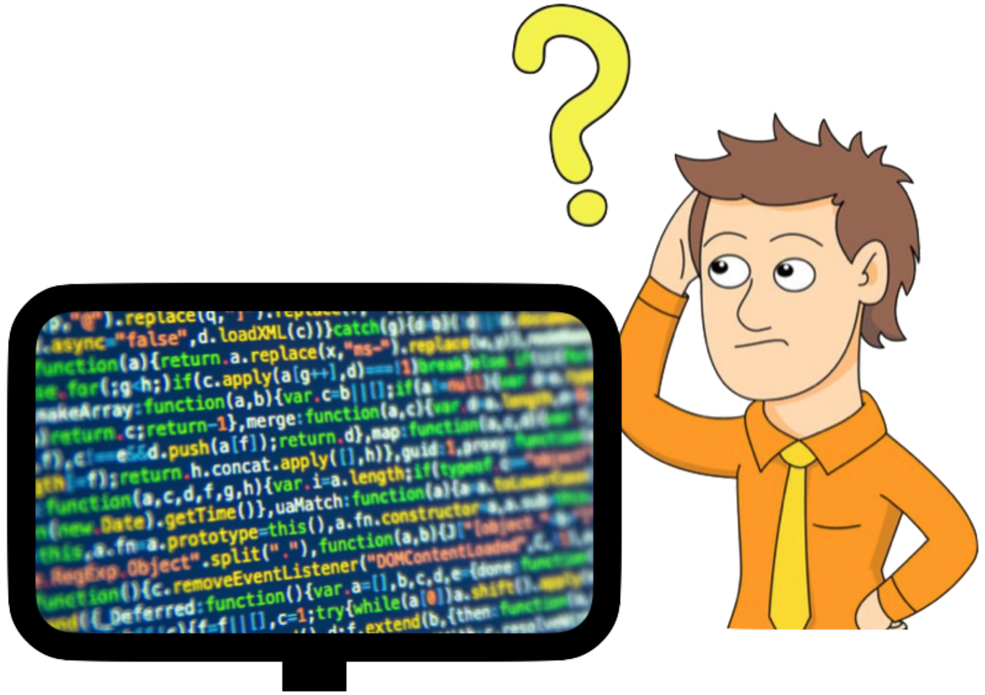


Modularity in python

```
# Import the pandas PACKAGE
import pandas as pd

# Create some example data
data = {'x': [1, 2, 3, 4],
        'y': [20.1, 62.5, 34.8, 42.7]}

# Create a dataframe CLASS object
df = pd.DataFrame(data)

# Use the plot METHOD
df.plot('x', 'y')
```

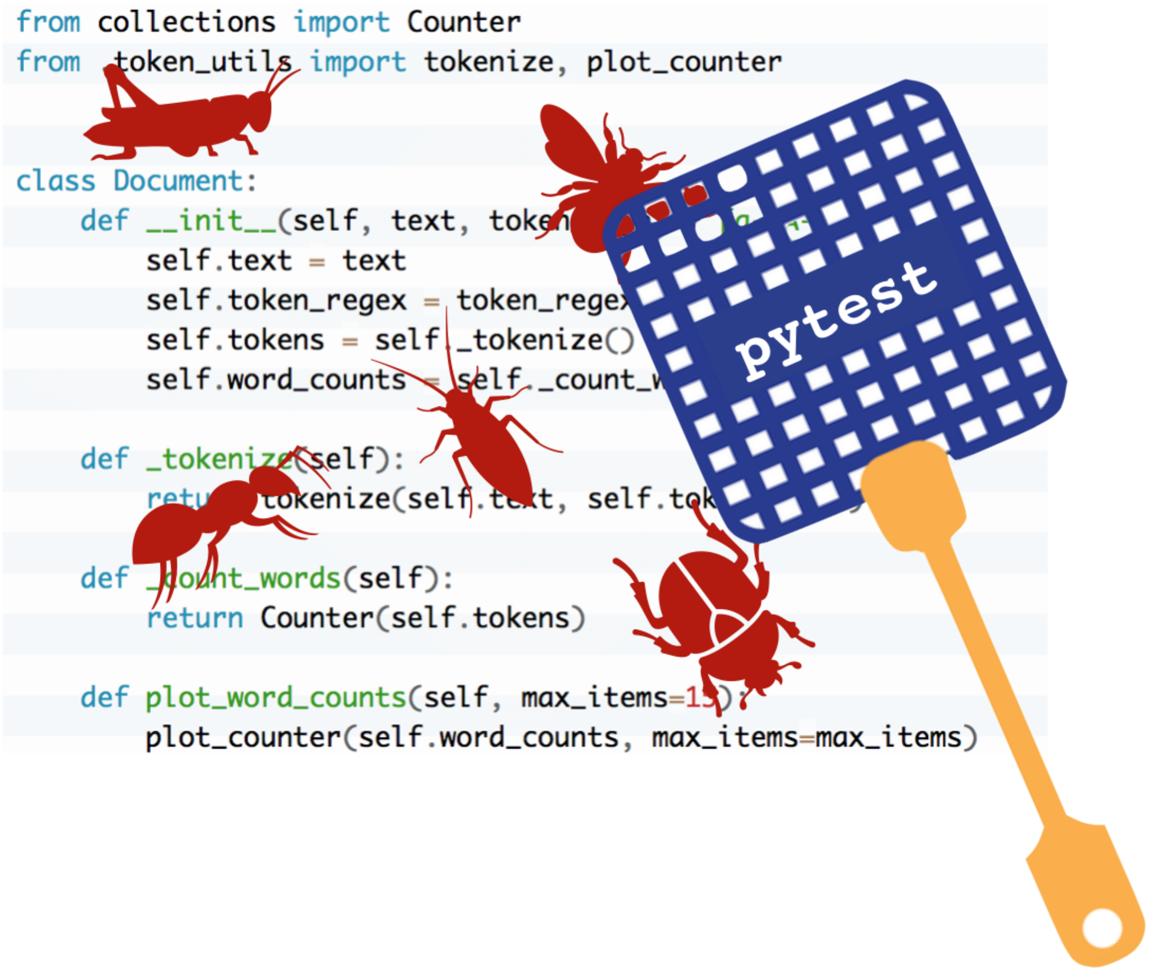
Benefits of documentation

- Show users how to use your project
- Prevent confusion from your collaborators
- Prevent frustration from future you



Benefits of automated testing

- Save time over manual testing
- Find & fix more bugs
- Run tests anytime/anywhere



```
from collections import Counter
from  token_utils import tokenize, plot_counter


class Document:
    def __init__(self, text, token
        self.text = text
        self.token_regex = token_regex
        self.tokens = self._tokenize()
        self.word_counts = self._count_w

    def _tokenize(self):
        return tokenize(self.text, self.tok

    def _count_words(self):
        return Counter(self.tokens)

    def plot_word_counts(self, max_items=15):
        plot_counter(self.word_counts, max_items=max_items)
```

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Let's Review

SOFTWARE ENGINEERING FOR DATA SCIENTISTS IN PYTHON

Introduction to Packages & Documentation

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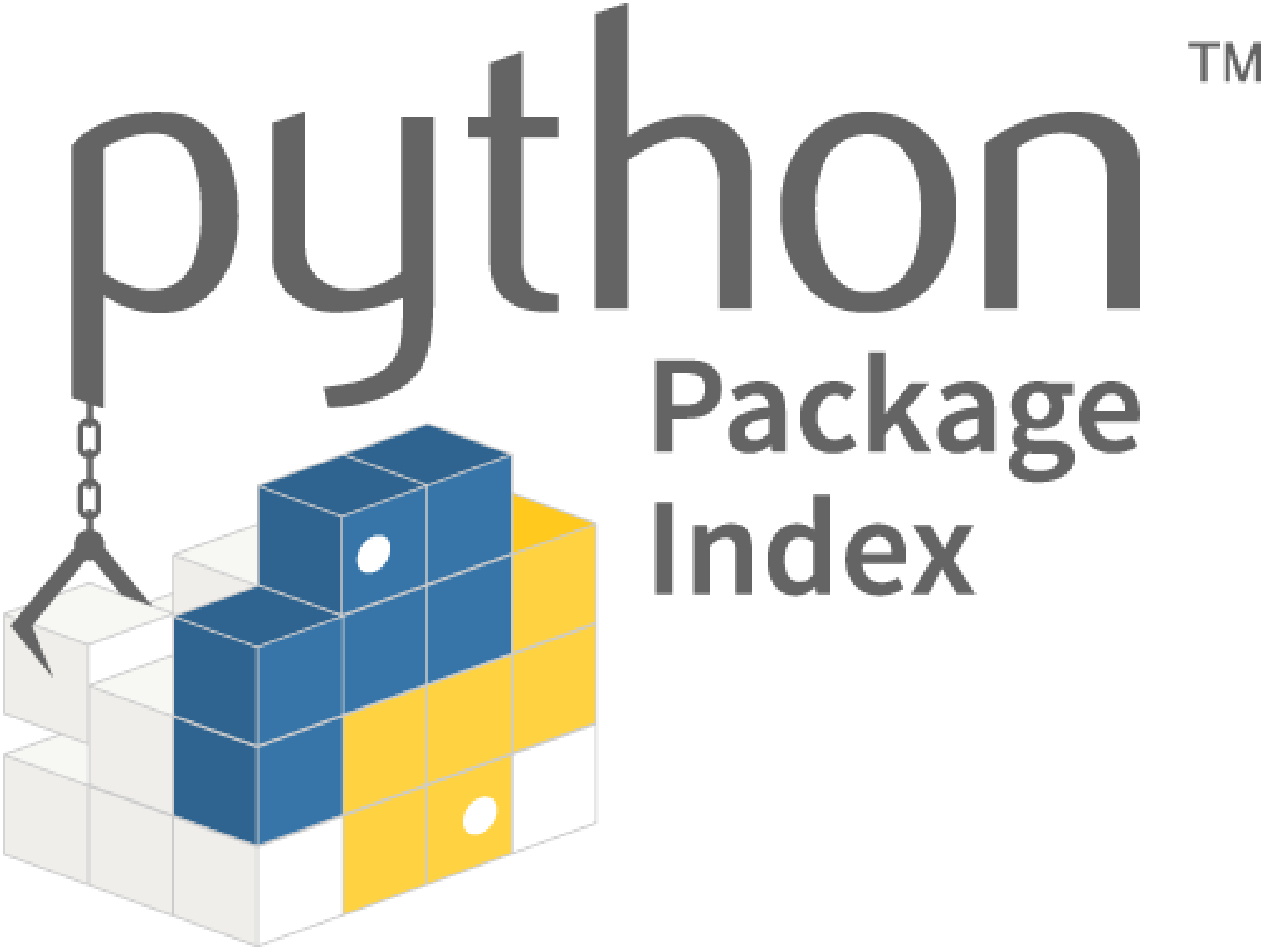
Packages and PyPi



```
$ pip install 📦
```

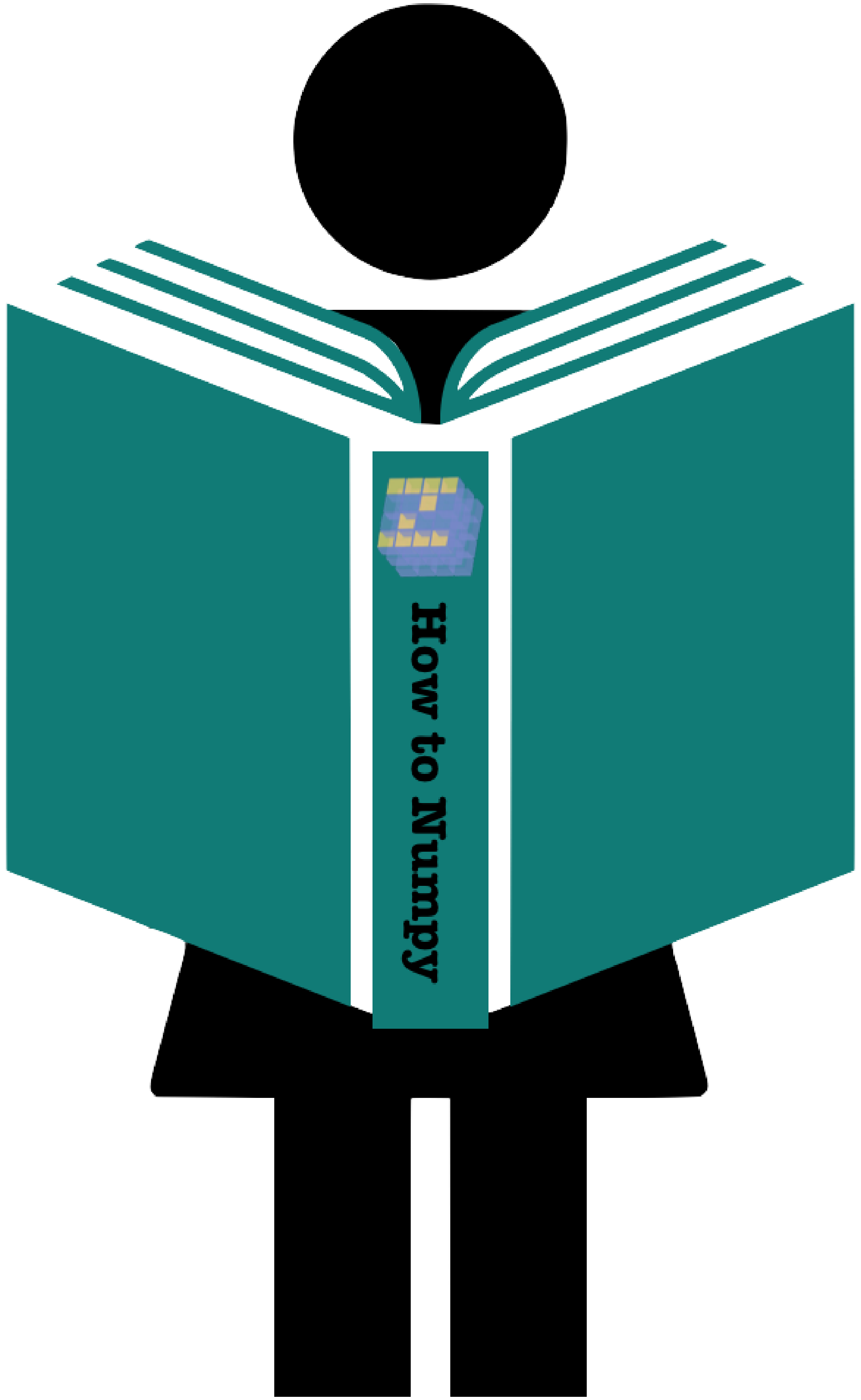
python ™
Package
Index

```
$ pip install 📦
```

Using pip to install numpy

```
datacamp@server:~$ pip install numpy

Collecting numpy
    100% |████████████████████████████████| 24.5MB 44kB/s
Installing collected packages: numpy
Successfully installed numpy-1.15.4
```


How to Numpy

Reading documentation with help()

```
help(numpy.busday_count)
```

```
busday_count(begindates, enddates)
    Counts the number of valid days between `begindates` and
    `enddates`, not including the day of `enddates`.

    Parameters
    ----------
    begindates : the first dates for counting.
    enddates : the end dates for counting (excluded from the count)

    Returns
    -------
    out : the number of valid days between the begin and end dates.

    Examples
    --------
    >>> # Number of weekdays in 2011
    ...  np.busday_count('2011', '2012')
    260
```

Reading documentation with help()

```
import numpy as np
help(np)
```

```
    Provides
      1. An array object of arbitrary homogeneous items
      2. Fast mathematical operations over arrays
      3. Linear Algebra, Fourier Transforms, Random Number Generation
```

```
help(42)
```

```
class int(object)
 |  int(x=0) -> integer
 |  int(x, base=10) -> integer
 |
 |  Convert a number or string to an integer, or return 0 if no arguments
 |  are given.  If x is a number, return x.__int__().  For floating point
 |  numbers, this truncates towards zero.
```

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Let's Practice

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Conventions and PEP 8

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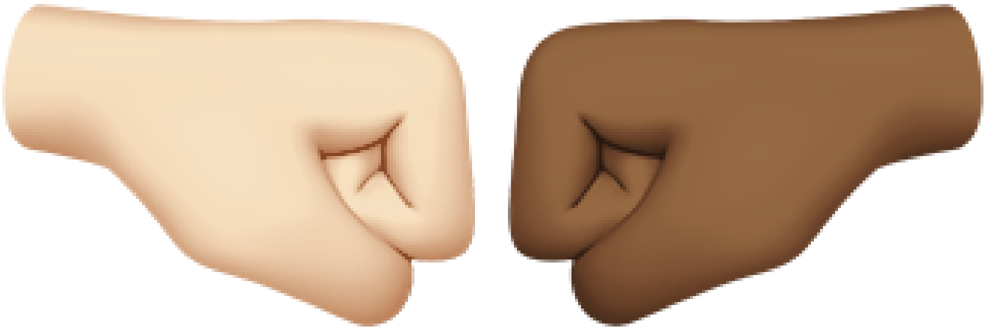
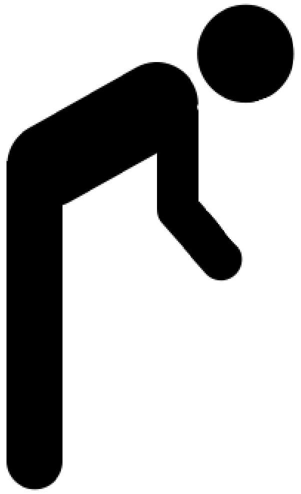
What are conventions?





Introducing PEP 8

"Code is read much more often than it is written"

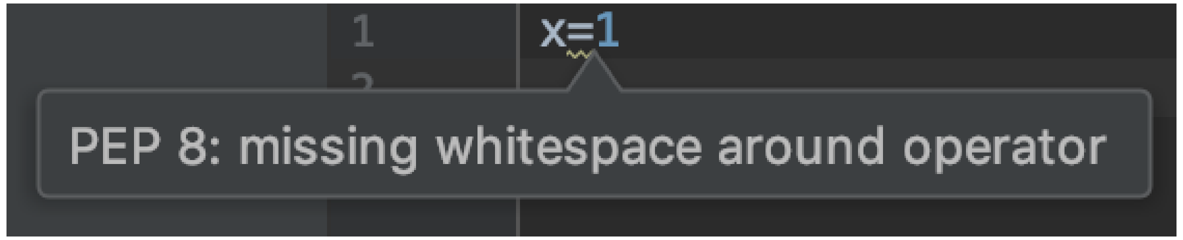
Violating PEP 8

```
#define our data
my_dict ={
    'a'  : 10,
'b': 3,
    'c'  :   4,
             'd': 7}
#import needed package
import numpy as np
#helper function
def DictToArray(d):
    """Convert dictionary values to numpy array"""
    #extract values and convert
              x=np.array(d.values())
              return x
print(DictToArray(my_dict))

array([10,  4,  3,  7])
```

Following PEP 8

```
# Import needed package
import numpy as np

# Define our data
my_dict = {'a': 10, 'b': 3, 'c': 4, 'd': 7}


# Helper function
def dict_to_array(d):
    """Convert dictionary values to numpy array"""
    # Extract values and convert
    x = np.array(d.values())
    return x


print(dict_to_array(my_dict))

array([10,  4,  3,  7])
```

PEP 8 Tools



```
x=1
```

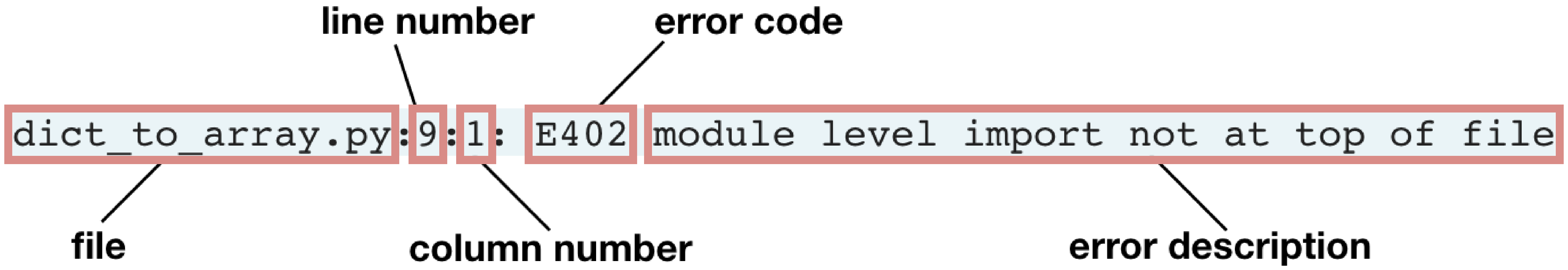
PEP 8: missing whitespace around operator

Using pycodestyle

```
datacamp@server:~$ pip install pycodestyle
datacamp@server:~$ pycodestyle dict_to_array.py
```

```
dict_to_array.py:5:9: E203 whitespace before ':'
dict_to_array.py:6:14: E131 continuation line unaligned for hanging indent
dict_to_array.py:8:1: E265 block comment should start with '# '
dict_to_array.py:9:1: E402 module level import not at top of file
dict_to_array.py:11:1: E302 expected 2 blank lines, found 0
dict_to_array.py:13:15: E111 indentation is not a multiple of four
```

Output from pycodestyle



line number

error code

```
dict_to_array.py:9:1: E402 module level import not at top of file
```

file

column number

error description

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Let's Practice