CS106A

Juliette Woodrow

Housekeeping

- Graphics contest is due Saturday at 11:59pm Anywhere on Earth

A little bit about me...

Let’s Jump Right In

Guiding Questions

1. How can we write better loops?

2. What tools do we have for developing and analyzing data?

3. Are there any trends in UFO data?

List Comprehensions

Problem: getting a list of squares

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- How would you produce this output list?

Problem: getting a list of squares - Attempt #1

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```
# [4, 6, 7, 8] → [16, 36, 49, 64]

def get_squared(num_lst):
    squares = []
    for num in num_lst:
        squares.append(num**2)
    return squares
```

Problem: getting a list of squares - Attempt #1

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def get_squared(num_lst):
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    for num in num_lst:
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    return squares
```

```
num_lst = [4,6,7,8]

squared_lst = get_squared(num_lst)

print(squared_lst)

# would print [16, 36, 49, 64]
```

Problem: getting a list of squares - Attempt #2

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num_lst = [4, 6, 7, 8]

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this is a list comprehension!

List Comprehensions

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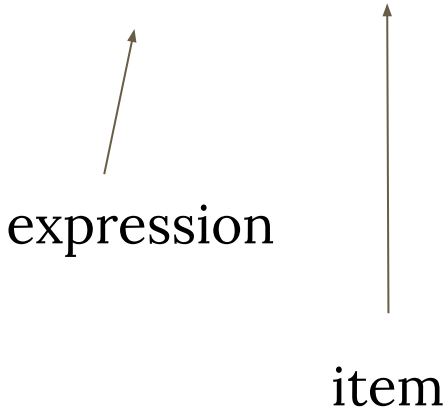

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List Comprehensions

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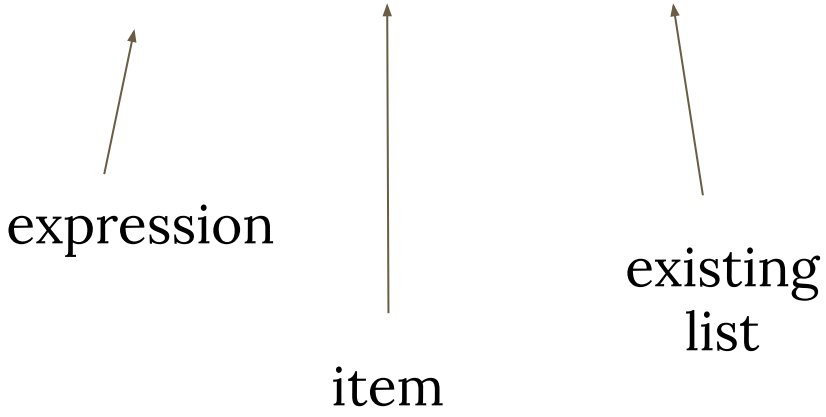

- **Definition:** one way to make a new list based on the values of an existing list

- **Three Key Parts:**
  - Expression
  - Item From Existing List
  - Existing List

Hey, we already know some of that syntax!

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- **[ ] -- that makes it a list**
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  [“Hi”, “mOm”, “aNd”, “DAD”] → [“hi”, “mom”, “and”, “dad”]

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- How can we use a list comprehension to do this?

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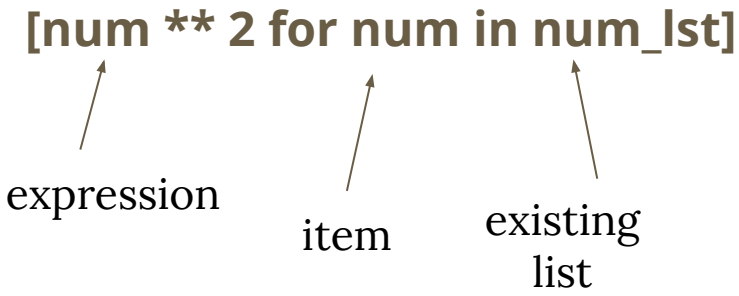

- **Definition:** one way to make a new list based on the values of an existing list

Problem: getting a list of lowercase strings

random_case = [“Hi”, “mOm”, “aNd”, “DAD”]

Problem: getting a list of lowercase strings

random_case = [“Hi”, “mOm”, “aNd”, “DAD”]

all_lower = [s.lower() for s in random_case]

print(all_lower)

would print [“hi”, “mom”, “and”, “dad”]

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  [“I”, “love”, “CS106A”] → [(“I”, 1), (“love”, 4), (“CS106A”, 6)]

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- Say you have a list of strings. Create a list of tuples where the first elem is the string and the second elem is the length of the string

  [“I”, “love”, “CS106A”] → [(“I”, 1), (“love”, 4), (“CS106A”, 6)]

- How can you solve this with a list comprehension?

Problem: getting a list of tuples

my_thoughts = [“I”, “love”, “CS106A”]

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my_thoughts = [“I”, “love”, “CS106A”]

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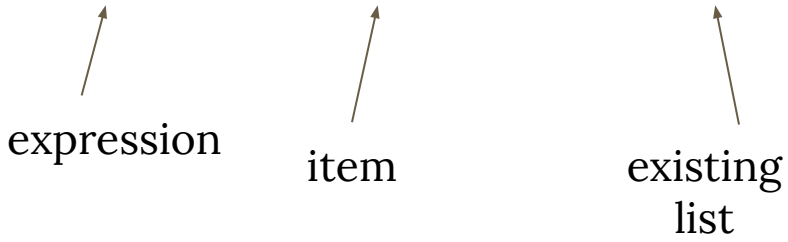

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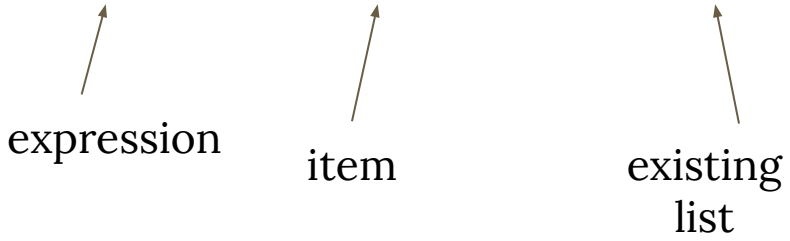

print(tuple_thoughts)

#would print [(“I”, 1), (“love”, 4), (“CS106A”, 6)]

Problem: converting temperature to celsius

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Problem: converting temperature to celsius

france_temps_c = [13, 14, 15, 16, 8, 9, 12]

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france_temps_f = [t*(9/5) + 32 for t in france_temps_c]

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france_temps_f = [t*(9/5) + 32 for t in france_temps_c]

print(france_temps_f)

would print [55.4, 57.2, 59.0, 46.4, 48.2, 53.6, 46.4]

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def make_fahrenheit(c):
    return c * (9/5) + 32
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Conditions in List Comprehensions

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- What if we want only the even numbers?

even_nums → [12, 14, 16, 18, 22, 22]

even_nums = [n for n in nums if n % 2 == 0]

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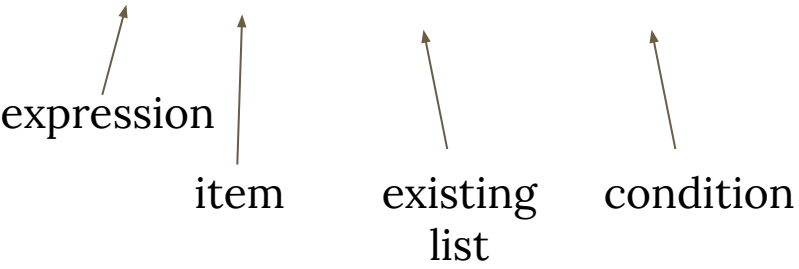

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kids = [“jonathan”, “isabelle”, “henry”, “juliette”, “audrey”, “bailey”]

- Want only the names that end in “y”

y_at_end_kids = [name for name in kids if name[-1] == ‘y’]

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- Want only the names that start with “b”

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kids = ["jonathan", "isabelle", "henry", "juliette", "audrey", "bailey"]

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```
y_at_end_kids = [name for name in kids if name[-1] == 'y']

# y_at_end_kids is ["henry", "audrey", "bailey"]
```

- Want only the names that start with "b"

```
b_at_front_kids = [name for name in kids if name[0] == 'b']
```

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Why List Comprehensions?

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What does it mean to by *Pythonic*?

When to not use list comprehensions?

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When to not use list comprehensions?

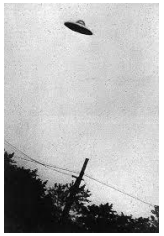
- When you need more than one condition
- When the expression is complex and you can’t easily decompose into a helper function

What tools do we have to develop and analyze data?

Let’s Analyze Some Data

Dataset Source

Let's Analyze Some Data



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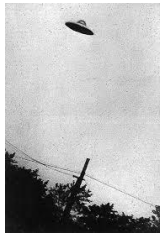

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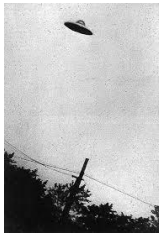

- Found this cool dataset with a lot of UFO sightings over the last century
- date/time, city, state, country, shape, duration, etc.
- Made me wonder:
  - Where are the most UFO sightings?
  - How long do the sightings last for?
  - What other trends can we find from this data?

Dataset Source

Let’s check out the code

If only there was something else...

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- Good for collaboration !
  - In your CS life outside of this class, you will likely collaborate on the code that you write

Jupyter Notebook

- Jupyter Notebook Set Up

$ python3 -m pip install jupyter

Quick Review of Sorting

Sorting

num_lst = [3, 4, 5, 8, 1, 12.3, 0, -3]

Sorting

num_lst = [3, 4, 5, 8, 1, 12.3, 0, -3]

sorted_lst = sorted(num_lst)

Sorting

```
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# sorted_lst → [-3, 0, 1, 3, 4, 5, 8, 12.3]
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rev_sorted_lst = sorted(num_lst, reverse=True)
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# rev_sorted_lst → [12.3, 8, 5, 4, 3, 1, 0, -3]
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def second_elem(x):
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sorted_tuple_thoughts = sorted(tuple_thoughts, **key=second_elem**, reverse=True)

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sorted_tuple_thoughts → [('CS106A', 6), ('love', 4), ('I', 1)]

Back to the code

How Can We Visualize Data?


Bias Bars
Word To Plot: class
11329
9711
8092
6474
4855
3237
1618
0
W
M
W
M
W
M
Low Reviews
Medium Reviews
High Reviews
Search:

You are all already experts on this!
But...
there is another way

Using Matplotlib

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- To install
  - $ python3 -m pip install matplotlib

Using Matplotlib

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```
import matplotlib.pyplot as plt
```

Using Matplotlib

```
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plt.title(text)   #adds a title to the plot

plt.show()    #displays the plot
```

Using Matplotlib

- There are many more features !!
  - Read more about Matplotlib here
  - This is a useful Matplotlib tutorial tutorial

Let’s try it out