while loop

INTERMEDIATE PYTHON

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if-elif-else

- Goes through construct only once!

```python
z = 6
if z % 2 == 0 :  # True
    print("z is divisible by 2")  # Executed
elif z % 3 == 0 :
    print("z is divisible by 3")
else :
    print("z is neither divisible by 2 nor by 3")


...    # Moving on
```

- While loop = repeated if statement

While

```
while condition :
    expression
```

- Numerically calculating model

- "repeating action until condition is met"

- Example
  - Error starts at 50

  - Divide error by 4 on every run

  - Continue until error no longer > 1

While

```
while condition :
    expression
```

`while_loop.py`

```python
error = 50.0

while error > 1:
    error = error / 4
    print(error)
```

- Error starts at 50

- Divide error by 4 on every run

- Continue until error no longer > 1

While

```python
while condition :
    expression
```

`while_loop.py`

```python
error = 50.0
#      50
while error > 1:      # True
    error = error / 4
    print(error)
```

```
12.5
```

While

```
while condition :
    expression
```

while_loop.py

```python
error = 50.0
#      12.5
while error > 1:      # True
    error = error / 4
    print(error)
```

```
12.5
3.125
```

While

```
while condition :
    expression
```

`while_loop.py`

```python
error = 50.0
#      3.125
while error > 1:     # True
    error = error / 4
    print(error)
```

```
12.5
3.125
0.78125
```

While

```
while condition :
    expression
```

`while_loop.py`

```python
error = 50.0
#     0.78125
while error > 1:    # False
    error = error / 4
    print(error)
```

```
12.5
3.125
0.78125
```

While

```python
while condition :
    expression
```

`while_loop.py`

```python
error = 50.0
while error > 1 :    # always True
    # error = error / 4
    print(error)
```

```
50
50
50
50
50
50
50
...
```

- DataCamp: session disconnected

- Local system: Control + C

Let's practice!

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for loop

```
for var in seq :
    expression
```

- "for each var in seq, execute expression"

fam

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
print(fam)
```

```
[1.73, 1.68, 1.71, 1.89]
```

fam

```python
fam = [1.73, 1.68, 1.71, 1.89]
print(fam[0])
print(fam[1])
print(fam[2])
print(fam[3])
```

```
1.73
1.68
1.71
1.89
```

for loop

```
for var in seq :
    expression
```

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
for height in fam :
    print(height)
```

for loop

```
for var in seq :
    expression
```

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
for height in fam :
    print(height)
    # first iteration
    # height = 1.73
```

```
1.73
```

for loop

```
for var in seq :
    expression
```

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
for height in fam :
    print(height)
    # second iteration
    # height = 1.68
```

```
1.73
1.68
```

for loop

```python
for var in seq :
    expression
```

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
for height in fam :
    print(height)
```

```
1.73
1.68
1.71
1.89
```

- No access to indexes

for loop

```
for var in seq :
    expression
```

`family.py`

```
fam = [1.73, 1.68, 1.71, 1.89]
```

- ???

```
index 0: 1.73
index 1: 1.68
index 2: 1.71
index 3: 1.89
```

enumerate

```
for var in seq :
    expression
```

`family.py`

```python
fam = [1.73, 1.68, 1.71, 1.89]
for index, height in enumerate(fam) :
    print("index " + str(index) + ": " + str(height))
```

```
index 0: 1.73
index 1: 1.68
index 2: 1.71
index 3: 1.89
```

Loop over string

```python
for var in seq :
    expression
```

`strloop.py`

```python
for c in "family" :
    print(c.capitalize())
```

```
F
A
M
I
L
Y
```

Let's practice!

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Loop Data Structures Part 1

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Dictionary

```
for var in seq :
    expression
```

`dictloop.py`

```python
world = { "afghanistan":30.55,
          "albania":2.77,
          "algeria":39.21 }
for key, value in world :
    print(key + " -- " + str(value))
```

```
ValueError: too many values to
          unpack (expected 2)
```

Dictionary

```
for var in seq :
    expression
```

dictloop.py

```python
world = { "afghanistan":30.55,
          "albania":2.77,
          "algeria":39.21 }
for key, value in world.items() :
    print(key + " -- " + str(value))
```

```
algeria -- 39.21
afghanistan -- 30.55
albania -- 2.77
```

Dictionary

```
for var in seq :
    expression
```

`dictloop.py`

```python
world = { "afghanistan":30.55,
          "albania":2.77,
          "algeria":39.21 }
for k, v in world.items() :
    print(k + " -- " + str(v))
```

```
algeria -- 39.21
afghanistan -- 30.55
albania -- 2.77
```

NumPy Arrays

```
for var in seq :
    expression
```

`nploop.py`

```python
import numpy as np
np_height = np.array([1.73, 1.68, 1.71, 1.89, 1.79])
np_weight = np.array([65.4, 59.2, 63.6, 88.4, 68.7])
bmi = np_weight / np_height ** 2
for val in bmi :
    print(val)
```

```
21.852
20.975
21.750
24.747
21.441
```

2D NumPy Arrays

```python
import numpy as np
np_height = np.array([1.73, 1.68, 1.71, 1.89, 1.79])
np_weight = np.array([65.4, 59.2, 63.6, 88.4, 68.7])
meas = np.array([np_height, np_weight])
for val in meas :
    print(val)
```

```
[ 1.73  1.68  1.71  1.89  1.79]
[ 65.4  59.2  63.6  88.4  68.7]
```

2D NumPy Arrays

```python
import numpy as np
np_height = np.array([1.73, 1.68, 1.71, 1.89, 1.79])
np_weight = np.array([65.4, 59.2, 63.6, 88.4, 68.7])
meas = np.array([np_height, np_weight])
for val in np.nditer(meas) :
    print(val)
```

```
1.73
1.68
1.71
1.89
1.79
65.4
...
```

Recap

- Dictionary
  - for `key, val in my_dict.items() :`

- NumPy array
  - `for val in np.nditer(my_array) :`

Let's practice!

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Loop Data Structures Part 2

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brics

```
        country     capital    area  population
BR        Brazil    Brasilia   8.516      200.40
RU        Russia      Moscow  17.100      143.50
IN         India   New Delhi   3.286     1252.00
CH         China     Beijing   9.597     1357.00
SA  South Africa    Pretoria   1.221       52.98
```

dfloop.py

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
```

for, first try

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
for val in brics :
    print(val)
```

```
country
capital
area
population
```

iterrows

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
for lab, row in brics.iterrows():
    print(lab)
    print(row)
```

```
BR
country        Brazil
capital       Brasilia
area            8.516
population      200.4
Name: BR, dtype: object
...
RU
country        Russia
capital        Moscow
area             17.1
population      143.5
Name: RU, dtype: object
IN ...
```

Selective print

dfloop.py

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
for lab, row in brics.iterrows():
    print(lab + ": " + row["capital"])
```

```
BR: Brasilia
RU: Moscow
IN: New Delhi
CH: Beijing
SA: Pretoria
```

Add column

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
for lab, row in brics.iterrows() :
    # - Creating Series on every iteration
    brics.loc[lab, "name_length"] = len(row["country"])
print(brics)
```

```
          country   capital    area  population  name_length
BR         Brazil  Brasilia   8.516      200.40            6
RU         Russia    Moscow  17.100      143.50            6
IN          India New Delhi   3.286     1252.00            5
CH          China   Beijing   9.597     1357.00            5
SA   South Africa  Pretoria   1.221       52.98           12
```

apply

`dfloop.py`

```python
import pandas as pd
brics = pd.read_csv("brics.csv", index_col = 0)
brics["name_length"] = brics["country"].apply(len)
print(brics)
```

```
         country     capital    area   population   name_length
BR        Brazil    Brasilia   8.516       200.40             6
RU        Russia      Moscow  17.100       143.50             6
IN         India   New Delhi   3.286      1252.00             5
CH         China     Beijing   9.597      1357.00             5
SA  South Africa    Pretoria   1.221        52.98            12
```

Let's practice!

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