

# Programming and Plotting in Python

The Carpentries Workshop











University of Strasbourg

2-3 March 2032

Share your experience!













## > minions

id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4

# VARIABLES











## OBSERVATIONS

id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4

Reality  
Versus  
Expectations!





> minions

id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	ten	48	3
120			purple	16	NA	1
100			yellow	3	54	4

Mixed  
Types

Missing  
Data






> leader\_table\_wide

	101	102	108	120	100
	1	1	0	0	1
	0	0	1	1	0

- Multiple Sources
- Different Formats



> minion\_details\_table

id	minion	type	age	missions_internal	missions_external
101		yellow	5	60	2
102		yellow	6	55	10
108		purple	10	48	3
120		purple	16	49	1
100		yellow	3	54	4



How to draw an owl

1.



1. Draw some circles

## How to draw an owl

1.



2.









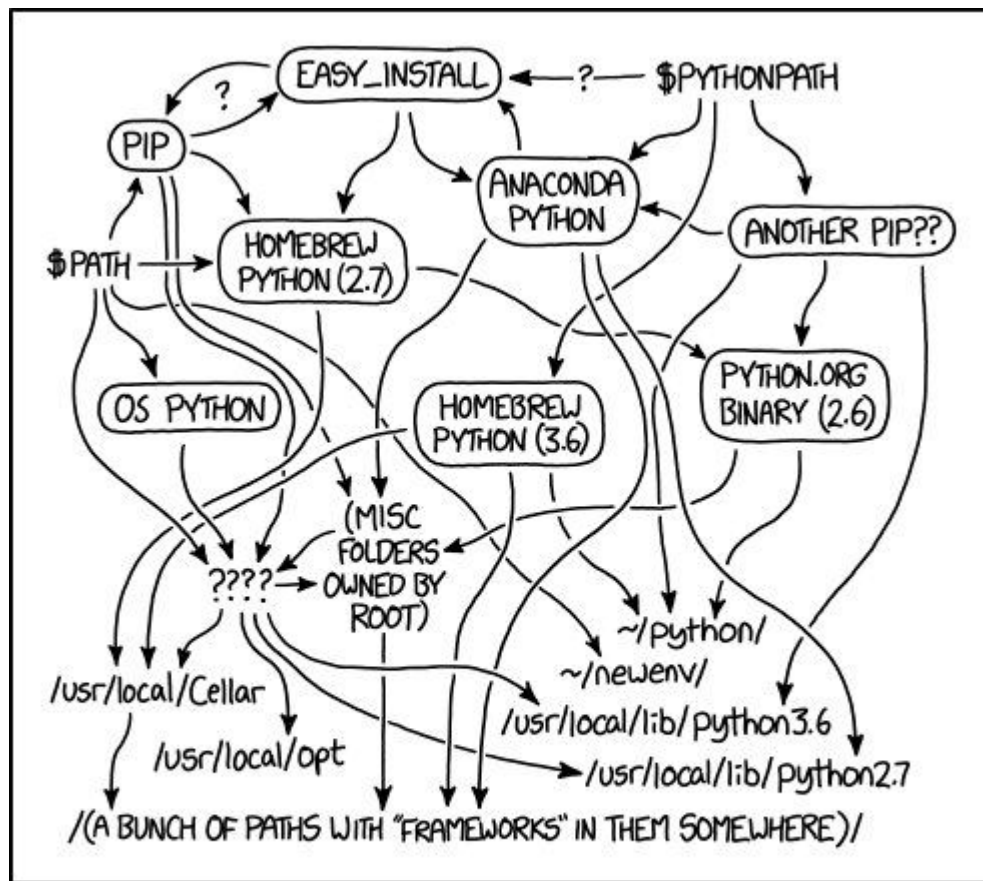
1. Draw some circles

2. Draw the rest of the f \*\*\*\*\* owl

Return rows with:

- minion value is yellow

id	minion	leader	type	age	missions_ internal	missions_e xternal
101			yellow	5	60	2
102			yellow	6	55	10
100			yellow	3	54	4



MY PYTHON ENVIRONMENT HAS BECOME SO DEGRADED  
THAT MY LAPTOP HAS BEEN DECLARED A SUPERFUND SITE.

# DataFrames











---

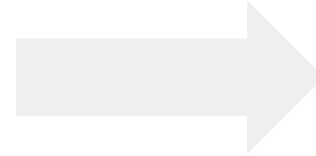
# Select Columns

---

Return a subset of columns

Select one column.











id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4

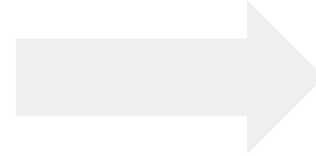


New dataframe

id
101
102
108
120
100

# Select multiple columns.











id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4



New dataframe	
id	age
101	5
102	6
108	10
120	16
100	3



Select all columns except for a specific one.

id	minion	leader	type	age	missions_ internal
101			yellow	5	60
102			yellow	6	55
108			purple	10	48
120			purple	16	49
100			yellow	3	54





# Filter Records

---

Return a subset of rows

Return rows with:











- minion value is yellow
- age more than 3

id	minion	leader	type	age	missions_ internal	missions_e xternal
101			yellow	5	60	2
102			yellow	6	55	10

# Aggregate

---

add/modify columns











id	minion	leader	type	age	missions _internal	missions_ext ernal	total_missions
101			yellow	5	60	2	62
102			yellow	6	55	10	65
108			purple	10	48	3	51
120			purple	16	49	1	50
100			yellow	3	54	4	58

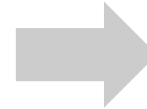
# Split-Apply-Combine

---

Calculate aggregate measures for groups

## Sum of external missions



id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4



missions\_external\_all

20

## Sum of missions per leader

leader	missions_internal_all	missions_external_all
	169	16
	97	4



# Join






---

Join multiple dataframes/datasets











> minion\_leader\_table

id	leader
101	
102	
108	
120	
100	

> minion\_details\_table











id	minion	type	age	missions_internal	missions_external
101		yellow	5	60	2
102		yellow	6	55	10
108		purple	10	48	3
120		purple	16	49	1
100		yellow	3	54	4

Join minion\_leader\_table and minion\_details\_table











id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4

# Arrange

---

id	minion	leader	type	age	missions_ internal	missions_ external
108			purple	10	48	3
120			purple	16	49	1
100			yellow	3	54	4
102			yellow	6	55	10
101			yellow	5	60	2

Ascending


id	minion	leader	type	age	missions_ internal	missions_ external
101			yellow	5	60	2
102			yellow	6	55	10
100			yellow	3	54	4
120			purple	16	49	1
108			purple	10	48	3



Descending

# Functions

---

kevin = 



kevin =



function

parameters

```
kevin_new = resize(element="kevin",resize_factor=2)
```

kevin = 

function

parameters

kevin\_new = resize(element="kevin",resize\_factor=2)

What is the value of kevin\_new ?

1



2



3



function

parameters

```
def accepted_member_v1(member_age):
```

```
    if member_age >= 5:
```

```
        accepted = 1
```

```
    else:
```

```
        accepted = 0
```

```
    return accepted
```

return value

kevin =



kevin\_age = 5

Kevin\_status = accepted\_member\_v1(kevin\_age)

Kevin\_status = accepted\_member\_v1(member\_age=kevin\_age)

kevin =



kevin\_age = 5

Kevin\_status = accepted\_member\_v1(kevin\_age)

Kevin\_status = accepted\_member\_v1(member\_age=kevin\_age)

Kevin\_status ?

function

parameters

```
def accepted_member_v1(member_age):
```

```
    if member_age >= 5:  
        accepted = 1  
    else:  
        accepted = 0
```

```
    return accepted
```

return value

function

parameters

```
def accepted_member_v2(member_age,  
                        acceptance_threshold):
```

```
    if member_age >= acceptance_threshold:  
        accepted = 1  
    else:  
        accepted = 0
```

```
    return accepted
```

return value

kevin =



kevin\_age = 5

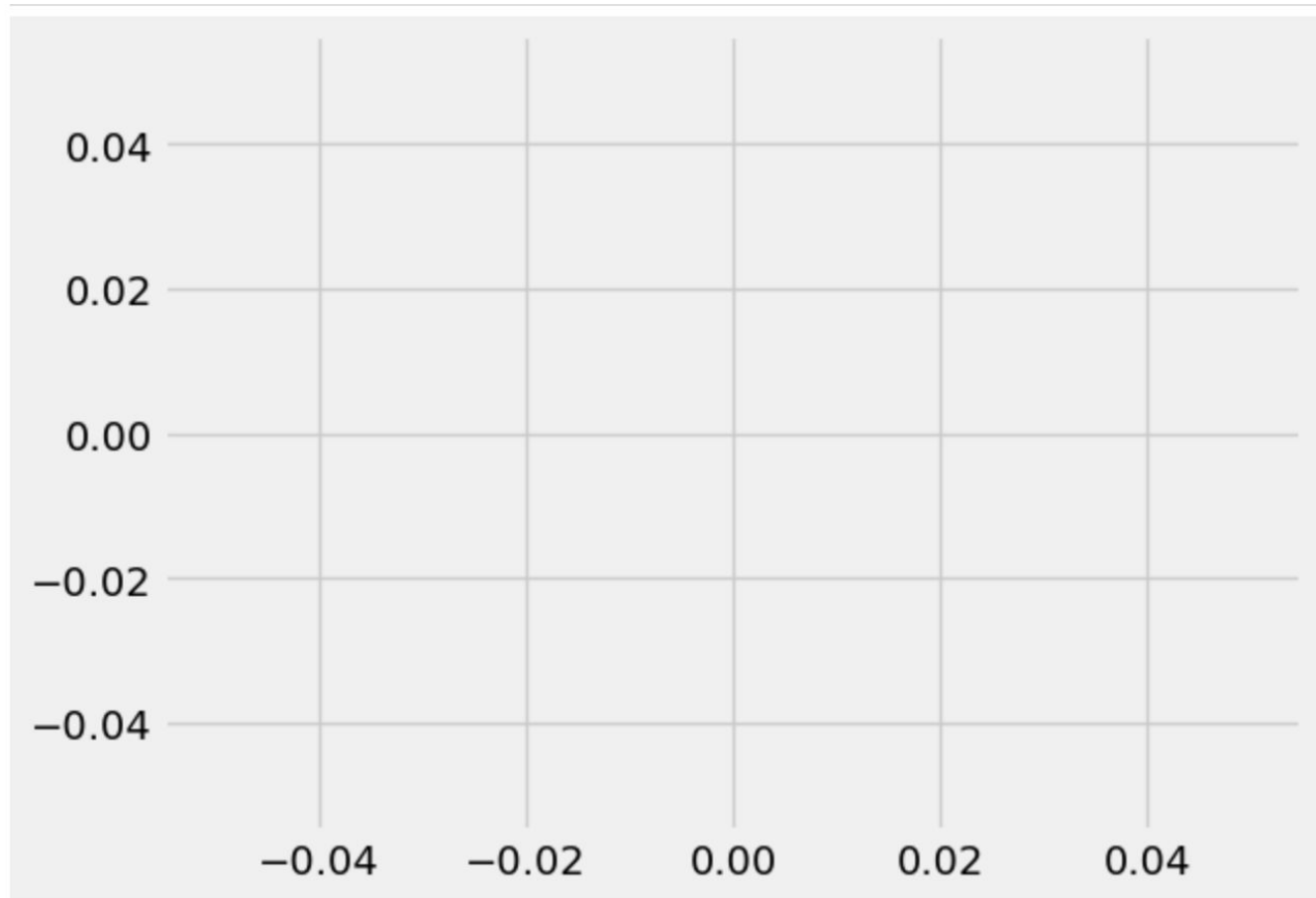
Kevin\_status = accepted\_member\_v2(member\_age=kevin\_age,  
acceptance\_threshold=7)

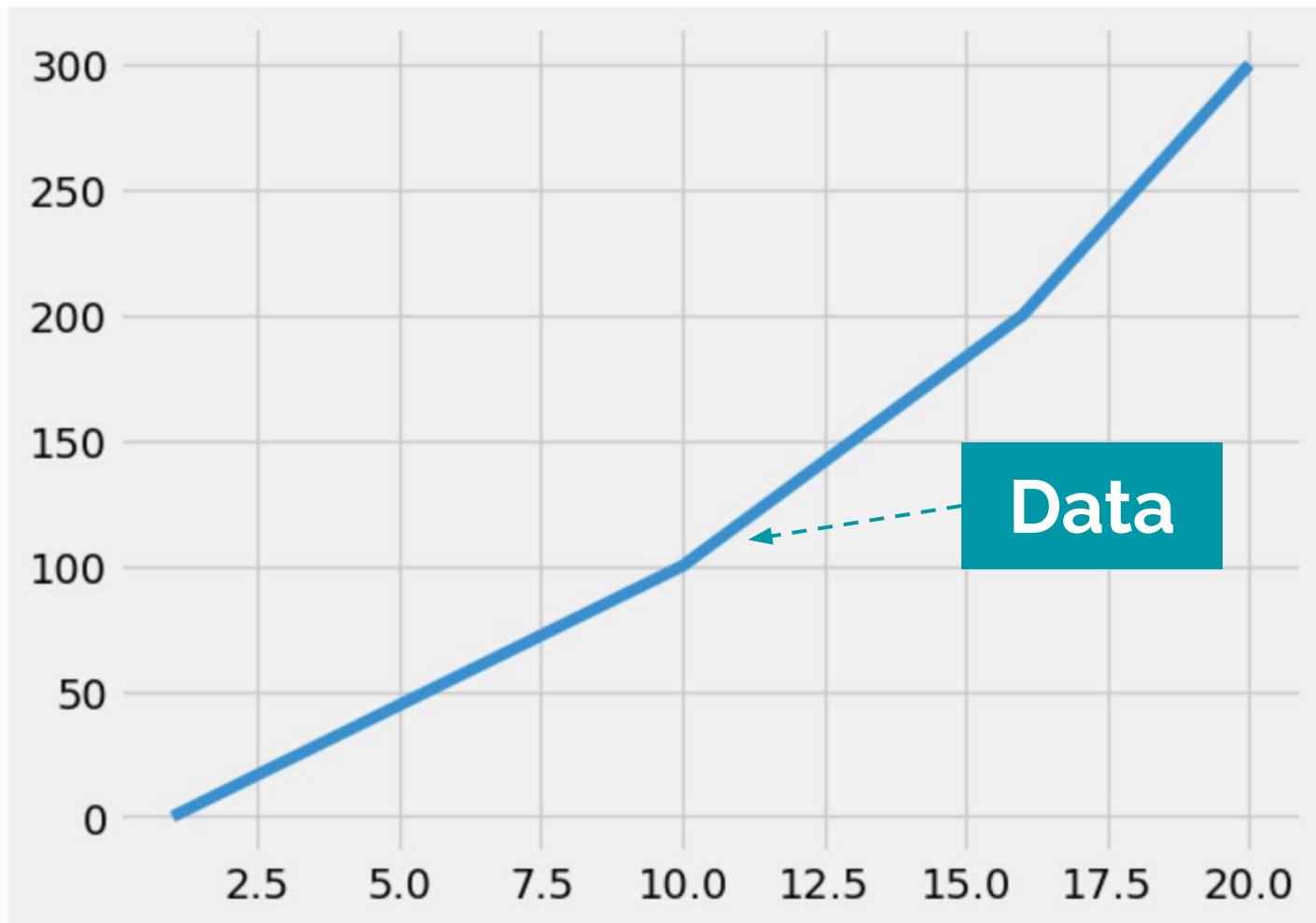
Kevin\_status ?

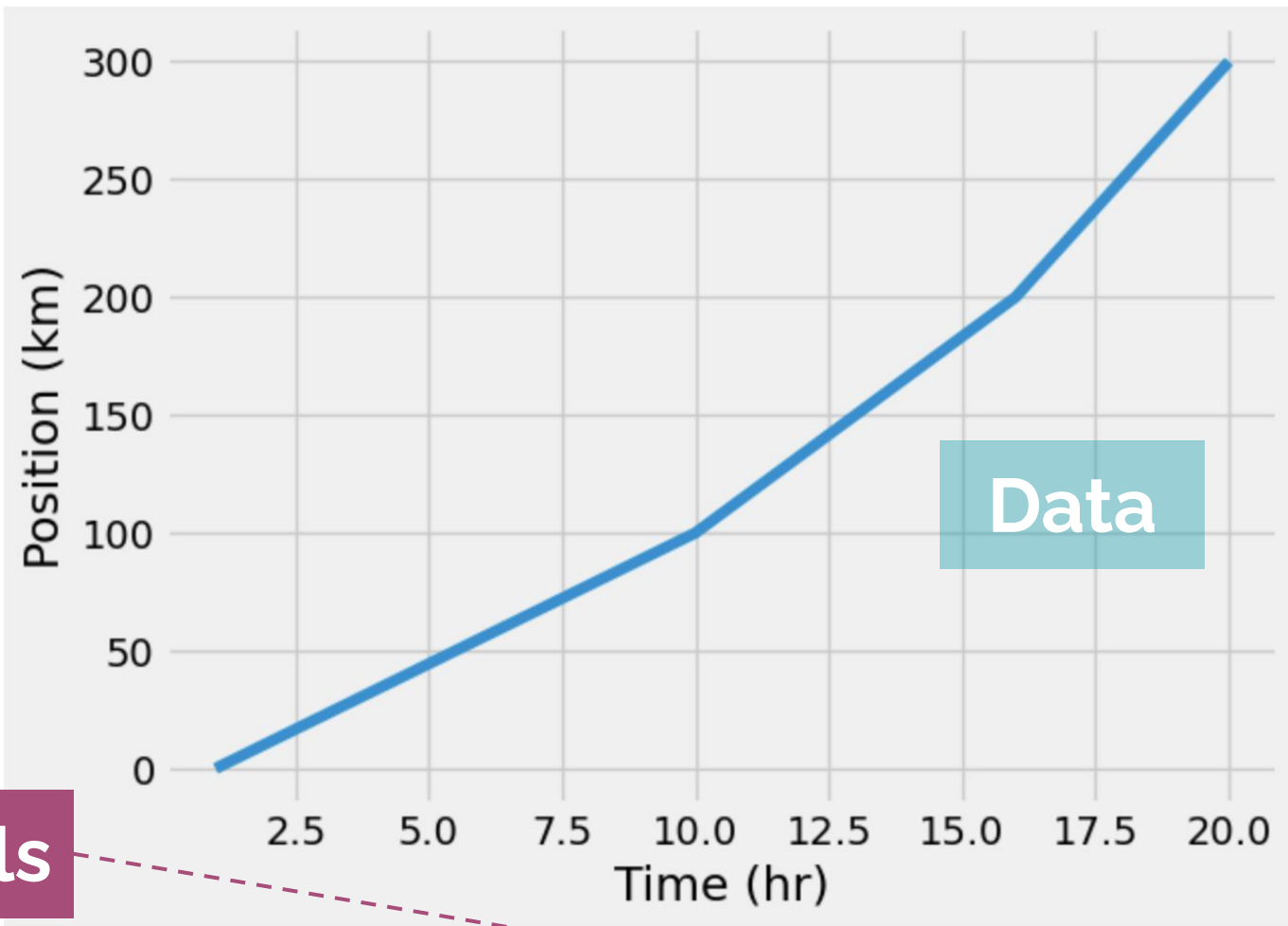


# Plotting

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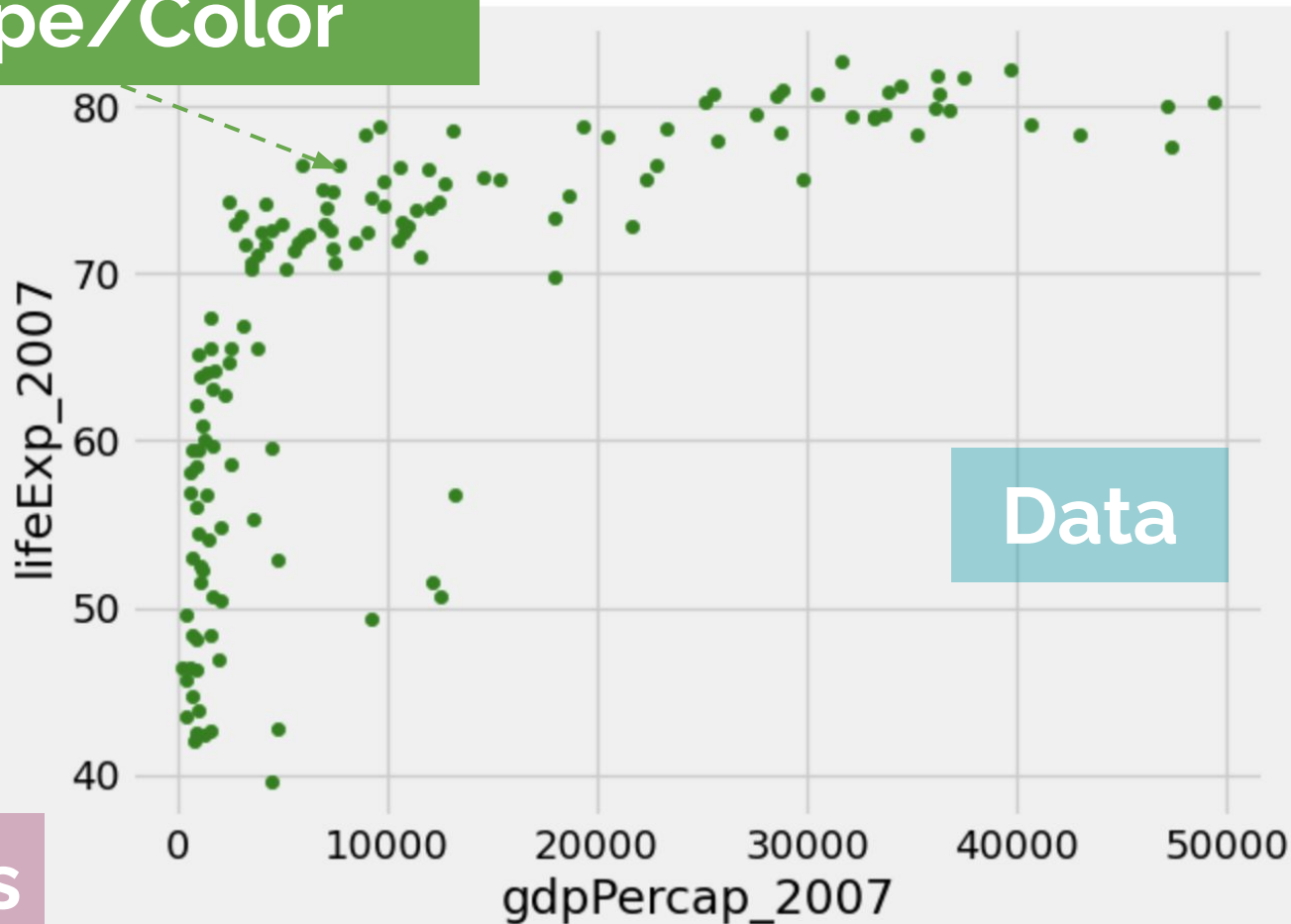




Labels

Data

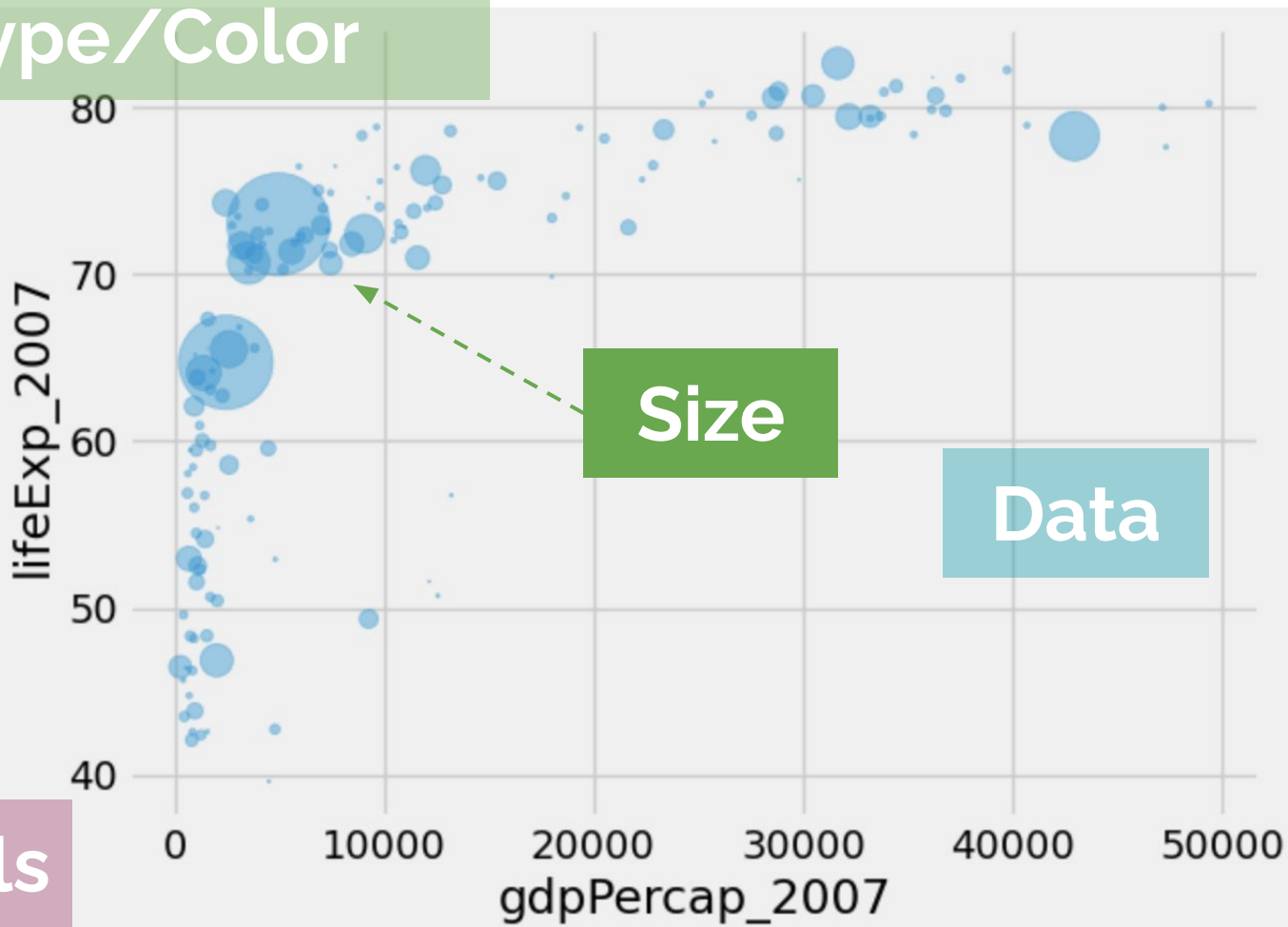
Type/Color



Labels

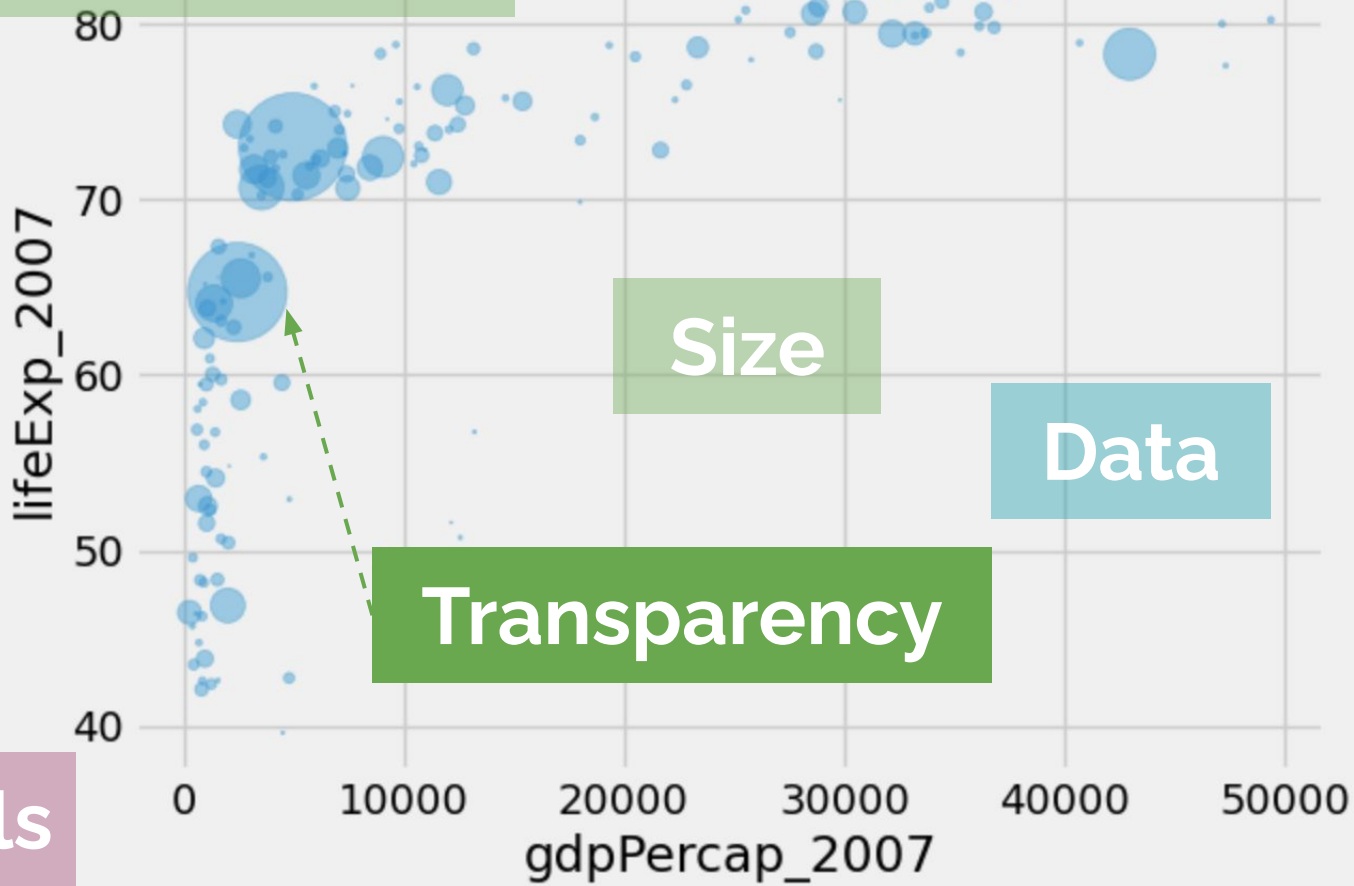
Data

Type/Color



Labels

Type/Color

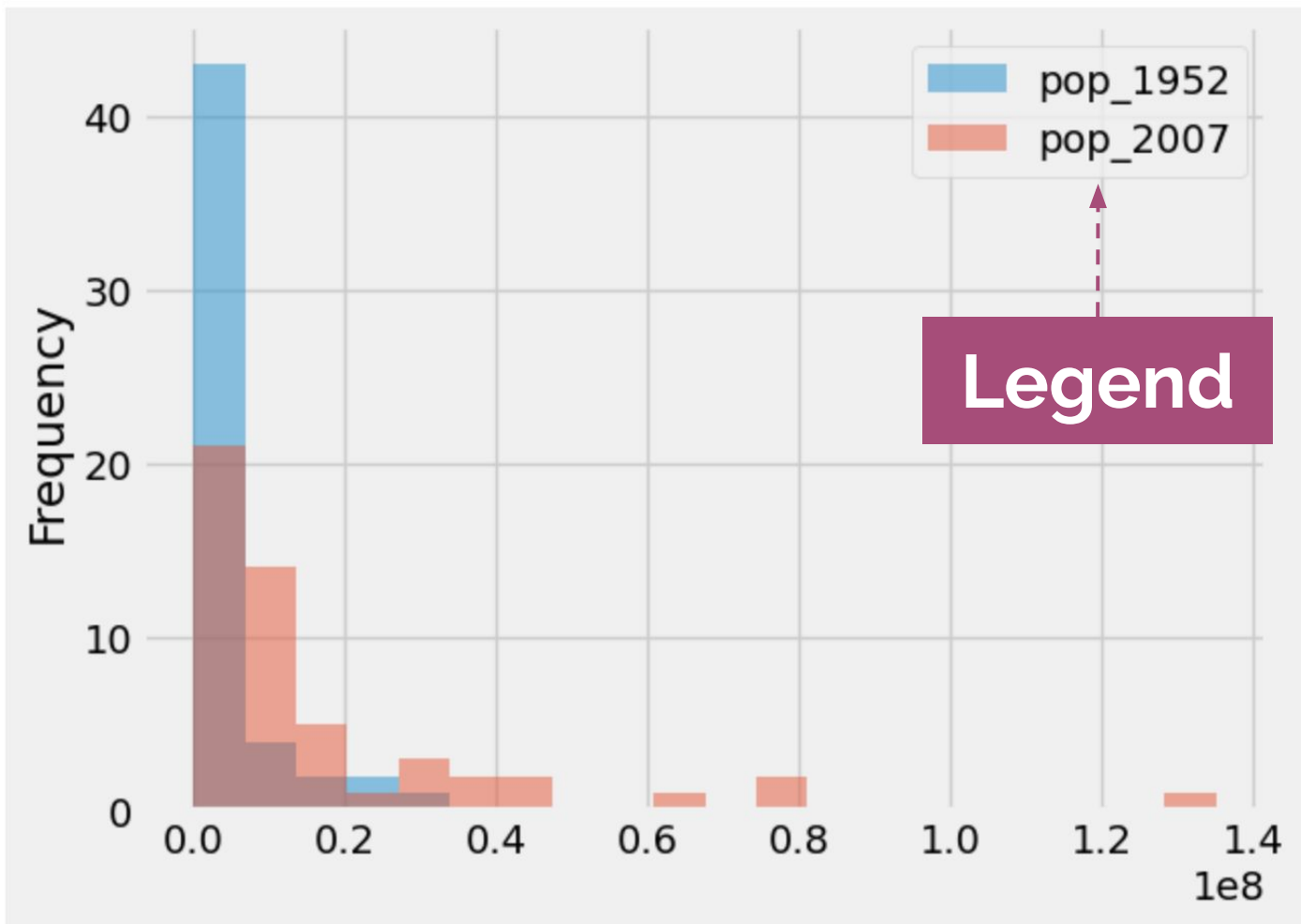


Size

Data

Transparency

Labels





MISSION ACCOMPLISHED

