Concatenating data

CLEANING DATA IN PYTHON

Daniel Chen
Instructor

Combining data

- Data may not always come in 1 huge file
  - 5 million row dataset may be broken into 5 separate datasets
  - Easier to store and share
  - May have new data for each day
- Important to be able to combine then clean, or vice versa

Concatenation

	date	element	value
0	2010-01-30	tmax	27.8
1	2010-01-30	tmin	14.5

	date	element	value
0	2010-02-02	tmax	27.3
1	2010-02-02	tmin	14.4

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0	2010-01-30	tmax	27.8
1	2010-01-30	tmin	14.5
0	2010-02-02	tmax	27.3
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1	2010-02-02	tmin	14.4

pandas concat()

```
concatenated = pd.concat([weather_p1, weather_p2])
print(concatenated)
```

```
        date      element   value
0  2010-01-30   tmax      27.8
1  2010-01-30   tmin      14.5
0  2010-02-02   tmax      27.3
1  2010-02-02   tmin      14.4
```

pandas concat()

```
concatenated = concatenated.loc[0, :]
```

```
        date       element   value
0  2010-01-30   tmax       27.8
0  2010-02-02   tmax       27.3
```

pandas concat()

```python
pd.concat([weather_p1, weather_p2], ignore_index=True)
```

```
     date       element   value
0  2010-01-30  tmax      27.8
1  2010-01-30  tmin      14.5
2  2010-02-02  tmax      27.3
3  2010-02-02  tmin      14.4
```

Concatenating DataFrames

	country	year	variable	value
0	AD	2000	m014	0
1	AE	2000	m014	2
2	AF	2000	m014	52
3	AD	2000	m1524	0
4	AE	2000	m1524	4
5	AF	2000	m1524	228

	age_group	sex
0	014	m
1	014	m
2	014	m
3	1524	m
4	1524	m
5	1524	m

Let's practice!

CLEANING DATA IN PYTHON

Finding and concatenating data

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Concatenating many files

- Leverage Python's features with data cleaning in `pandas`
- In order to concatenate DataFrames:
  - They must be in a list
  - Can individually load if there are a few datasets
  - But what if there are thousands?
- Solution: `glob()` function to find files based on a pattern

Globbing

- Pattern matching for file names
- Wildcards: `*` and `?`
    - Any csv file: `*.csv`
    - Any single character: `file_?.csv`
- Returns a list of file names
- Can use this list to load into separate DataFrames

The plan

- Load files from globbing into `pandas`
- Add the DataFrames into a list
- Concatenate multiple datasets at once

Find and concatenate

```python
import glob

csv_files = glob.glob('*.csv')
print(csv_files)
```

```
['file5.csv', 'file2.csv', 'file3.csv', 'file1.csv', 'file4.csv']
```

Using loops

```python
list_data = []

for filename in csv_files:
    data = pd.read_csv(filename)
    list_data.append(data)

pd.concat(list_data)
```

Let's practice!

CLEANING DATA IN PYTHON

Merge data

CLEANING DATA IN PYTHON

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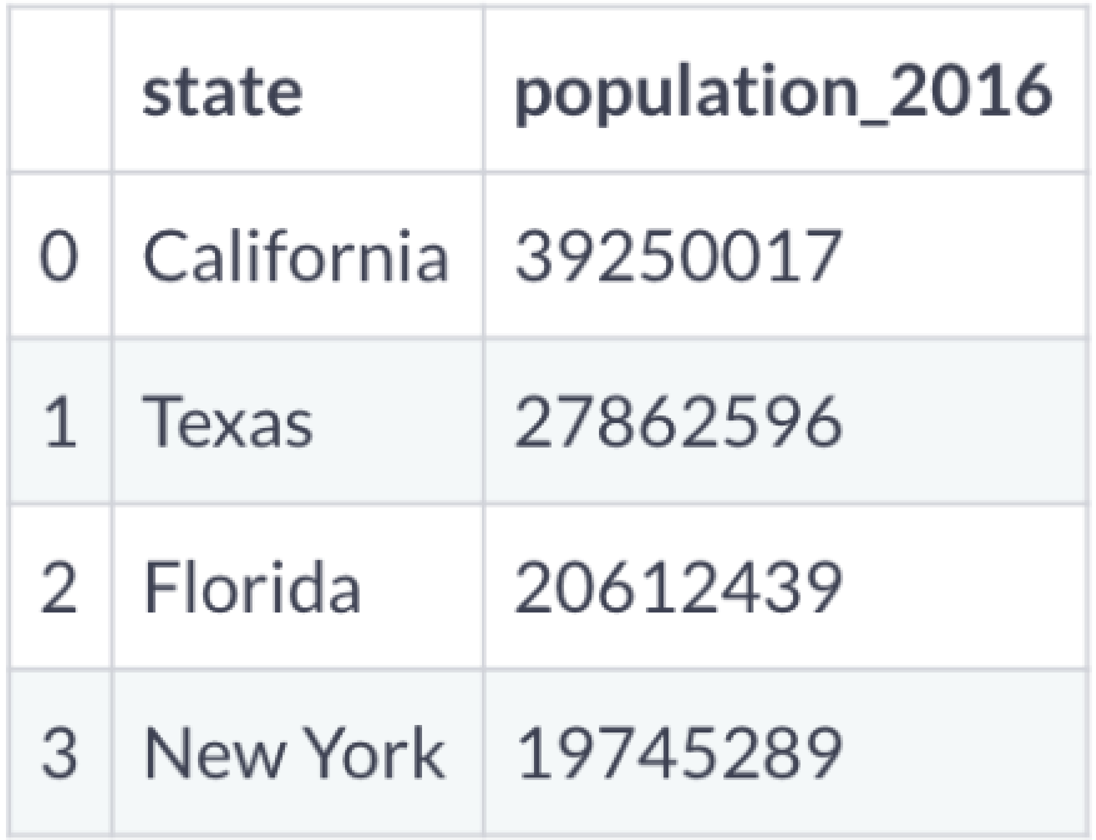
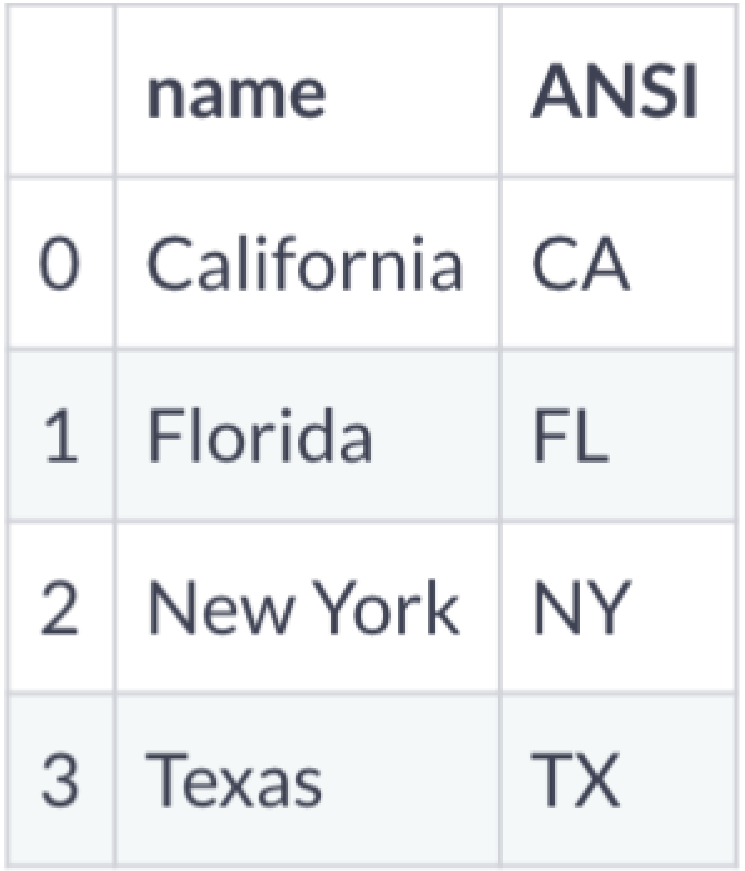
Combining data

- Concatenation is not the only way data can be combined



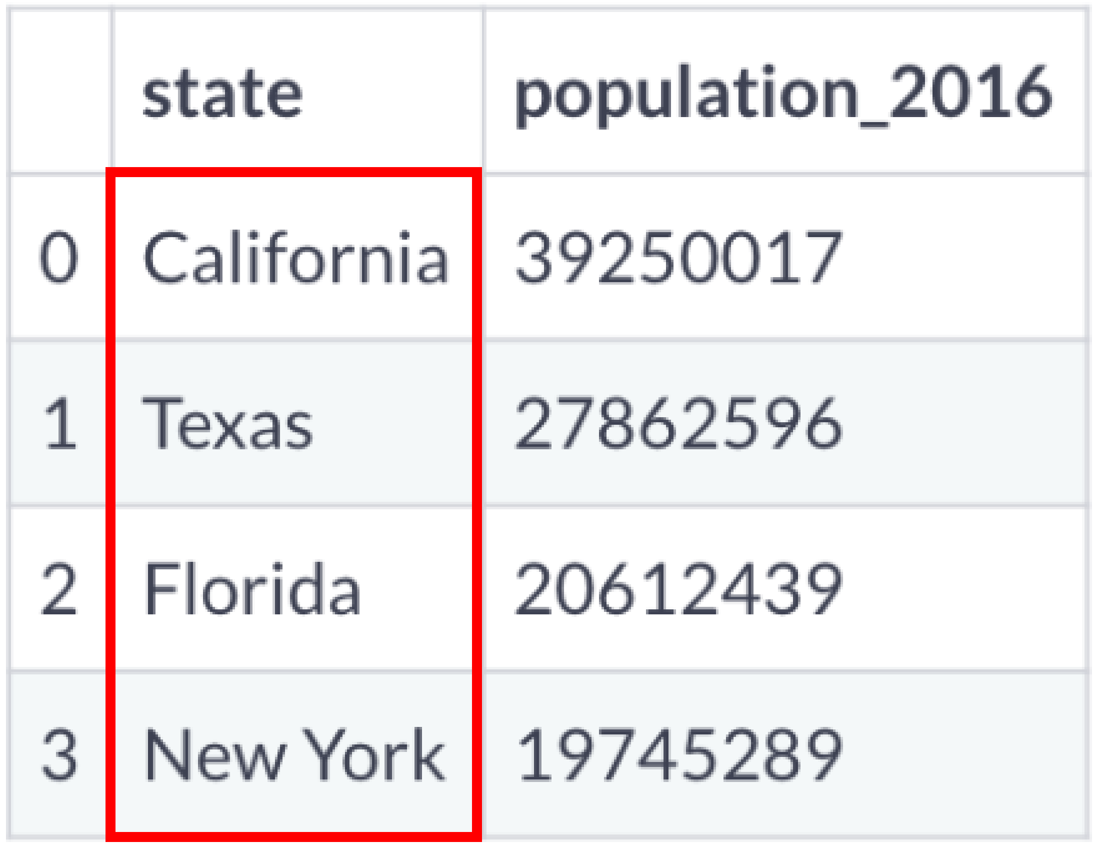
	state	population_2016
0	California	39250017
1	Texas	27862596
2	Florida	20612439
3	New York	19745289



	name	ANSI
0	California	CA
1	Florida	FL
2	New York	NY
3	Texas	TX

Combining data

- Concatenation is not the only way data can be combined



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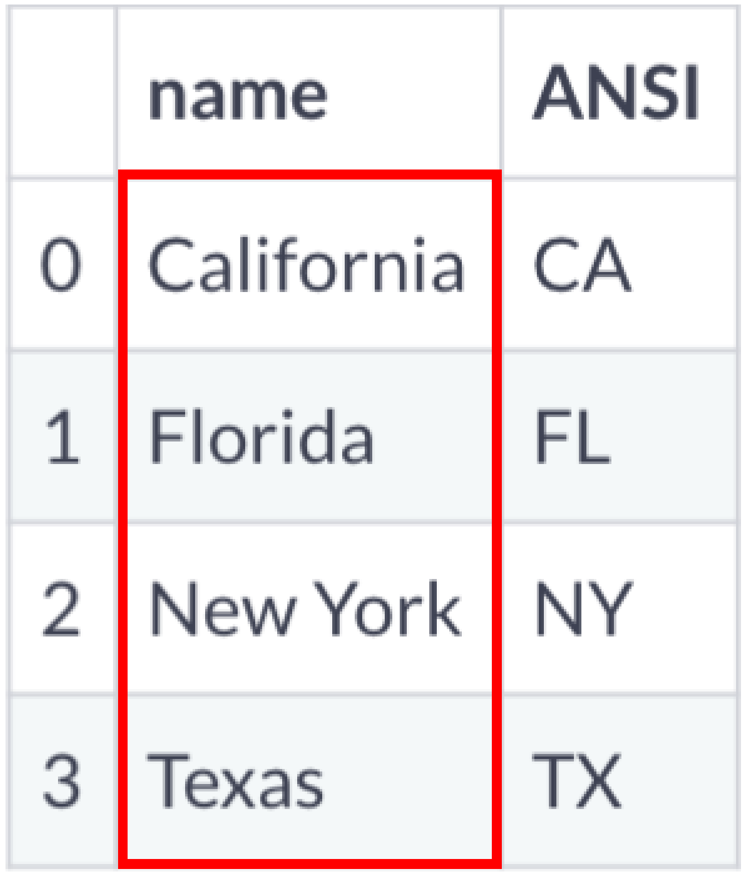
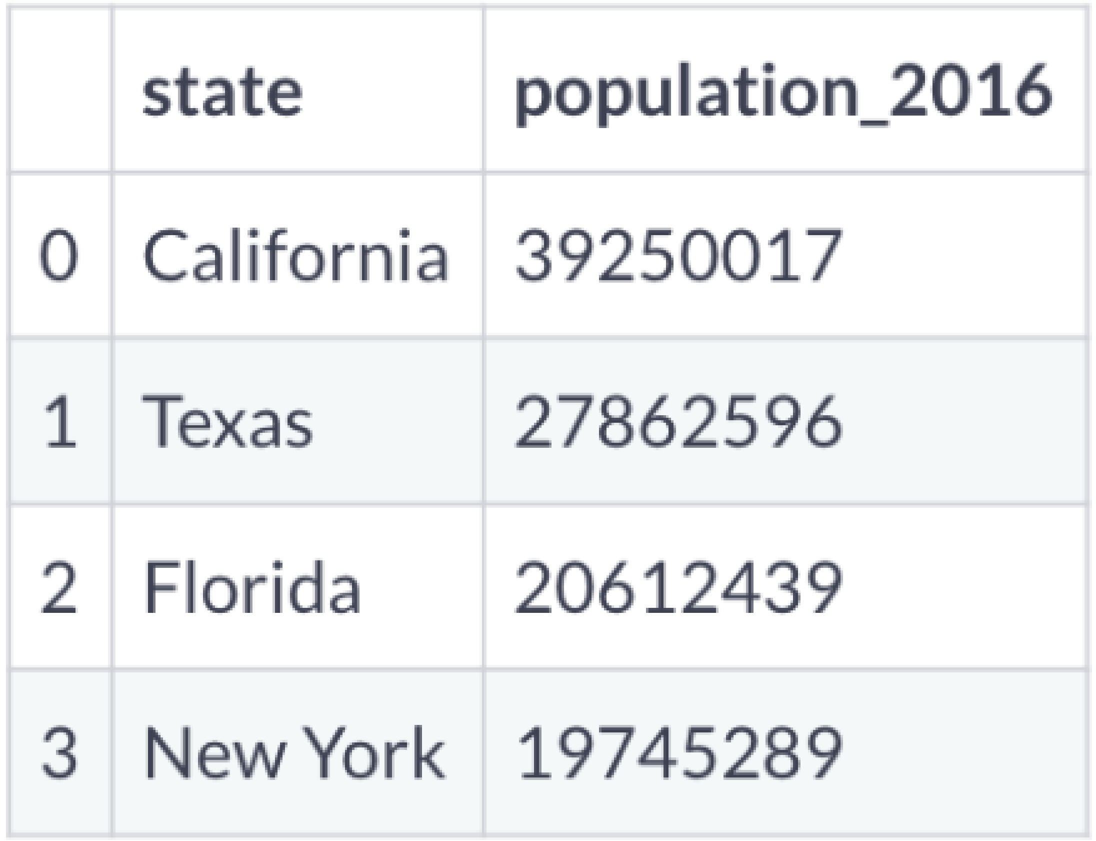


	name	ANSI
0	California	CA
1	Florida	FL
2	New York	NY
3	Texas	TX

Merging data

- Similar to joining tables in SQL
- Combine disparate datasets based on common columns



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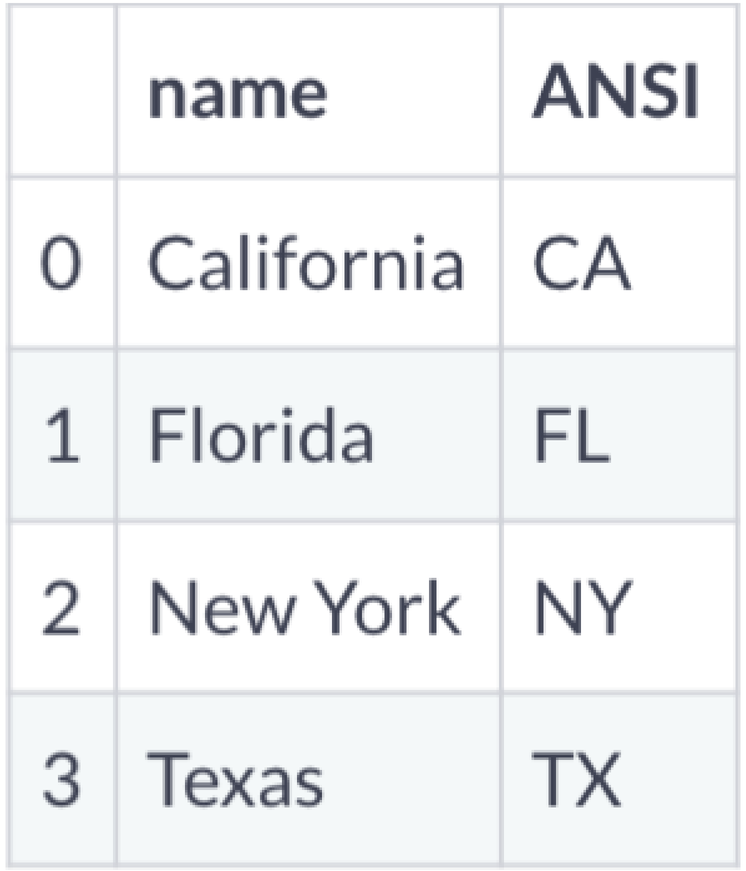
1	Texas	27862596
2	Florida	20612439
3	New York	19745289



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0	California	CA
1	Florida	FL
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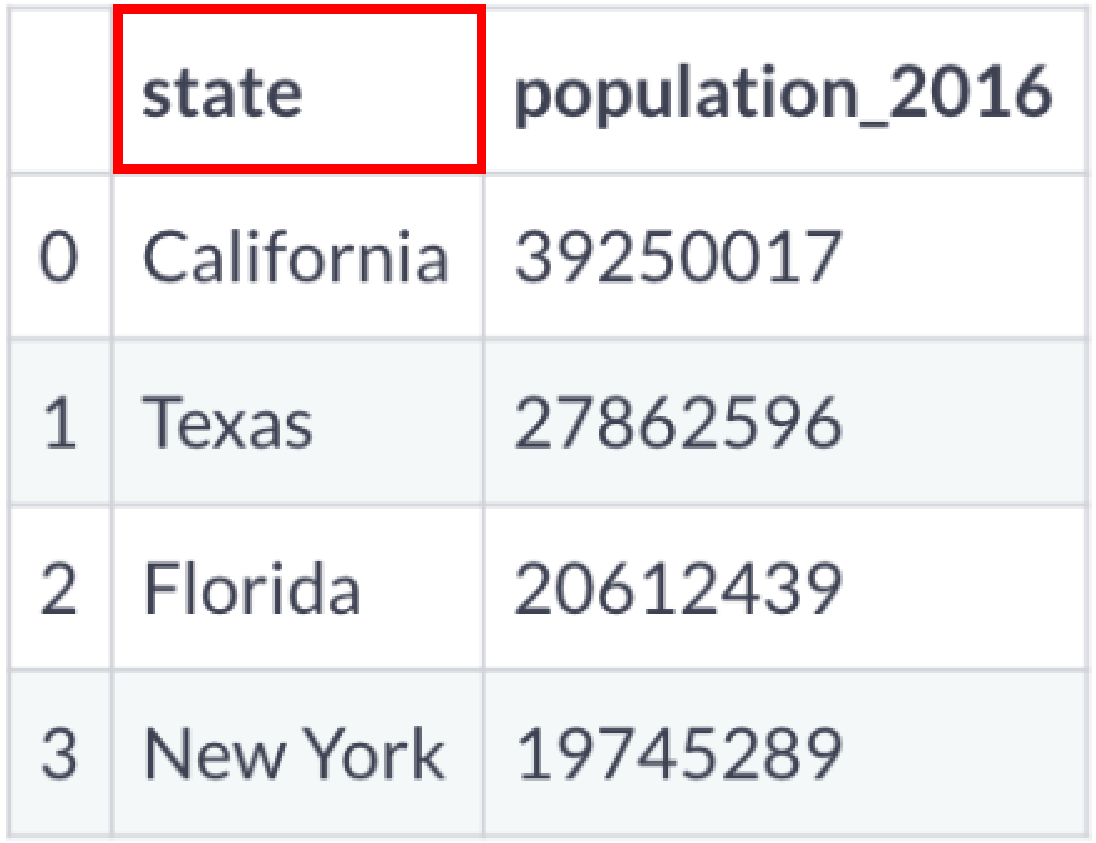
Merging data

- Similar to joining tables in SQL
- Combine disparate datasets based on common columns



	state	population_2016
0	California	39250017
1	Texas	27862596
2	Florida	20612439
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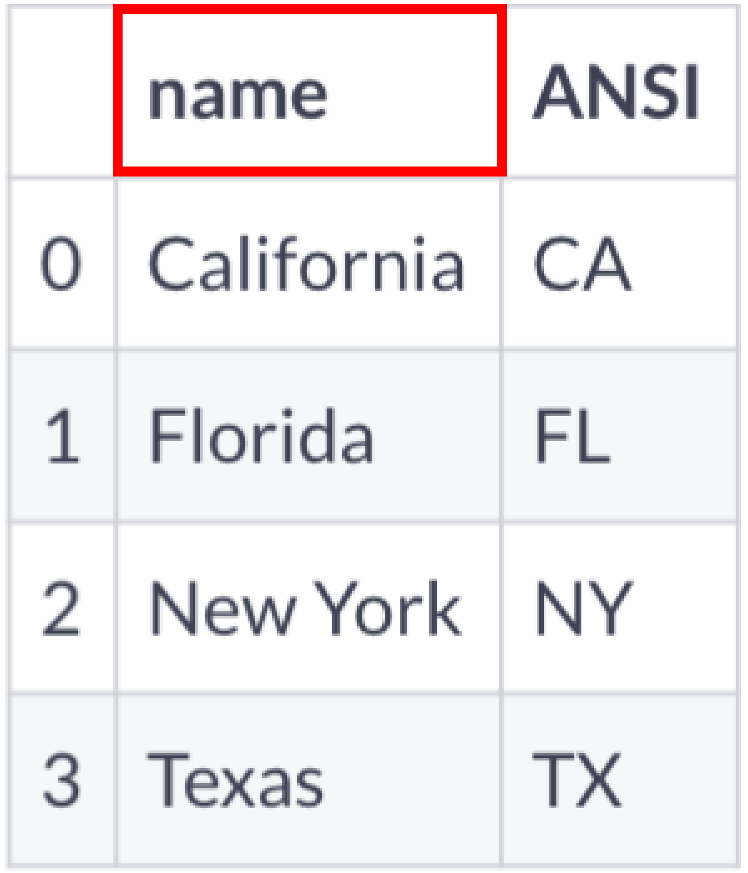


	name	ANSI
0	California	CA
1	Florida	FL
2	New York	NY
3	Texas	TX

Merging data

```python
pd.merge(left=state_populations, right=state_codes,
         on=None, left_on='state', right_on='name')
```

```
        state   population_2016        name   ANSI
0  California          39250017  California     CA
1       Texas          27862596       Texas     TX
2     Florida          20612439     Florida     FL
3    New York          19745289    New York     NY
```

Types of merges

- One-to-one
- Many-to-one / one-to-many
- Many-to-many

One-to-one

	state	population_2016
0	California	39250017
1	Texas	27862596
2	Florida	20612439
3	New York	19745289

	name	ANSI
0	California	CA
1	Florida	FL
2	New York	NY
3	Texas	TX

One-to-one

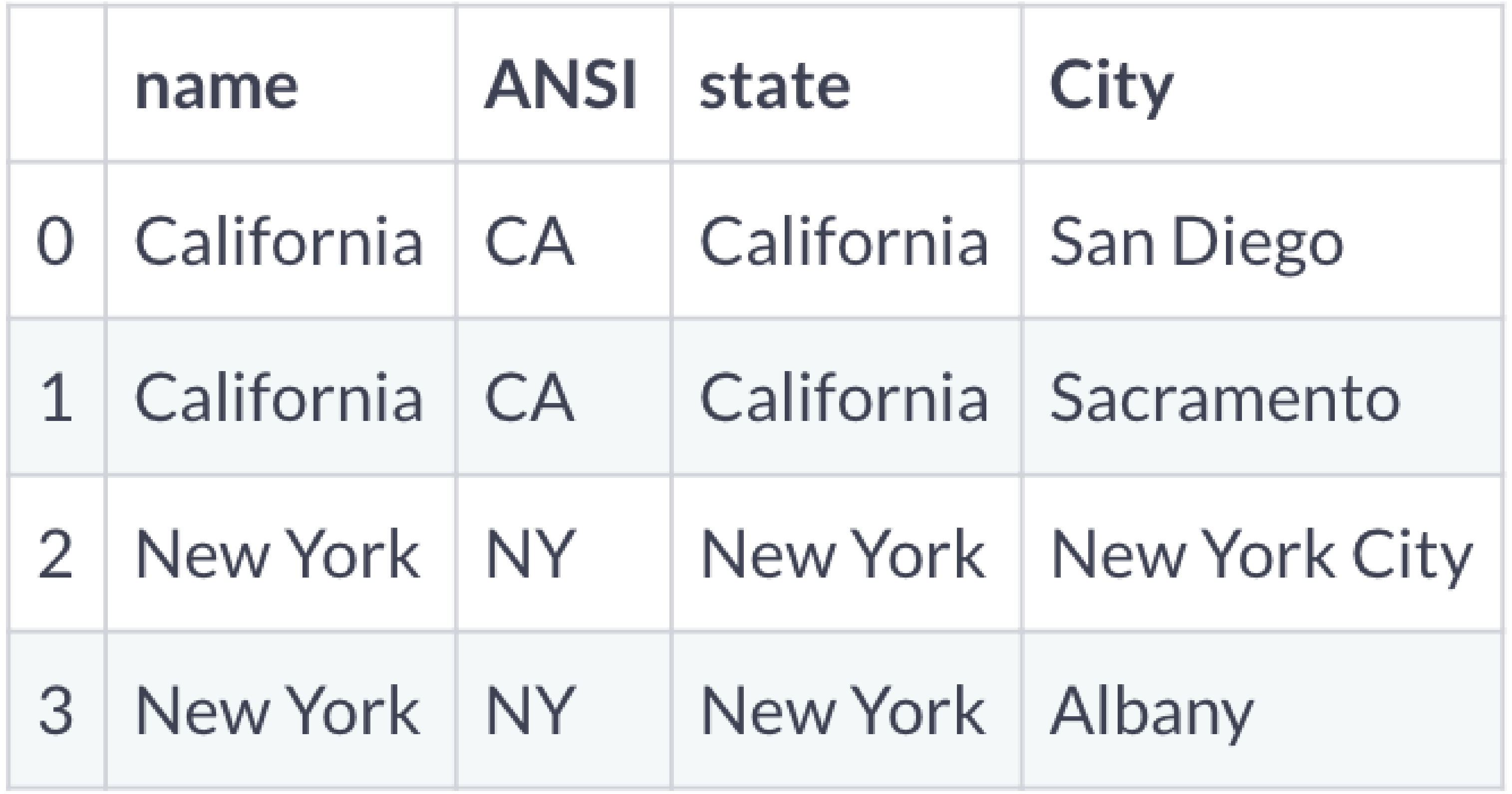
	state	population_2016	name	ANSI
0	California	39250017	California	CA
1	Texas	27862596	Texas	TX
2	Florida	20612439	Florida	FL
3	New York	19745289	New York	NY

Many-to-one / one-to-many

	state	City
0	California	San Diego
1	California	Sacramento
2	New York	New York City
3	New York	Albany

	name	ANSI
0	California	CA
1	Florida	FL
2	New York	NY
3	Texas	TX

Many-to-one / one-to-many



	name	ANSI	state	City
0	California	CA	California	San Diego
1	California	CA	California	Sacramento
2	New York	NY	New York	New York City
3	New York	NY	New York	Albany

Many-to-one / one-to-many

	name	ANSI	state	City
0	California	CA	California	San Diego
1	California	CA	California	Sacramento
2	New York	NY	New York	New York City
3	New York	NY	New York	Albany

Different types of merges

- One-to-one
- Many-to-one
- Many-to-many
- All use the same function
- Only difference is the DataFrames you are merging

Let's practice!

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