



CLEANING DATA IN PYTHON

Concatenating data



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

	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

```
In [1]: concatenated = pd.concat([weather_p1, weather_p2])
```

```
In [2]: 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

```
In [3]: concatenated = concatenated.loc[0, :]
```

```
Out[3]:
```

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



pandas concat

```
In [4]: pd.concat([weather_p1, weather_p2], ignore_index=True)
```

```
Out[4]:
```

	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



CLEANING DATA IN PYTHON

Let's practice!



CLEANING DATA IN PYTHON

Finding and concatenating data



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: * ?
 - 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

```
In [1]: import glob
```

```
In [2]: csv_files = glob.glob('*.*csv')
```

```
In [3]: print(csv_files)
```

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



Using loops

```
In [4]: list_data = []
```

```
In [5]: for filename in csv_files:  
...:     data = pd.read_csv(filename)  
...:     list_data.append(data)
```

```
In [6]: pd.concat(list_data)
```



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Let's practice!



CLEANING DATA IN PYTHON

Merge data



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



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
3	New York	19745289

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



Merging data

```
In [1]: pd.merge(left=state_populations, right=state_codes,  
....:             on=None, left_on='state', right_on='name')
```

```
Out[1]:
```

	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



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



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Let's practice!