Teaching the teacher: Python
Day 2 – Morning: Pandas

Today

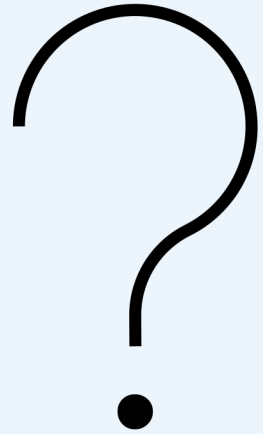
Python modules

What are Pandas

Basic operations

Data wrangling

Questions about yesterday



Python modules

Modules, packages, libraries

"Code library" that you can import

```
import pandas as pd
```

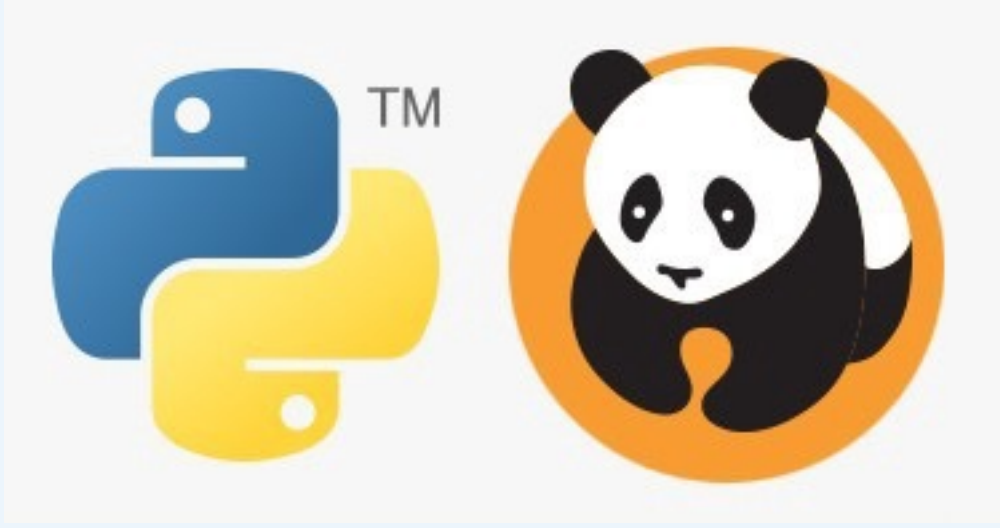
Several built-in modules

https://docs.python.org/3/library/

Pip install one's written by others

```
pip install …
```

Pandas



Pandas

"pandas is an open source, BSD-licensed library providing high-performance, easy-to-use data structures and data analysis tools for the Python programming language."

Pd.DataFrames:

- Objects stroing tabular data in rows and columns
- Colums and rows have names
- Many built-in methods for data wrangling and basic analyses

- *SPSS, Excel, R…*

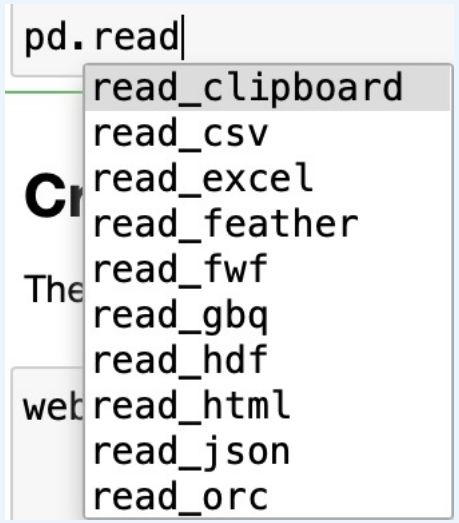
How do you make a panda?

Make a dataframe from a dict or list

```
df = pd.DataFrame(list-of-lists,
dict etc.)
```

Read from an existing file

```
df = pd.read
```



```
videos = pd.read_csv('videolist_search500_2020_01_25-12_34_16.tab')
```

```
---------------------------------------------------------------------------
ParserError                               Traceback (most recent call last)
<ipython-input-3-70a34e0eabd1> in <module>
----> 1 videos = pd.read_csv('videolist_search500_2020_01_25-12_34_16.tab')

/anaconda3/lib/python3.7/site-packages/pandas/io/parsers.py in parser_f(filepath_or_buffer, sep, delimiter, header, names, index_col, usecols, squeeze, prefix, mangle_dupe_cols, dtype, engine, converters, true_values, false_values, skipinitialspace, skiprows, skipfooter, nrows, na_values, keep_default_na, na_filter, verbose, skip_blank_lines, parse_dates, infer_datetime_format, keep_date_col, date_parser, dayfirst, iterator, chunksize, compression, thousands, decimal, lineterminator, quotechar, quoting, doublequote, escapechar, comment, encoding, dialect, tupleize_cols, error_bad_lines, warn_bad_lines, delim_whitespace, low_memory, memory_map, float_precision)
    700                     skip_blank_lines=skip_blank_lines)
    701
--> 702         return _read(filepath_or_buffer, kwds)
    703
    704     parser_f.__name__ = name

/anaconda3/lib/python3.7/site-packages/pandas/io/parsers.py in _read(filepath_or_buffer, kwds)
    433
    434     try:
--> 435         data = parser.read(nrows)
    436     finally:
    437         parser.close()
```

```
videos = pd.read_csv('videolist_search500_2020_01_25-12_34_16.tab', sep='\t')
videos
```

	position	channelId	channelTitle	videoId	publishedAt	publishedAtSQL	videoTitle	videoDescription	videoCategoryId	videoCategoryLabel	...
0	1	UCIALMKvObZNtJ6AmdCLP7Lg	Bloomberg Markets and Finance	sGHq_EwXDn8	2020-01-24T04:15:28.000Z	2020-01-24 04:15:28	Australia's Policies Going in Wrong Direction ...	Jan.23 -- Michael Mann, distinguished professo...	25	News & Politics	...
1	2	UCb1Ti1WKPauPpXkYKVHNpsw	LBC	PRtn1W2RAVU	2020-01-23T10:32:38.000Z	2020-01-23 10:32:38	Nigel Farage compares President Trump and Prin...	This is Nigel Farage's reaction to President T...	25	News & Politics	...
2	3	UC-SJ6nODDmufqBzPBwCvYvQ	CBS This Morning	2CQvBGSiDvw	2019-12-23T13:38:55.000Z	2019-12-23 13:38:55	Climate change in the 2020s: What impacts to e...	In our series The 2020's, we're exploring the ...	25	News & Politics	...
3	4	UCcyq283he07B7_KUX07mmtA	Business Insider	Cbwv1jg4gZU	2020-01-22T22:28:34.000Z	2020-01-22 22:28:34	Solution To Climate Change Is To Make It Profi...	Environmental problems rose to the top of the ...	25	News & Politics	...

In what situations would you choose for approaches from yesterday (for-loop) to read or write tabular data and in which would you use pandas?
Pros? Cons?

When to use Panda dataframes

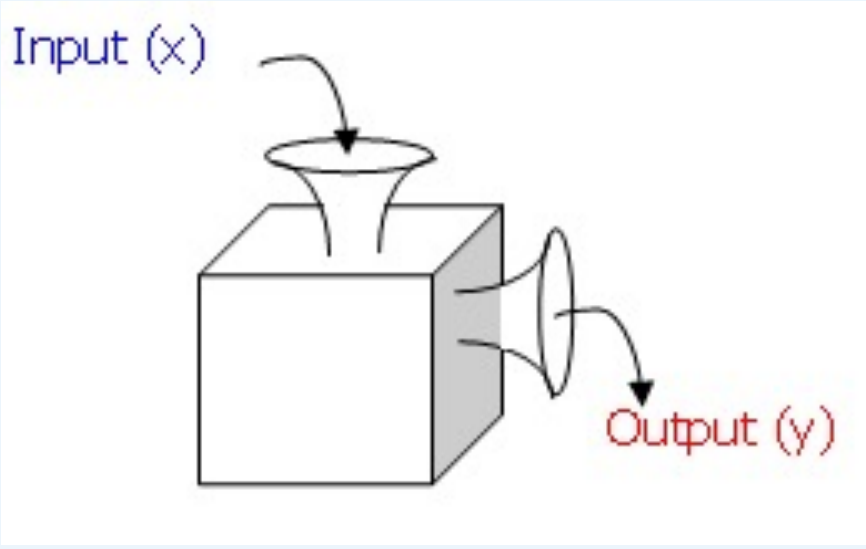
Pandas	Other formats
• Tabular data • Easy to have a look • Data wrangling, descriptives… • R/SPSS/Stata user-friendly	• Non-tabular data • No clear cases (rows) and variables (columns) • Large size of data • Long operations (avoid crashing)

Pandas – basic operations

- dataframe.columns
- dataframe.isna().sum()
- dataframe.head()
- dataframe.describe().transpose()
- dataframe.groupby(“x”)

Pandas and applying fuctions

```
df['new_column'] = df['source_column'].apply(function)
```



Subsetting and slicing

list: `list[0:5]` – 0,1,2,3,4

Dict: `mydict[“mijnkey”]` – value associated with a key

Dataframe:

- `df[[‘col2’, ‘col2’]]` – two columns from a dataframe
- `df[df[‘col1’] == ‘value’]` – only rows that score 1 on col1
- `df[df[‘col2’]>0]` – only rows that score more than 0 on col 2

Subsetting with iloc

Choose column or row

`iloc[]` – number of the column/row

`.loc[]` – name of the column

Concat and merging

Two situations:

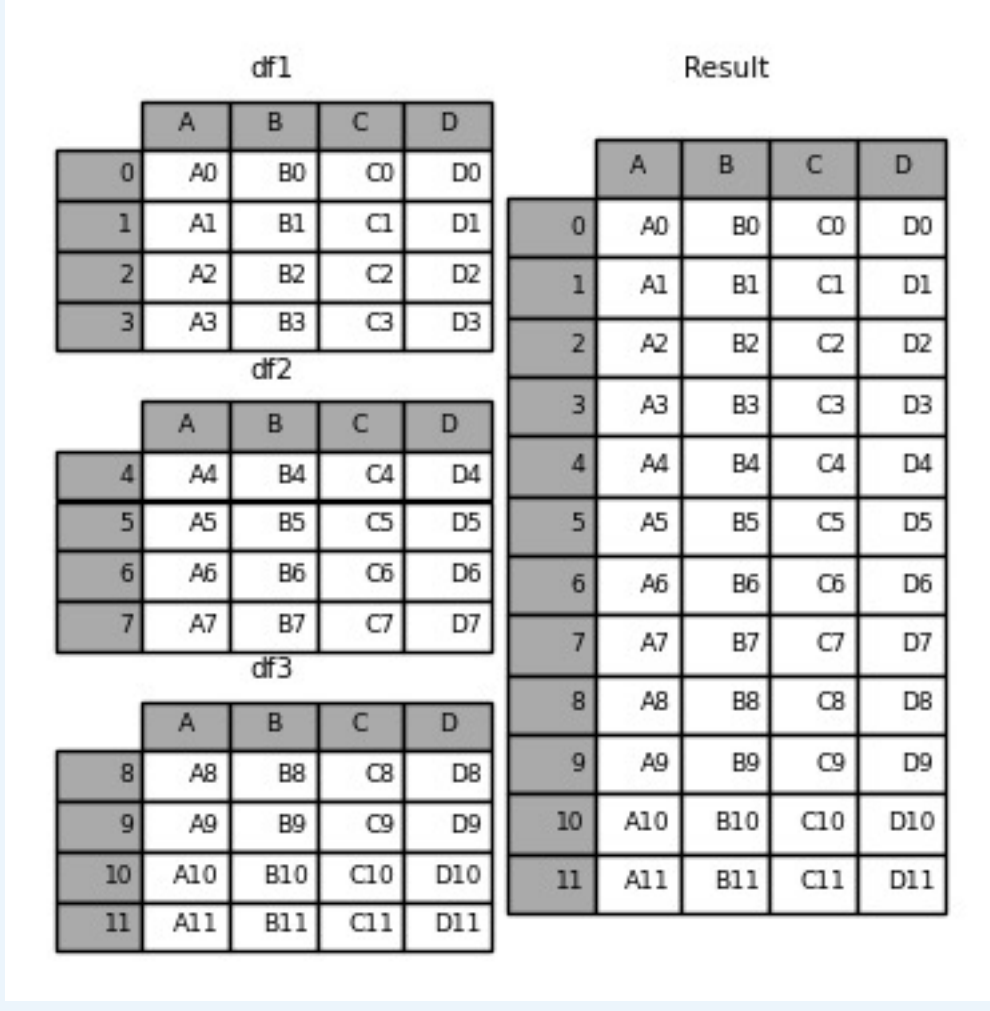
1. Two datasets that you can merge together on a unique identifier
   → merge
1. Two datasets that have the same variables/columns; you can “add cases”
   → concat

Add cases

Concat

```
frames = [df1, df2, df3]

result = pd.concat(frames)
```



	A	B	C	D
0	A0	B0	C0	D0
1	A1	B1	C1	D1
2	A2	B2	C2	D2
3	A3	B3	C3	D3

	A	B	C	D
4	A4	B4	C4	D4
5	A5	B5	C5	D5
6	A6	B6	C6	D6
7	A7	B7	C7	D7

	A	B	C	D
8	A8	B8	C8	D8
9	A9	B9	C9	D9
10	A10	B10	C10	D10
11	A11	B11	C11	D11

	A	B	C	D
0	A0	B0	C0	D0
1	A1	B1	C1	D1
2	A2	B2	C2	D2
3	A3	B3	C3	D3
4	A4	B4	C4	D4
5	A5	B5	C5	D5
6	A6	B6	C6	D6
7	A7	B7	C7	D7
8	A8	B8	C8	D8
9	A9	B9	C9	D9
10	A10	B10	C10	D10
11	A11	B11	C11	D11

```
df_bezoekers
```

	bezoeker	source	tijd	paginas
0	476	social	360	3
1	467	organic	36	2
2	234	organic	12	1
3	626	search	98	2
4	964	social	2	1
5	125	social	68	3
6	784	search	43	2
7	346	search	87	3
8	567	organic	276	3
9	345	social	45	2
10	246	social	8	1
11	865	search	78	2
12	135	search	2	1
13	357	search	35	3
14	126	search	43	2
15	765	social	77	3

```
df_info
```

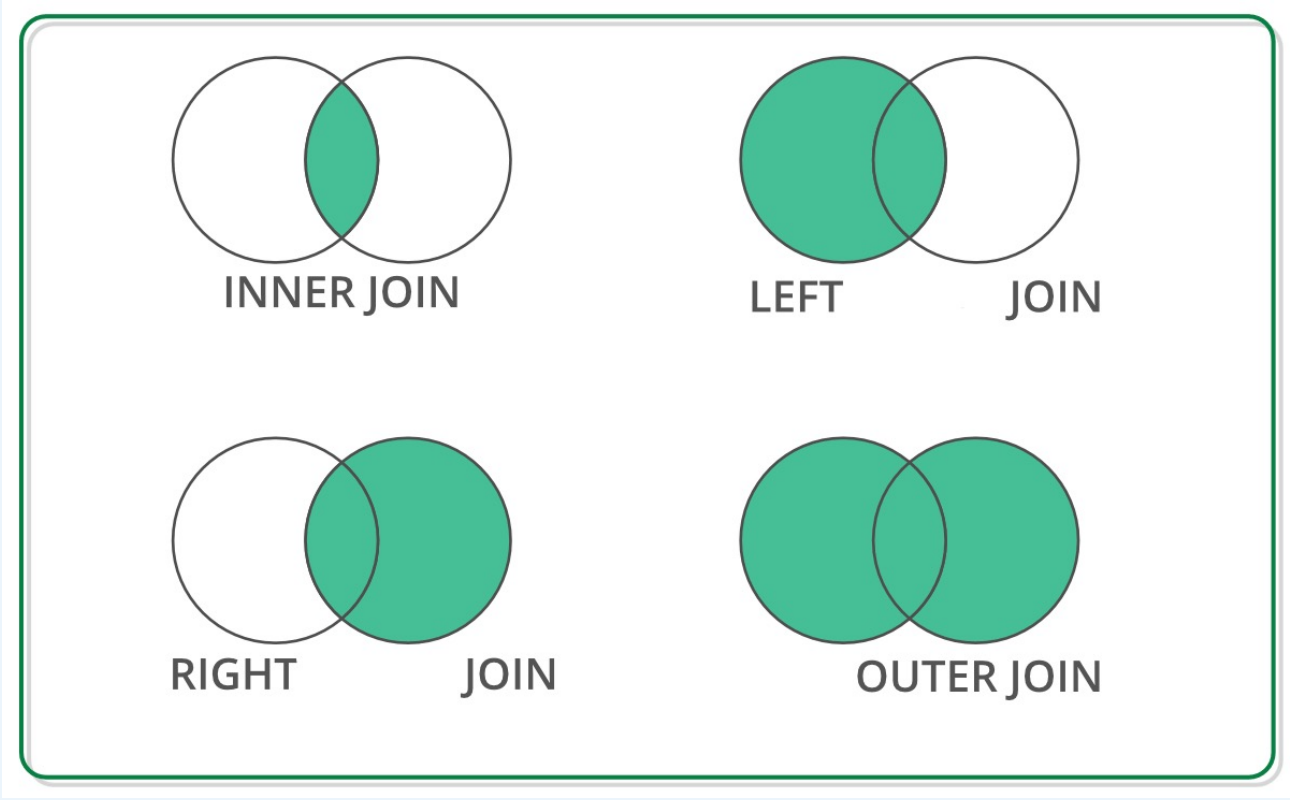
	ID	Geslacht	Leeftijd	Postcode	Subscribed
0	476.0	man	23.0	1019.0	True
1	467.0	man	56.0	3842.0	False
2	234.0	man	32.0	7539.0	True
3	626.0	vrouw	56.0	8163.0	False
4	964.0	vrouw	32.0	7815.0	True
...	...	...	...	...	...
99	NaN	NaN	NaN	NaN	NaN
100	NaN	NaN	NaN	NaN	NaN
101	NaN	NaN	NaN	NaN	NaN
102	NaN	NaN	NaN	NaN	NaN
103	NaN	NaN	NaN	NaN	NaN

Merge

Merge

→ Add columns

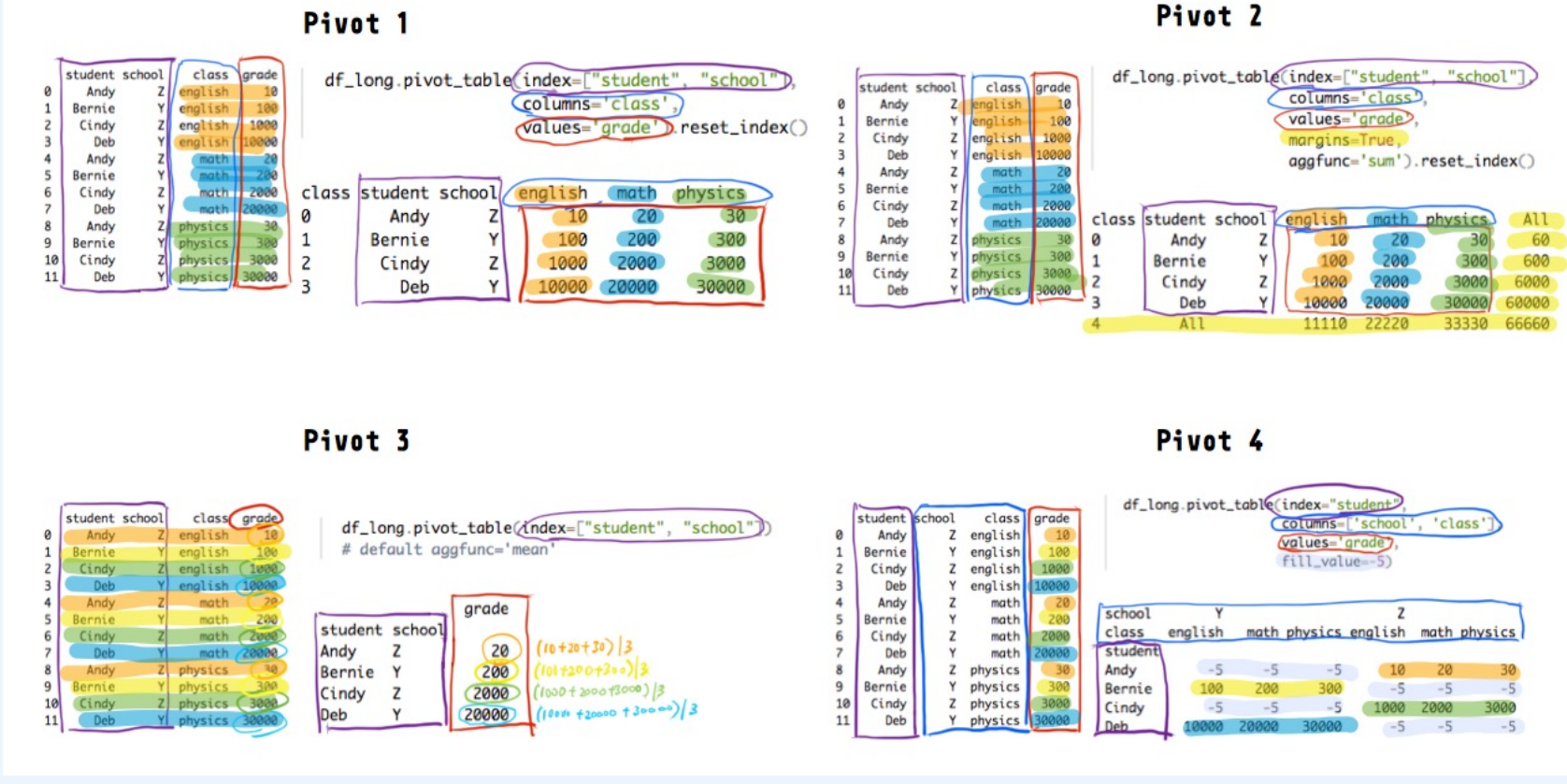
```
df3 = df1.merge(df2, on="ID", how=?)
```



Bonus – data shape

- Aggregate to change unit of analysis
- Reshape data to wide or long

Reshaping pandas dataframe with pivot_table (wide to long)



Source: towards data science