Week 10 Tutorial: Data Wrangling in Python

POP77001 Computer Programming for Social Scientists

Loading the Dataset

- Replace filepath with the location of the file on your computer

```
import pandas as pd
```

```
# This time let's skip the 2nd row, which contains questions
PATH = '../data/kaggle_survey_2022_responses.csv'

kaggle2022 = pd.read_csv(PATH, skiprows = [1])
kaggle2022.head(n = 1)
```

	Duration (in seconds)	Q2	Q3	Q4	Q5	Q6_1	Q6_2	Q6_3	Q6_4	Q6_5	...
0	121	30-34	Man	India	No	NaN	NaN	NaN	NaN	NaN	...

1 rows × 296 columns

```
# We will load the questions as a separate dataset
kaggle2022_qs = pd.read_csv(PATH, nrows = 1)
kaggle2022_qs
```

	Duration (in seconds)	Q2	Q3	Q4	Q5	Q6_1	Q6_2

	Duration (in seconds)	Q2	Q3	Q4	Q5	Q6_1	Q6_2
0	Duration (in seconds)	What is your age (# years)?	What is your gender? - Selected Choice	In which country do you currently reside?	Are you currently a student? (high school, uni...	On which platforms have you begun or completed...	On which platforms have you begun or completed...

1 rows × 296 columns

Exercise: Categorical Variables

- Load the dataset (as local file)
- Consider country of residence reported by respondents (question Q4).
- Make sure you can select the column both using label and index.
- Calculate the percentages of top 3 countries of residence in the sample.

Crosstabulation in pandas

```
# Calculate crosstabulation between 'Age group' (Q2) and 'Gender' (Q3)
pd.crosstab(kaggle2022['Q2'], kaggle2022['Q3'])
```

Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
Q2					
18-21	3310	13	69	7	1160
22-24	3168	15	50	6	1044
25-29	3425	14	56	6	971
30-34	2248	12	43	6	663
35-39	1791	6	36	1	519
40-44	1480	6	29	2	410
45-49	997	6	10	1	239
50-54	759	0	14	1	140
55-59	506	3	13	0	89
60-69	470	3	10	1	42

Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
Q2					
70+	112	0	4	2	9

Margins in Crosstab

```
# It is often useful to see the proportions/percentages rather than raw counts
pd.crosstab(kaggle2022['Q2'], kaggle2022['Q3'], normalize = 'columns')
```

Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
Q2					
18-21	0.181211	0.166667	0.206587	0.212121	0.219448
22-24	0.173437	0.192308	0.149701	0.181818	0.197503
25-29	0.187507	0.179487	0.167665	0.181818	0.183693
30-34	0.123070	0.153846	0.128743	0.181818	0.125426
35-39	0.098051	0.076923	0.107784	0.030303	0.098184
40-44	0.081025	0.076923	0.086826	0.060606	0.077563
45-49	0.054582	0.076923	0.029940	0.030303	0.045214
50-54	0.041553	0.000000	0.041916	0.030303	0.026485
55-59	0.027702	0.038462	0.038922	0.000000	0.016837

Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
Q2					
60-69	0.025731	0.038462	0.029940	0.030303	0.007946
70+	0.006132	0.000000	0.011976	0.060606	0.001703

Crosstab with `pivot_table`

```
# For `values` variable we use `Q4`, but any other would work equally well
pd.pivot_table(
  kaggle2022,
  index = 'Q2',
  columns = 'Q3',
  values = 'Q4',
  aggfunc = 'count',
  fill_value = 0
)
```

Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
Q2					
18-21	3310	13	69	7	1160
22-24	3168	15	50	6	1044
25-29	3425	14	56	6	971
30-34	2248	12	43	6	663
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Q3	Man	Nonbinary	Prefer not to say	Prefer to self-describe	Woman
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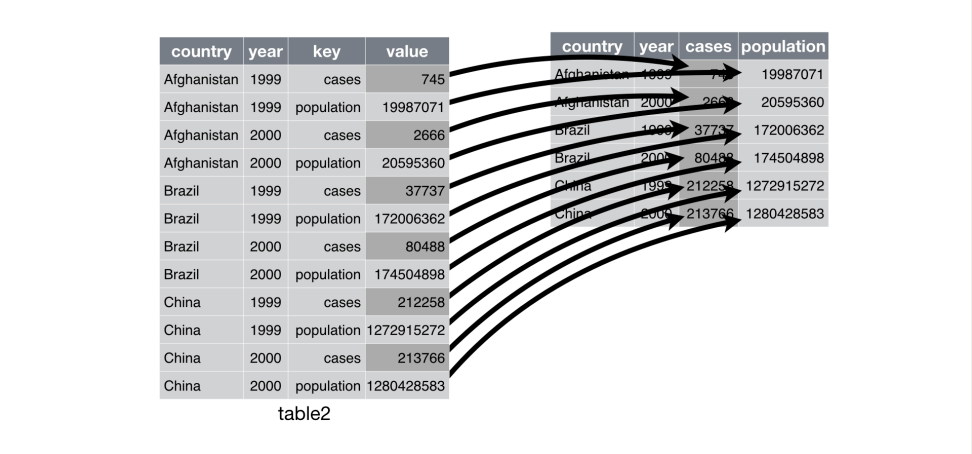
60-69	470	3	10	1	42
70+	112	0	4	2	9

Exercise: Manipulating Columns

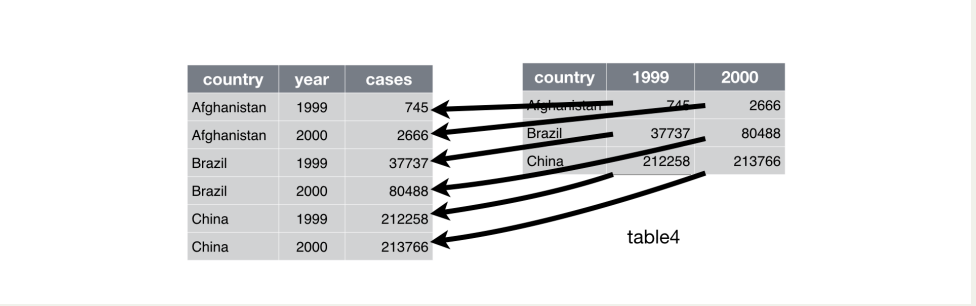
- Let's take a look at the first column of the dataset.
- It lists the time it took respondents to complete the survey (in seconds).
- First, change column's long name to `duration_min`.
- Now modify the column such that it shows time in minutes.
- Filter dataset leaving only respondents who took more than 3 mins to respond.
- How many are dropped?

Pivoting Data in pandas

- Recall pivoting from R.
- The two main operations are:
  - Spreading some variable across columns (`pd.DataFrame.pivot()`)
  - Gathering some columns in a variable pair (`pd.DataFrame.melt()`)



pd.DataFrame.pivot()



pd.DataFrame.melt()

Source

R for Data Science

Pivoting Data to Long

```
df_wide = pd.DataFrame({
  'country': ['Afghanistan', 'Brazil'],
  '1999': [745, 2666],
  '2000': [37737, 80488]
})
df_wide
```

	country	1999	2000
0	Afghanistan	745	37737
1	Brazil	2666	80488

```
# Pivoting longer
df_long = df_wide.melt(
    id_vars = 'country',
    var_name = 'year',
    value_name = 'cases'
)
df_long
```

	country	year	cases
0	Afghanistan	1999	745
1	Brazil	1999	2666
2	Afghanistan	2000	37737
3	Brazil	2000	80488

Pivoting Data to Wide

```
# Pivoting wider
df_wide = df_long.pivot(
    index = 'country',
    columns = 'year',
    values = 'cases'
)
df_wide
```

year	1999	2000
country		
Afghanistan	745	37737
Brazil	2666	80488

```
# As using pivot creates an index from
# the column used as the row labels, we
# may want to use reset_index to move
# the data back into a column
df_wide.reset_index()
```

year	country	1999	2000
0	Afghanistan	745	37737
1	Brazil	2666	80488

Week 10 Exercise (unassessed)

- Try replicating Exercise 5 from Assignment 2 using `pandas`.
- You can use `pd.DataFrame.isna()` or `pd.DataFrame.notna()` for filtering.