Effective Programming Practices for Economists

Data management with pandas

Inspecting and summarizing data

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Motivation

- So far we have looked at tiny DataFrames
- Real datasets don’t fit on a screen
- Need quick ways to:
  - Look at subsets
  - Calculate summary statistics
  - Plot distributions

Example

	country	continent	year	life_exp	pop	gdp_per_cap	iso_alpha	iso_num
0	Afghanistan	Asia	1952	28.801	8425333	779.445314	AFG	4
1	Afghanistan	Asia	1957	30.332	9240934	820.853030	AFG	4
2	Afghanistan	Asia	1962	31.997	10267083	853.100710	AFG	4
3	Afghanistan	Asia	1967	34.020	11537966	836.197138	AFG	4
4	Afghanistan	Asia	1972	36.088	13079460	739.981106	AFG	4
5	Afghanistan	Asia	1977	38.438	14880372	786.113360	AFG	4
...	...	...	...	...	...	...	...	...
1699	Zimbabwe	Africa	1987	62.351	9216418	706.157306	ZWE	716
1700	Zimbabwe	Africa	1992	60.377	10704340	693.420786	ZWE	716
1701	Zimbabwe	Africa	1997	46.809	11404948	792.449960	ZWE	716
1702	Zimbabwe	Africa	2002	39.989	11926563	672.038623	ZWE	716
1703	Zimbabwe	Africa	2007	43.487	12311143	469.709298	ZWE	716

Summarize an entire DataFrame

assume that `df` is the full gapminder data

```
>>> relevant = ["life_exp", "pop", "gdp_per_cap"]
>>> df[relevant].describe()
```

	life_exp	pop	gdp_per_cap
count	1704.00	1704.00	1704.00
mean	59.47	29601212.32	7215.33
std	12.92	106157896.74	9857.45
min	23.60	60011.00	241.17
25%	48.20	2793664.00	1202.06
50%	60.71	7023595.50	3531.85
75%	70.85	19585221.75	9325.46
max	82.60	1318683096.00	113523.13

- `.describe` can summarize entire DataFrames
- Result is again a DataFrame
- Often good idea to select a subset of columns

Calculate specific statistics

assume that `df` is the full gapminder data

```
>>> df["life_exp"].mean()
59.474439366197174

>>> df.groupby("year").mean()

year
1952    49.057620
1957    51.507401
1962    53.609249
...
```

- Standard summary statistics are implemented and named as expected:
  - `std`
  - `min` and `max`
  - `median` and `quantile`
- Vectorized and really fast implementations

Quick plotting: Series

```
>>> pd.options.plotting.backend = "plotly"
>>> df.groupby("year")["life_exp"].mean().plot()
```

- Any Series has a `.plot` method
- Any Series has a `.hist` method
- Summary statistics based on groupby return Series which can again be plotted

Quick plotting: DataFrames

```
>>> pd.options.plotting.backend = "plotly"
>>> df.plot.scatter(x="year", y="life_exp",
                    color="country")
```

- Any DataFrame has a `.plot` method
- Defaults to line plot, can access `.scatter` and many more
- Notebook gives you interactive plots

Statistics for categorical data

```
>>> df["country"].unique()[:2]

<ArrowStringArrayNumpySemantics>
['Afghanistan', 'Albania']
Length: 2, dtype: string

>>> df["country"].value_counts().sort_index()[:2]

country
Afghanistan    12
Albania        12
Name: count, dtype: int64
```