Fall 2018: Introduction to Data Science

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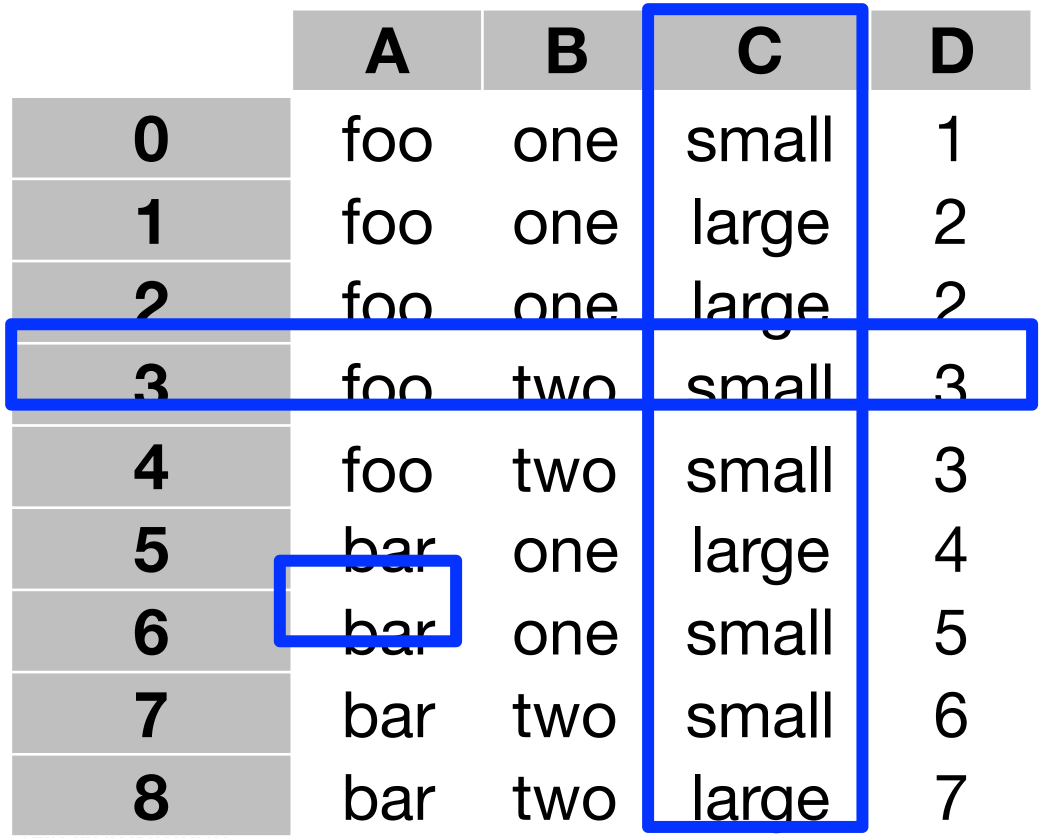
The DataFrame



	A	B	C	D
0	foo	one	small	1
1	foo	one	large	2
2	foo	one	large	2
3	foo	two	small	3
4	foo	two	small	3
5	bar	one	large	4
6	bar	one	small	5
7	bar	two	small	6
8	bar	two	large	7

- Rows -> Axis 0
- Columns -> Axis 1

- df[“C”]
- df.iloc[3]
- df.iloc[6][“A”]

Chain Indexing

- df.iloc[6][“A”] is an example of **chain indexing** and is considered bad Python practice

Missing Values

- Python uses NaN to indicate missing values as it reads in
- This feature can be turned off
- Missing values can be filled in with other default values
- ForwardFill and BackwardFill propagate next or previous values in table

Scales

- **Ratio** Scale: equally spaced with valid +/1; e.g. height
- **Interval** Scale: equally spaced, but zero has specific meaning; e.g. temp
- **Ordinal** Scale: ordered values, but not equally spaced; e.g. grades
- **Nominal** Scale: categorized, no order; e.g., Countries

- Can convert one to another
  - ❑ Grades could be nominal/categorical
  - ❑ Can be converted to ordinal or ratio
- Can also convert numerical values to categorical
  - ❑ Discretization
  - ❑ Histograms
- Use cut feature in pandas

Python and SQL

- SQL is a query language used to query relational databases
- SELECT operation
  - □ SELECT [ ] FROM [ ] WHERE [ ]

- Python notebooks allow for SQL queries to be incorporated
- query = '""'SELECT **fields**
  FROM **Rel**
  WHERE **conds**
  '"'’’
- df = **Rel**.query_to_pandas(query)

Google’s BigQuery

- Google's serverless enterprise data warehouse with security
- Infrastructure by Google to create logical data warehouse
- Allows scalable data analytics and ML tools at good price-performance
- Uses SQL without need for database administrator
- Allows relational DB, spreadsheets, objects DB, and ODBC/JDBC drivers
- Makes it easy to join public or commercial datasets with local datasets
- Columnar & cloud storage, parallel execution, automatic optimizations
- Supports popular BI tools like Tableau, MicroStrategy, Looker, and Data Studio$^{\text{BETA}}$ out of the box

Let’s try BigQuery

- BigQuery is a database that lets you use SQL to work with very large datasets.
- Open link: https://www.Kaggle.com/kernels/fork/1058477 in a new tab
- After logging in, upload the Python notebook sql2py.ipynb and run it.
- The code, loads the Chicago_crime database.
- It then shows how to convert SQL queries into python code.

Blogs

- Planetpython.org
- Dataskeptic.com