CS167: Machine Learning

Pandas Tutorial

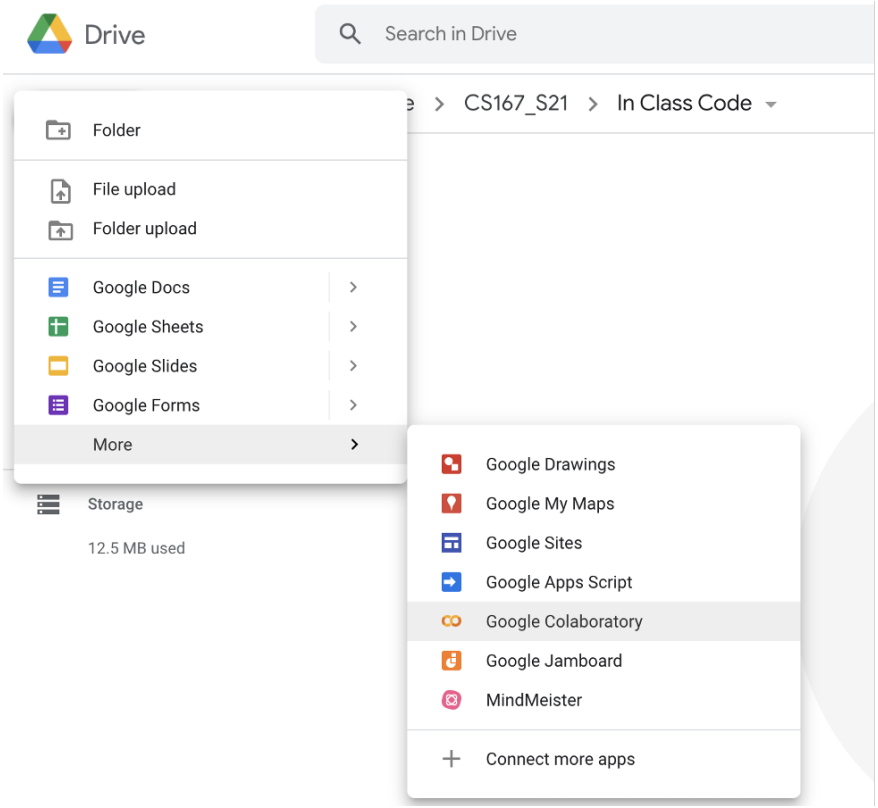
Monday, February 2nd, 2026

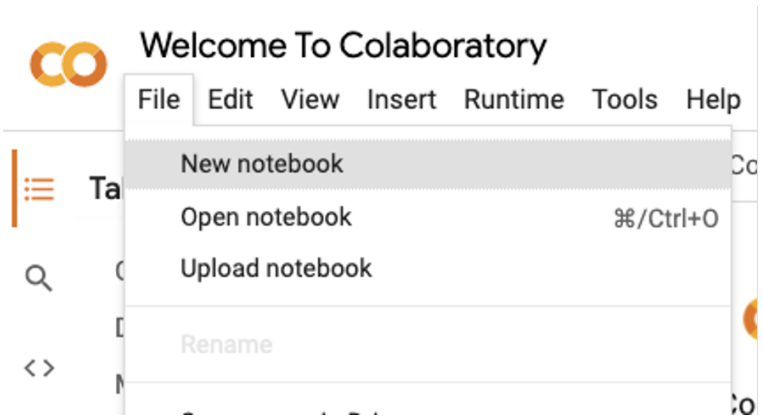
Recap

- Introduction to Google Colab
- Python Lab
- Accessing Data

Recap: Create a new notebook

- There are two ways to do this:
  - From Google Drive: https://drive.google.com/
  - From Colab: https://colab.research.google.com/





Recap: Python Lab

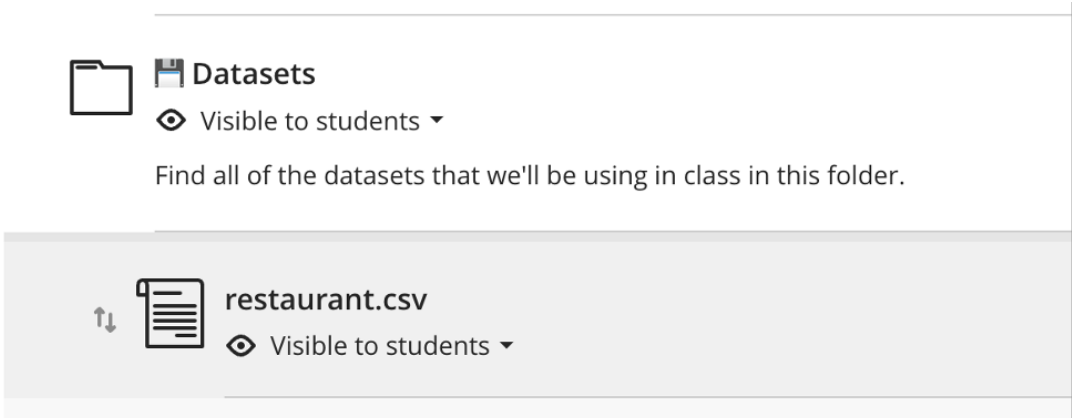
- Make sure you give your notebook a name (maybe `Day01_notes.ipynb`), and save it to your CS167-Notes Github repository. Your workflow for the rest of class should look something like this:

  - you should have the `Day01_Notes.txt` file open, as well as your Colab Notebook.
  - Copy a section of text from the .txt file and paste it into a new cell in your Colab Notebook.
  - Take a minute and look over the code and predict what will happen. Some cells have specific instructions as to what you should be trying to predict.
  - Run the cell, and see if your prediction was correct.
    - If so, great! Move on.
    - If not, even better--you get to dig into why your expectations were different than how it actually worked, which is a great opportunity to learn something new :)
  - Move on to the next cell and repeat!

Recap: Accessing Data

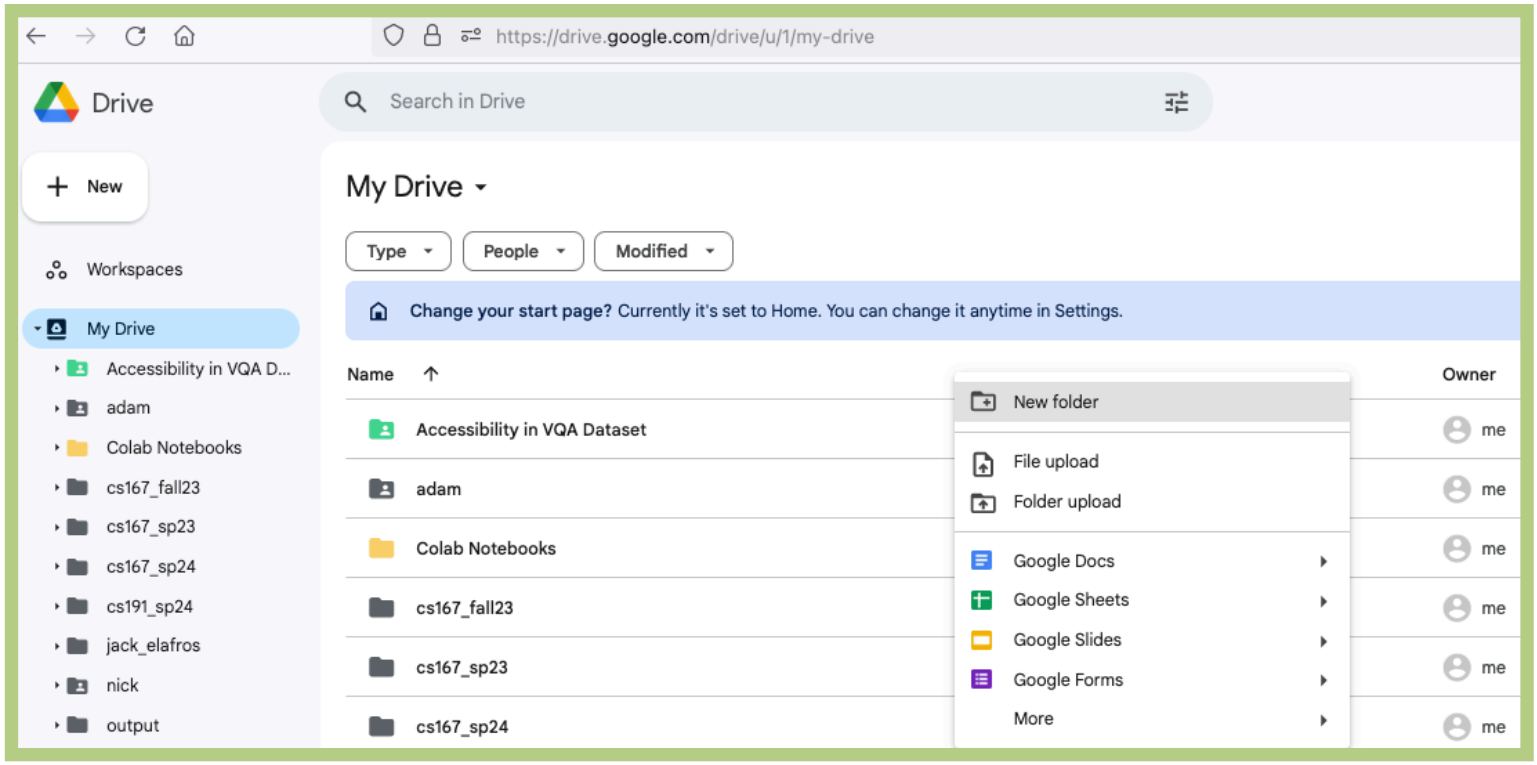
- Google Colab is a cloud-based tool, which means that we need to store our data in the cloud as well. We cannot simply reference our local data and expect it to work.

- Go ahead and download the `restaurant.csv` file from Blackboard. It is in the Datasets folder.



Recap: Uploading File to Google Drive

- Upload the `restaurant.csv` to your Google Drive.
  - First go to: drive.google.com
  - Then, create a directory/folder (by right-clicking your mouse) as shown below:



Recap: Accessing Data

- To access this file in Google Colab, you'll need a little bit of code.

```
[ ]  # The first step is to mount your Google Drive to your Colab account.
     #You will be asked to authorize Colab to access your Google Drive. Follow the steps they lead you through.

     #this will only work in Google Colab.

     from google.colab import drive
     drive.mount('/content/drive')
```

- Do a demonstration …

Today's Agenda

- Topics:
  - Introduction to Pandas (a library in Python)
  - Subsetting (Columns, Rows, or both) in a DataFrame
    - Select Columns in a DataFrame
    - Select Rows in a DataFrame
    - Select **subsets** of the DataFrame (both rows and columns)

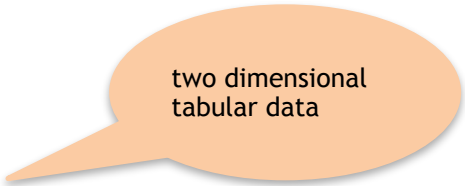
Accessing Data

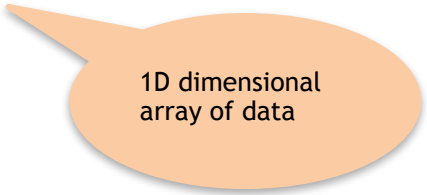
- **Pandas** is a super powerful Python data analysis library.
  - it's built on top of another powerful library called `numpy`

- Using Google Colab, `pandas` should already be installed. If you see `In [*]` next to a cell, it means your computer is working on the task

Pandas Datatypes: `DataFrame` and `Series`

- In `pandas`, there are two main datatypes
  - `DataFrame`
  - `Series`





Pandas Datatypes: `DataFrame`

- Pandas Documentation defines `DataFrames` as:
  - *'Two-dimensional, size-mutable, potentially heterogeneous tabular data'*

  - basically, think of `DataFrames` as our excel sheets--two dimensional, tabular data
  - Each column has a name, and you can use these names to filter and create subsets of data
  - often, you'll see `DataFrames` variables abbreviated to `df`

Creating `DataFrame` by reading from a file

- You will be able to show the path of `restaurant.csv` on your Google Drive as follows:

```
#you should be able to run this without any issue.
import pandas as pd

path = "/content/drive/MyDrive/cs167_sp26/datasets/restaurant.csv"
df_rest = pd.read_csv(path)
print(df_rest)
```

```
    alt  bar  fri  hun   pat price rain  res     type    est target
0   Yes   No   No  Yes  Some   $$$   No  Yes   French   0-10    Yes
1   Yes   No   No  Yes  Full     $   No   No     Thai  30-60     No
2    No  Yes   No   No  Some     $   No   No   Burger   0-10    Yes
3   Yes   No  Yes  Yes  Full     $   No   No     Thai  10-30    Yes
4   Yes   No  Yes   No  Full   $$$   No  Yes   French    >60     No
5    No  Yes   No  Yes  Some    $$  Yes  Yes  Italian   0-10    Yes
6    No  Yes   No   No   NaN     $  Yes   No   Burger   0-10     No
7    No   No   No  Yes  Some    $$  Yes  Yes     Thai   0-10    Yes
8    No  Yes  Yes   No  Full     $  Yes   No   Burger    >60     No
9   Yes  Yes  Yes  Yes  Full   $$$   No  Yes  Italian  10-30     No
10   No   No   No   No   NaN     $   No   No     Thai   0-10     No
11  Yes  Yes  Yes  Yes  Full     $   No   No   Burger  30-60    Yes
```

- We did this last week

Helpful Method Alert: `df.head()`

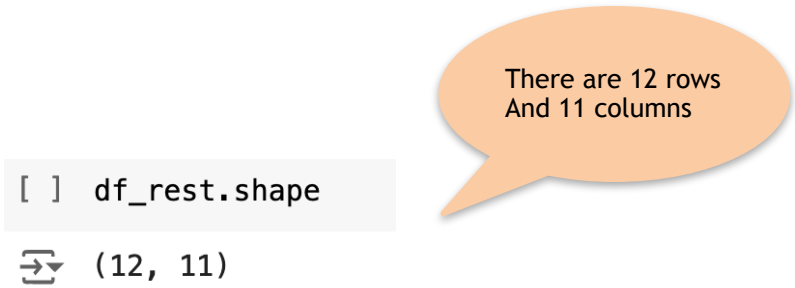
- The `.head()` method can be called on any `DataFrame`, and by default will display the first 5 lines/rows of the data, as well as the names of the columns.
  - if you want it to display more than 5 rows, you can provide a number as an argument to the method.

```
df_rest.head(7)
```

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
1	Yes	No	No	Yes	Full	$	No	No	Thai	30-60	No
2	No	Yes	No	No	Some	$	No	No	Burger	0-10	Yes
3	Yes	No	Yes	Yes	Full	$	No	No	Thai	10-30	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No
5	No	Yes	No	Yes	Some	$$	Yes	Yes	Italian	0-10	Yes
6	No	Yes	No	No	NaN	$	Yes	No	Burger	0-10	No

Helpful Method Alert: `df.shape()`

- The `.shape()` method can be called on any `DataFrame`, and it will show the dimensions ie, *number of rows* and *number of columns*



Column Names

- Want to see a list of all of the column names in your dataset? Try using `df.columns`

```
[4] df_rest.columns

Index(['alt', 'bar', 'fri', 'hun', 'pat', 'price', 'rain', 'res', 'type',
       'est', 'target'],
      dtype='object')
```

- If there are no spaces in the name of a column, you can also reference it using dot notation like so: `df.type`

```
df_rest.type
```

	type
0	French
1	Thai
2	Burger
3	Thai
4	French
5	Italian
6	Burger
7	Thai
8	Burger
9	Italian
10	Thai
11	Burger

Practice Time: Your Turn

- Give these helpful DataFrame methods a try on Google Colab for the next few minutes!

Ways of creating `DataFrame`

- The syntax for creating a `DataFrame` from scratch looks like:
  - `pandas.DataFrame(data, index, columns)`

```
df = pd.DataFrame() # creates an empty DataFrame
print(df)
```

```
Empty DataFrame
Columns: []
Index: []
```

Creating `DataFrame: 1D List`

- The syntax for creating a `DataFrame` from scratch looks like this:

```
# Example#3: initializing a DataFrame with list of items (without a column name)

data_list = [10, 20, 30, 40, 50, 60] # initialize list elements

df_1 = pd.DataFrame(data_list, columns=['numbers']) # Create the pandas DataFrame with column name is provided explicitly
print('size of the dataframe df_1', df_1.shape)
# print dataframe
df_1
```

```
size of the dataframe df_1 (6, 1)
```

	numbers
0	10
1	20
2	30
3	40
4	50
5	60

Creating `DataFrame: 1D List`

- The syntax for creating a `DataFrame` from scratch looks like this:

```
# Example#4: adding a column name (ie, "last name") to the DataFrame
data = ["reza", "chris", "eric"]
df_1 = pd.DataFrame(data, columns=["last name"])
print(df_1)
```

```
  last name
0      reza
1     chris
2      eric
```

Creating DataFrame: 2D List

```
# Example#8: initialize list of lists (each inner list corresponds to one row in the DataFrame)
data_2d_list = [['reza', 1], ['chris', 2], ['eric', 3]]

# Create the pandas DataFrame
df_3 = pd.DataFrame(data_2d_list, columns=['name', 'score'])

# print dataframe.
df_3
```

	name	score
0	reza	1
1	chris	2
2	eric	3

Creating DataFrame: dictionary

```
# Example#5: Create the pandas DataFrame with the column names provided explicitly
data_dict = {'col1':[1,2,3], 'col2':[4,5,6], 'col3':[7,8,9]}
df_2 = pd.DataFrame(data_dict)
print('size of the dataframe df_2', df_2.shape)
# print dataframe
df_2
```

```
size of the dataframe df_2 (3, 3)
```

	col1	col2	col3
0	1	4	7
1	2	5	8
2	3	6	9

Creating DataFrame: dictionary

```
# Example#6: Initializing a DataFrame with a dictionary of items allows you to specify the column names along with their corresponding values.
data_source = {'first name': ['a', 'b', 'c'], 'last name':['A', 'B', 'C']}
df_2 = pd.DataFrame(data_source)
print(df_2)

# Example#7: Initializing a DataFrame with a dictionary of items allows you to specify the column names along with their corresponding values.
data_source = {"first name":["alimoor", "chris", "eric"], "last name":["reza", "porter", "manley"], "scores":[2, 3, 4]}
df_2 = pd.DataFrame(data_source)
df_2.head()
```

```
  first name last name
0          a         A
1          b         B
2          c         C
```

	first name	last name	scores
0	alimoor	reza	2
1	chris	porter	3
2	eric	manley	4

Exercise#1: Practice Time, Your Turn

- Give these helpful DataFrame methods a try on Google Colab for the next few minutes!

- **Task 1:** Create a DataFrame with a single column containing the names of the six closest planets to the Sun:
  - ‘Mercury', 'Venus', 'Earth', 'Mars', 'Jupiter', and 'Saturn'

Exercise#2: Practice Time, Your Turn

- Give these helpful DataFrame methods a try on Google Colab for the next few minutes!

- **Task 2:** Create another DataFrame with a two columns containing the names of the six closest planets to the Sun and its type (rocky vs. gaseous)
  - ‘Mercury’, 'Venus',‘Earth', 'Mars', 'Jupiter', and 'Saturn'
  - ‘Rocky', 'Rocky', 'Rocky', 'Rocky', ‘Gaseous', and ‘'Gaseous'

Exercise#3: Practice Time, Your

- Give these helpful DataFrame methods a try on Google Colab for the next few minutes!

- **Task 3:** Now create last DataFrame with a two columns containing the names of the six closest planets to the Sun and its type (rocky vs. gaseous) using dictionary
  - ‘Mercury’, 'Venus',‘Earth', 'Mars', 'Jupiter', and 'Saturn'
  - ‘Rocky', 'Rocky', 'Rocky', 'Rocky', ‘Gaseous', and ‘'Gaseous'

Today's Agenda

- Rows in a DataFrame

- Subsetting (Columns, Rows, or both) in a DataFrame
  - Select subset of Columns in a DataFrame
  - Select subset of Rows in a DataFrame
  - Select **subsets** of the DataFrame (both rows and columns)

Selecting Rows in DataFrames using `loc` and `iloc`:

- Simply put:
  - `loc` gets DataFrame rows and columns by **labels/names**
  - `iloc` gets DataFrame rows and columns by **index/position**

Selecting Rows in DataFrames: `loc`

- Let's read the dataset and try `loc` to get items by rows **labels/names**

```
# load a new csv file 'titanic.csv'. you can find it on Blackboard under datasets module
path = '/content/drive/MyDrive/cs167_fall24/datasets/titanic.csv'

# read the file into a dataframe
df_titanic = pd.read_csv(path)
print('data.shape: ', df_titanic.shape)
df_titanic.head()
```

```
data.shape:  (891, 15)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
0	0	3	male	22.0	1	0	7.2500	S	Third	man	True	NaN	Southampton	no	False
1	1	1	female	38.0	1	0	71.2833	C	First	woman	False	C	Cherbourg	yes	False
2	1	3	female	26.0	0	0	7.9250	S	Third	woman	False	NaN	Southampton	yes	True
3	1	1	female	35.0	1	0	53.1000	S	First	woman	False	C	Southampton	yes	False
4	0	3	male	35.0	0	0	8.0500	S	Third	man	True	NaN	Southampton	no	True

labels/names (not indices)

Selecting Rows in DataFrames: `loc`

- `loc` gets DataFrame rows and columns by **labels/names**
- Let's take a subset of titanic and try to use `loc`:

```
[51] subset = df_titanic.loc[800:805] # since it's a label, it will take rows labeled 800, 801, 802, 803, 804, and 805.
     print(subset)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True
805	0	3	male	31.00	0	0	7.7750	S	Third	man	True	NaN	Southampton	no	True

labels/names (not indices)

ALERT: `print(subset)` shows all 6 rows

Selecting Rows in DataFrames: `loc`

- `loc` gets DataFrame rows and columns by **labels/names**
- Let's take a subset of titanic and try to use `loc` and `iloc`:

```
subset = df_titanic.loc[800:805]
subset.head()
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True

labels/names (not indices)

ALERT: `subset.head()` only shows the first 5 rows.

Selecting Rows in DataFrames: `loc`

- `loc` gets DataFrame rows and columns by **labels/names**

```
[51] subset = df_titanic.loc[800:805] # since it's a label, it will take rows labeled 800, 801, 802, 803, 804, and 805.
     print(subset)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True
805	0	3	male	31.00	0	0	7.7750	S	Third	man	True	NaN	Southampton	no	True

- What would happen if I do the following?

```
subset.loc[800]
```

```
survived                0
pclass                  2
sex                  male
age                  34.0
sibsp                   0
parch                   0
fare                 13.0
embarked                S
class              Second
who                   man
adult_male           True
deck                  NaN
embark_town    Southampton
alive                  no
alone                True
Name: 800, dtype: object
```

Selecting Rows in DataFrames: `loc`

- `loc` gets DataFrame rows and columns by **labels/names**

```
[51] subset = df_titanic.loc[800:805] # since it's a label, it will take rows labeled 800, 801, 802, 803, 804, and 805.
     print(subset)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True
805	0	3	male	31.00	0	0	7.7750	S	Third	man	True	NaN	Southampton	no	True

- What would happen if I do the following?

```
subset.loc[805]
```

```
survived                0
pclass                  3
sex                  male
age                  31.0
sibsp                   0
parch                   0
fare                7.775
embarked                S
class               Third
who                   man
adult_male           True
deck                  NaN
embark_town    Southampton
alive                   no
alone                 True
Name: 805, dtype: object
```

Selecting Rows in DataFrames: `loc`

- `loc` gets DataFrame rows and columns by **labels/names**

```
[51] subset = df_titanic.loc[800:805] # since it's a label, it will take rows labeled 800, 801, 802, 803, 804, and 805.
     print(subset)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True
805	0	3	male	31.00	0	0	7.7750	S	Third	man	True	NaN	Southampton	no	True

- What would happen if I do the following?

```
subset.loc[806] #
```

```
---------------------------------------------------------------------------
ValueError                                Traceback (most recent call last)
/usr/local/lib/python3.10/dist-packages/pandas/core/indexes/range.py in get_loc(self, key, method, tolerance)
    390                 try:
--> 391                     return self._range.index(new_key)
    392                 except ValueError as err:

ValueError: 806 is not in range

The above exception was the direct cause of the following exception:
```

Selecting Rows in DataFrames: `iloc`

- `iloc` gets DataFrame rows and columns by **index/position**

```
[51] subset = df_titanic.loc[800:805] # since it's a label, it will take rows labeled 800, 801, 802, 803, 804, and 805.
     print(subset)
```

	survived	pclass	sex	age	sibsp	parch	fare	embarked	class	who	adult_male	deck	embark_town	alive	alone
800	0	2	male	34.00	0	0	13.0000	S	Second	man	True	NaN	Southampton	no	True
801	1	2	female	31.00	1	1	26.2500	S	Second	woman	False	NaN	Southampton	yes	False
802	1	1	male	11.00	1	2	120.0000	S	First	child	False	B	Southampton	yes	False
803	1	3	male	0.42	0	1	8.5167	C	Third	child	False	NaN	Cherbourg	yes	False
804	1	3	male	27.00	0	0	6.9750	S	Third	man	True	NaN	Southampton	yes	True
805	0	3	male	31.00	0	0	7.7750	S	Third	man	True	NaN	Southampton	no	True

```
subset.iloc[0]  #works
```

```
survived                0
pclass                  2
sex                  male
age                  34.0
sibsp                   0
parch                   0
fare                 13.0
embarked                S
class              Second
who                   man
adult_male           True
deck                  NaN
embark_town    Southampton
alive                  no
alone                True
Name: 800, dtype: object
```

```
subset.iloc[1]  #works
```

```
survived                1
pclass                  2
sex                female
age                  31.0
sibsp                   1
parch                   1
fare                26.25
embarked                S
class              Second
who                 woman
adult_male          False
deck                  NaN
embark_town    Southampton
alive                  yes
alone                False
Name: 801, dtype: object
```

```
subset.iloc[5]  #works
```

```
survived                0
pclass                  3
sex                  male
age                  31.0
sibsp                   0
parch                   0
fare                7.775
embarked                S
class              Third
who                   man
adult_male           True
deck                  NaN
embark_town    Southampton
alive                   no
alone                True
Name: 805, dtype: object
```

Exercise#4:
Practice Time, Your Turn

- Try `loc/iloc` on your Google Colab notebook using different name or indices!

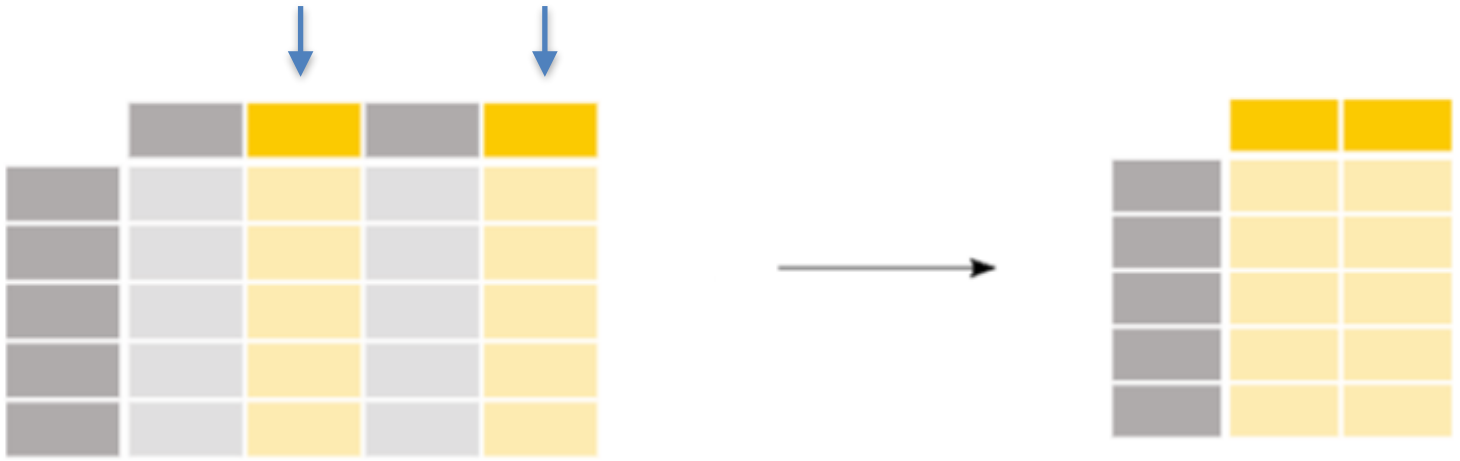
Today's Agenda

- Rows in a DataFrame

- Subsetting (Columns, Rows, or both) in a DataFrame
  - Select subset of Columns in a DataFrame
  - Select subset of Rows in a DataFrame
  - Select **subsets** of the DataFrame (both rows and columns)

Subsetting Columns in a DataFrame

- Why might we want a subset of the columns of a DataFrame?



Subsetting Columns in a DataFrame

- Sometimes you don't need all of the columns and just want to work with a **subset** of the columns of the original dataset.

- Other times, you may want to reorder the columns in your dataset.

- Here's how you would do either of those: The syntax for subsetting columns from a DataFrame (`df`) is:

  - One column: `df['column_name']`

  - Multiple columns: `df[['column1', 'column2', 'target']]`

Subsetting Columns in a DataFrame

- So, if we wanted to look at the **`price`** column, we could do:

```
#you should be able to run this without any issue.
import pandas as pd

path = "/content/drive/MyDrive/cs167_sp26/datasets/restaurant.csv"
df_rest = pd.read_csv(path)
print(df_rest)
```

```
...     alt  bar  fri  hun   pat price rain  res     type    est target
0   Yes   No   No  Yes  Some   $$$   No  Yes   French   0-10    Yes
1   Yes   No   No  Yes  Full     $   No   No     Thai  30-60     No
2    No  Yes   No   No  Some     $   No   No   Burger   0-10    Yes
3   Yes   No  Yes  Yes  Full     $   No   No     Thai  10-30    Yes
4   Yes   No  Yes   No  Full   $$$   No  Yes   French    >60     No
5    No  Yes   No  Yes  Some    $$  Yes  Yes  Italian   0-10    Yes
6    No  Yes   No   No   NaN     $  Yes   No   Burger   0-10     No
7    No   No   No  Yes  Some    $$  Yes  Yes     Thai   0-10    Yes
8    No  Yes  Yes   No  Full     $  Yes   No   Burger    >60     No
9   Yes  Yes  Yes  Yes  Full   $$$   No  Yes  Italian  10-30     No
10   No   No   No   No   NaN     $   No   No     Thai   0-10     No
11  Yes  Yes  Yes  Yes  Full     $   No   No   Burger  30-60    Yes
```

```
prices = df_rest['price']
prices.head()
```

	price
0	$$$
1	$
2	$
3	$
4	$$$

Subsetting Columns in a DataFrame

- Imagine you want to only work with '**rain**', '**hun**', '**target**'

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
1	Yes	No	No	Yes	Full	$	No	No	Thai	30-60	No
2	No	Yes	No	No	Some	$	No	No	Burger	0-10	Yes
3	Yes	No	Yes	Yes	Full	$	No	No	Thai	10-30	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No

```
prices = df_rest[ ['rain', 'hun', 'target'] ]
prices.head()
```

	rain	hun	target
0	No	Yes	Yes
1	No	Yes	No
2	No	No	Yes
3	No	Yes	Yes
4	No	No	No

Subsetting Columns in a DataFrame

- Re-order your new subset so that **`rain`** `and` **`hun`** `switched`

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
1	Yes	No	No	Yes	Full	$	No	No	Thai	30-60	No
2	No	Yes	No	No	Some	$	No	No	Burger	0-10	Yes
3	Yes	No	Yes	Yes	Full	$	No	No	Thai	10-30	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No

```
prices_reordered = df_rest[ ['hun', 'rain', 'target'] ]
prices_reordered.head()
```

	hun	rain	target
0	Yes	No	Yes
1	Yes	No	No
2	No	No	Yes
3	Yes	No	Yes
4	No	No	No

Exercise#5:
Practice Time, Your Turn

💬 Group Exercise:

Download the Titanic Dataset from Blackboard, upload it to a spot in your GoogleDrive; you might have already done so by now.

See if you can make the following subsets:

- make a subset called `ages` that holds the ages of the passengers on the titanic
- create a subset called `titanic_subset` with the columns `survived`, `deck`, `sex`, and `age`, in that order.

```
[ ]  # your code
     # ...
```

Today's Agenda

- Rows in a DataFrame

- Subsetting (Columns, Rows, or both) in a DataFrame
  - Select subset of Columns in a DataFrame
  - Select subset of Rows in a DataFrame
  - Select **subsets** of the DataFrame (both rows and columns)

Subsetting Rows in a DataFrame

- Why might you want a subset of the rows?

- Maybe you want only rows that satisfy a certain condition--in the restaurant dataset, maybe:
  - Italian Restaurants
  - only examples when it didn't rain
  - etc.

Subsetting Rows in a DataFrame

- To understand the syntax for subsetting rows in a DataFrame, we need to understand how conditionals work in Python/ Pandas:
  - to check whether each row in a `DataFrame` meets a criteria, use the following syntax
  - it will return a `Series` with `True/False`, where rows that are `True` meet the criteria, and `False` do not

What is a Series?
Next slide

```
df_rest['type'] == 'French'
```

Pandas Datatypes: `Series`

- Pandas Documentation defines `Series` as:
  - `Series` are 1D arrays with axis labels
    - Each **row** in a DataFrame is a `Series`
    - Each **column** in a DataFrame is also a `Series`.

```
print(type(restaurant_data.iloc[0])) #the first row in the dataframe
print(type(restaurant_data['type'])) #the column 'type' from the dataframe
```

```
<class 'pandas.core.series.Series'>
<class 'pandas.core.series.Series'>
```

Subsetting Rows in a DataFrame

```
data is a  <class 'pandas.core.frame.DataFrame'>
```

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
1	Yes	No	No	Yes	Full	$	No	No	Thai	30-60	No
2	No	Yes	No	No	Some	$	No	No	Burger	0-10	Yes
3	Yes	No	Yes	Yes	Full	$	No	No	Thai	10-30	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No

```
condition = df_rest['type'] == 'French'
condition
```

```
0      True
1     False
2     False
3     False
4      True
5     False
6     False
7     False
8     False
9     False
10    False
11    False
```

Subsetting Rows in a DataFrame

- Taking this one step further, we can use this boolean Series to filter our rows:
  - `condition = df[ 'column name' ] == 'something'`
  - `subset_rows = df[ condition ]`

```
condition = df_rest['type'] == 'French'
french_rest = df_rest[condition]
french_rest
```

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No

Subsetting Rows in a DataFrame

- It can be done in one step as follows:
  - `subset_rows = df[ df[ 'column name' ] == 'something' ]`

```
french_rest = df_rest[ df_rest['type'] == 'French' ]
french_rest
```

	alt	bar	fri	hun	pat	price	rain	res	type	est	target
0	Yes	No	No	Yes	Some	$$$	No	Yes	French	0-10	Yes
4	Yes	No	Yes	No	Full	$$$	No	Yes	French	>60	No

Exercise#6:
Practice Time, Your Turn

💬 Group Exercise:

See if you can create a subset called rainy_day, of rows where it rained from the dataset 'restaurant.csv'

```
[ ]  # your code
     # ...
```