Introduction to Pandas in Python

Estimated time needed: **15** minutes

Objectives

After completing this lab you will be able to:

- Use Pandas to access and view data

The table has one row for each album and several columns.

You can see the dataset here:

Artist Album Released Length Genre Music recording sales (millions) Claimed sales (millions) Released Soundtrack Rating (friends) Michael Jackson Thriller 1982 00:42:19 Pop, rock, R&B 46 65 30-Nov-82 10.0 AC/DC Back in Black 1980 00:42:11 Hard rock 26.1 50 25-Jul-80 8.5 Pink Floyd The Dark Side of the Moon 1973 00:42:49 Progressive rock 24.2 45 01-Mar-73 9.5 Whitney Houston The Bodyguard 1992 00:57:44 Soundtrack/R&B, soul, pop 26.1 50 25-Jul-80 Y 7.0 Meat Loaf Bat Out of Hell 1977 00:46:33 Hard rock, progressive rock 20.6 43 21-Oct-77 7.0 Eagles Their Greatest Hits (1971-1975) 1976 00:43:08 Rock, soft rock, folk rock 32.2 42 17-Feb-76 9.5 Bee Gees Saturday Night Fever 1977 1:15:54 Disco 20.6 40 15-Nov-77 Y 9.0 Fleetwood Mac Rumours 1977 00:40:01 Soft rock 27.9 40 04-Feb-77 9.5

```
# Dependency needed to install file

!pip install xlrd
!pip install openpyxl
```

```
Requirement already satisfied: xlrd in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (1.2.0)
Requirement already satisfied: openpyxl in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (3.1.2)
Requirement already satisfied: et-xmlfile in
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages (from
openpyxl) (1.1.0)
```

```
# Import required library

import pandas as pd
```

After the import command, we now have access to a large number of pre-built classes and functions. This assumes the library is installed; in our lab environment all the necessary libraries are installed. One way pandas allow you to work with data is a dataframe. Let's go through the process to go from a comma separated values (.csv) file to a dataframe. This variable csv_path stores the path of the .csv, which is used as an argument to the read_csv function. The result is stored in the object df, this is a common short form used for a variable referring to a Pandas dataframe.

```
# Read data from CSV file

csv_path = 'https://cf-courses-data.s3.us.cloud-object-
storage.appdomain.cloud/IBMDeveloperSkillsNetwork-PY0101EN-
SkillsNetwork/labs/Module%204/data/TopSellingAlbums.csv'
df = pd.read_csv(csv_path)
```

We can use the method head() to examine the first five rows of a dataframe:

```
# Print first five rows of the dataframe

df.head()
```

```
             Artist                     Album  Released   Length  \
0  Michael Jackson                   Thriller      1982  0:42:19
1            AC/DC               Back in Black      1980  0:42:11
2       Pink Floyd  The Dark Side of the Moon      1973  0:42:49
3  Whitney Houston               The Bodyguard      1992  0:57:44
4        Meat Loaf            Bat Out of Hell      1977  0:46:33

                          Genre  Music Recording Sales (millions)  \
0               pop, rock, R&B                              46.0
1                    hard rock                              26.1
2             progressive rock                              24.2
3               R&B, soul, pop                              27.4
4  hard rock, progressive rock                              20.6

   Claimed Sales (millions) Released.1 Soundtrack  Rating
0                        65  30-Nov-82        NaN    10.0
1                        50  25-Jul-80        NaN     9.5
2                        45  01-Mar-73        NaN     9.0
3                        44  17-Nov-92          Y     8.5
4                        43  21-Oct-77        NaN     8.0
```

We use the path of the excel file and the function read_excel. The result is a data frame as before:

```
# Read data from Excel File and print the first five rows

xlsx_path = 'https://s3-api.us-geo.objectstorage.softlayer.net/cf-
courses-data/CognitiveClass/PY0101EN/Chapter%204/Datasets/
TopSellingAlbums.xlsx'

df = pd.read_excel(xlsx_path)
df.head()
```

```
             Artist                     Album  Released    Length  \
0  Michael Jackson                   Thriller      1982  00:42:19
1            AC/DC               Back in Black      1980  00:42:11
2       Pink Floyd  The Dark Side of the Moon      1973  00:42:49
```

```
3  Whitney Houston              The Bodyguard      1992  00:57:44
4        Meat Loaf            Bat Out of Hell      1977  00:46:33

                          Genre  Music Recording Sales (millions)  \
0               pop, rock, R&B                                46.0
1                    hard rock                                26.1
2             progressive rock                                24.2
3               R&B, soul, pop                                27.4
4  hard rock, progressive rock                                20.6

   Claimed Sales (millions) Released.1 Soundtrack  Rating
0                        65 1982-11-30        NaN    10.0
1                        50 1980-07-25        NaN     9.5
2                        45 1973-03-01        NaN     9.0
3                        44 1992-11-17          Y     8.5
4                        43 1977-10-21        NaN     8.0
```

We can access the column Length and assign it a new dataframe x:

```
# Access to the column Length

x = df[['Length']]
x
```

```
     Length
0  00:42:19
1  00:42:11
2  00:42:49
3  00:57:44
4  00:46:33
5  00:43:08
6  01:15:54
7  00:40:01
```

The process is shown in the figure:

You can also get a column as a series. You can think of a Pandas series as a 1-D dataframe. Just use one bracket:

```
# Get the column as a series

x = df['Length']
x
```

```
0    00:42:19
1    00:42:11
2    00:42:49
3    00:57:44
```

```
4    00:46:33
5    00:43:08
6    01:15:54
7    00:40:01
Name: Length, dtype: object
```

You can also get a column as a dataframe. For example, we can assign the column Artist:

```
# Get the column as a dataframe

x = df[['Artist']]
type(x)

pandas.core.frame.DataFrame
```

You can do the same thing for multiple columns; we just put the dataframe name, in this case, df, and the name of the multiple column headers enclosed in double brackets. The result is a new dataframe comprised of the specified columns:

```
# Access to multiple columns

y = df[['Artist','Length','Genre']]
y
```

	Artist	Length	Genre
0	Michael Jackson	00:42:19	pop, rock, R&B
1	AC/DC	00:42:11	hard rock
2	Pink Floyd	00:42:49	progressive rock
3	Whitney Houston	00:57:44	R&B, soul, pop
4	Meat Loaf	00:46:33	hard rock, progressive rock
5	Eagles	00:43:08	rock, soft rock, folk rock
6	Bee Gees	01:15:54	disco
7	Fleetwood Mac	00:40:01	soft rock

The process is shown in the figure:

One way to access unique elements is the iloc method, where you can access the 1st row and the 1st column as follows:

```
# Access the value on the first row and the first column

df.iloc[0, 0]

'Michael Jackson'
```

You can access the 2nd row and the 1st column as follows:

```
# Access the value on the second row and the first column

df.iloc[1,0]
```

```
'AC/DC'
```

You can access the 1st row and the 3rd column as follows:

```
# Access the value on the first row and the third column

df.iloc[0,2]
```

```
1982
```

```
# Access the value on the second row and the third column
df.iloc[1,2]
```

```
1980
```

This is shown in the following image

You can access the column using the name as well, the following are the same as above:

```
# Access the column using the name

df.loc[0, 'Artist']
```

```
'Michael Jackson'
```

```
# Access the column using the name

df.loc[1, 'Artist']
```

```
'AC/DC'
```

```
# Access the column using the name

df.loc[0, 'Released']
```

```
1982
```

```
# Access the column using the name

df.loc[1, 'Released']
```

```
1980
```

You can perform slicing using both the index and the name of the column:

```
# Slicing the dataframe

df.iloc[0:2, 0:3]
```

```
            Artist          Album  Released
0  Michael Jackson       Thriller      1982
1            AC/DC  Back in Black      1980
```

```
# Slicing the dataframe using name

df.loc[0:2, 'Artist':'Released']
```

```
            Artist                     Album  Released
0  Michael Jackson                  Thriller      1982
1            AC/DC              Back in Black      1980
2       Pink Floyd  The Dark Side of the Moon      1973
```

Use a variable q to store the column Rating as a dataframe

```
# Write your code below and press Shift+Enter to execute
q = df[['Rating']]
q
```

```
   Rating
0    10.0
1     9.5
2     9.0
3     8.5
4     8.0
5     7.5
6     7.0
7     6.5
```

Assign the variable q to the dataframe that is made up of the column Released and Artist:

```
# Write your code below and press Shift+Enter to execute
q = df[['Released','Artist', 'Rating']]
q
```

```
   Released           Artist  Rating
0      1982  Michael Jackson    10.0
1      1980            AC/DC     9.5
2      1973       Pink Floyd     9.0
3      1992  Whitney Houston     8.5
```

```
4      1977        Meat Loaf     8.0
5      1976           Eagles     7.5
6      1977         Bee Gees     7.0
7      1977    Fleetwood Mac     6.5
```

Access the 2nd row and the 3rd column of df:

```
# Write your code below and press Shift+Enter to execute
```

Use the following list to convert the dataframe index df to characters and assign it to df_new; find the element corresponding to the row index a and column 'Artist'. Then select the rows a through d for the column 'Artist'

```
new_index=['a','b','c','d','e','f','g','h']
```

Congratulations, you have completed your first lesson and hands-on lab in Python.

Authors:

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Change Log

Date (YYYY-MM-DD)	Version	Changed By	Change Description
2022-01-10	2.1	Malika	Removed the readme for GitShare
2020-08-26	2.0	Lavanya	Moved lab to course repo in GitLab
2020-11-24	3.0	Nayef	Added new images