READ FILES

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1 Reading files in different formats

Nowadays, we can work with a large amount of data that comes from different sources and in different formats. Excel files with **xls** and **xlsx** formats, as well as other well-known formats such as **csv** and **txt**.

In this practice we will see how we can read those files, as well as a series of basic commands to modify and manipulate those data frames in the first instance.

1.1 Goal

- Learn how we can open different data formats using **Pandas**.

[1]:
```
# import libraries
#=================================

import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

2 Open excel files

To open excel files we will use the function `pd.read_excel()`.

In this case, within the excel files we find two formats, the **xls** and the **xlsx** format. It is important to know what format we are dealing with, because currently we will have to carry out one process or another when opening the files.

2.1 Xls files

In this case, we are going to use a data frame that collects information about the different creatures in the Pokemon world, specifically, all the 1st Generation Pokemon.

[5]:
```
# Open Xls file
#=================================

poke = pd.read_excel("PokemonGen.xls")

poke.head()
```

[5]:
```
   Unnamed: 0  #                   Name Type 1  Type 2  HP  Attack  Defense  \
0           0  1              Bulbasaur  Grass  Poison  45      49       49
1           1  2                Ivysaur  Grass  Poison  60      62       63
2           2  3               Venusaur  Grass  Poison  80      82       83
3           3  3  VenusaurMega Venusaur  Grass  Poison  80     100      123
4           4  4             Charmander   Fire     NaN  39      52       43

   Sp. Atk  Sp. Def  Speed  Generation  Legendary
0       65       65     45           1      False
1       80       80     60           1      False
2      100      100     80           1      False
3      122      120     80           1      False
4       60       50     65           1      False
```

2.2 Select column as index

In this case, we have imported together with the data table the index generated in the previous program (either Excel or another). However, if we do not indicate the column or the name of the index, Python will generate yours automatically.

To **select the index column** we will be using the `index_col` command.

[8]:
```
# Select column by position
#==================================
# poke = pd.read_excel("PokemonGen.xls", index_col=0)


# Select column by name
#==================================
poke = pd.read_excel("PokemonGen.xls", index_col="Unnamed: 0")


poke.head()
```

[8]:
```
   #                   Name Type 1  Type 2  HP  Attack  Defense  Sp. Atk  \
0  1              Bulbasaur  Grass  Poison  45      49       49       65
1  2                Ivysaur  Grass  Poison  60      62       63       80
2  3               Venusaur  Grass  Poison  80      82       83      100
3  3  VenusaurMega Venusaur  Grass  Poison  80     100      123      122
4  4             Charmander   Fire     NaN  39      52       43       60

   Sp. Def  Speed  Generation  Legendary
0       65     45           1      False
1       80     60           1      False
2      100     80           1      False
3      120     80           1      False
4       50     65           1      False
```

2.3 Modify the index

Many times, it will happen that our data table already has an index. In that case, if it is an index that interests us and that is necessary to understand the data (populations, dates ...) we will have to **modify the index** that Python generates for us.

To ** modify the index ** we will use the `df.index` function

[9]:
```
# Select the index with the iloc function (column position)
#=================================
poke.index = poke.iloc[:, -1]


# Select the index indicating the name of the column
#=================================
poke.index = poke["#"]


# Remove the column in question
#=================================
poke = poke.drop("#", axis=1)

poke.head()
```

[9]:

#	Name	Type 1	Type 2	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Generation	Legendary
1	Bulbasaur	Grass	Poison	45	49	49	65	65	45	1	False
2	Ivysaur	Grass	Poison	60	62	63	80	80	60	1	False
3	Venusaur	Grass	Poison	80	82	83	100	100	80	1	False
3	VenusaurMega Venusaur	Grass	Poison	80	100	123	122	120	80	1	False
4	Charmander	Fire	NaN	39	52	43	60	50	65	1	False

2.4 Xlsx files

In this case, we are going to use a data frame that includes information about the performance of a group of students in different subjects, as well as a series of attributes of their environment.

For XLSX files, it is currently necessary to add the `engine` command. This process is not necessary when opening xls files (at least currently).

[13]:
```
# Open an excel file (xlsx)
#=================================
stu = pd.read_excel("StudentsPerformance.xlsx", engine="openpyxl")

stu.head()
```

[13]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	standard	none	72	72	74
1	female	group C	some college	standard	completed	69	90	88
2	female	group B	master's degree	standard	none	90	95	93
3	male	group A	associate's degree	free/reduced	none	47	57	44
4	male	group C	some college	standard	none	76	78	75

2.5 Select a specific sheet

When we deal with excel files or other similar ones, they can have more than one datasheet. On many occasions, we will have to select one or another sheet to work on it.

The `read_excel` function shows you **by default the first sheet** of the file.

To **select a sheet** we will use the command `sheet_name`.

[12]:
```
# Selec sheet by position
#=================================
stu_sheet0 = pd.read_excel("StudentsPerformance.xlsx", sheet_name=0,␣
 ↪engine="openpyxl")


# Select sheet by name
#=================================
stu_sheet1 = pd.read_excel("StudentsPerformance.xlsx", sheet_name="Sheet1",␣
 ↪engine="openpyxl")


stu.head()
```

[12]:

	gender	race/ethnicity	parental level of education	lunch
0	female	group B	bachelor's degree	standard
1	female	group C	some college	standard
2	female	group B	master's degree	standard
3	male	group A	associate's degree	free/reduced

```
4    male        group C                some college      standard

  test preparation course  math score
0                    none          72
1               completed          69
2                    none          90
3                    none          47
4                    none          76
```

2.6 Modify column names

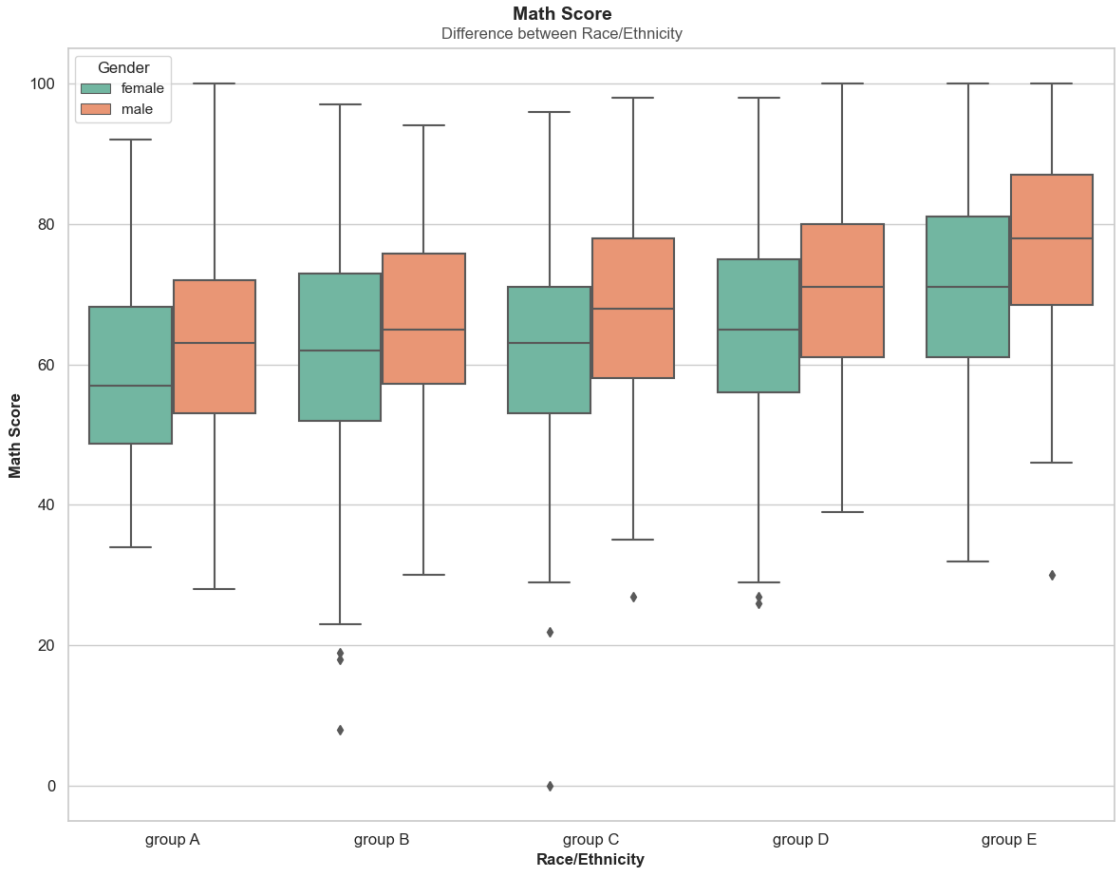
In this case, we want to rename the columns. It is very **IMPORTANT** to avoid that our headers have **blank spaces**. This can cause us problems when we want to work with them or clean data.

To do this, we can modify it directly when opening the file using the `names` command.

[14]:
```
# Create a variable with corrected names
#==================================

new_names = ["Gender", "Race/Ethnicity", "Parental_Education", "Lunch",␣
 ↪"Test_preparation_course", "Math_score",
            "Reading_score", "Writing_score"]


# Assing new column names
#==================================

stu = pd.read_excel("StudentsPerformance.xlsx", engine="openpyxl",␣
 ↪names=new_names)


stu.head()
```

[14]:
```
   Gender Race/Ethnicity  Parental_Education         Lunch  \
0  female        group B   bachelor's degree      standard
1  female        group C        some college      standard
2  female        group B     master's degree      standard
3    male        group A  associate's degree  free/reduced
4    male        group C        some college      standard

  Test_preparation_course  Math_score  Reading_score  Writing_score
0                    none          72             72             74
1               completed          69             90             88
2                    none          90             95             93
3                    none          47             57             44
4                    none          76             78             75
```

[15]:
```
# Create a plot using categorical data
#================================

sns.set_theme(style="whitegrid")

fig, ax = plt.subplots(nrows=1, ncols=1, figsize=(12,10), dpi=100)


sns.boxplot(x=stu["Race/Ethnicity"],
            y= stu["Math_score"],
            hue=stu["Gender"],
            ax=ax,
            palette="Set2",
            order=["group A","group B","group C","group D","group E"])

ax.set_xlabel("Race/Ethnicity", fontsize=12, fontweight="bold")
ax.set_ylabel("Math Score", fontsize=12, fontweight="bold")

ax.tick_params(labelsize=12)


fig.text(x=0.50, y=0.91, s="Math Score",fontsize=14,␣
 ↪fontweight="bold",ha="center")
fig.text(x=0.50, y=0.89, s="Difference between Race/Ethnicity",fontsize=12,␣
 ↪alpha=0.8,ha="center")

fig.tight_layout()
fig.subplots_adjust(top=0.88)
plt.show()


# More information about plots and visualizations in my tutorial plots &␣
 ↪visualizations (chek out my Github)
```



3 Other files (csv, txt ...)

To open csv files we will use the `read_csv` function.

In this case, through the `read_csv` function we can open different files both **csv** and **txt**. We can also use commands that allow us to discern the **type of separator** we use, as well as many other functions.

3.1 Csv files

In this case, we are going to use a file that collects data from the Titanic, specifically, of each passenger and a serie of attributes of each of these. This is a csv of a series of files to make a predictive model to measure the survival of the passengers of the Titanic.

[16]:
```
# Open a csv file
#================================
train = pd.read_csv("train.csv")

train.head()
```

[16]:
```
   PassengerId  Survived  Pclass  \
0            1         0       3
1            2         1       1
2            3         1       3
3            4         1       1
4            5         0       3

                                                Name     Sex   Age  SibSp  \
0                            Braund, Mr. Owen Harris    male  22.0      1
1  Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0      1
2                             Heikkinen, Miss. Laina  female  26.0      0
3       Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0      1
4                           Allen, Mr. William Henry    male  35.0      0

   Parch            Ticket     Fare Cabin Embarked
0      0         A/5 21171   7.2500   NaN        S
1      0          PC 17599  71.2833   C85        C
2      0  STON/O2. 3101282   7.9250   NaN        S
3      0            113803  53.1000  C123        S
4      0            373450   8.0500   NaN        S
```

3.2 Modify name of headers

In this case, we have the names of the columns in English but we would be interested in changing them to the same ones in Spanish, since it is easier if we are not native English speakers.

To do this, we will use the `df.cols` function.

[17]:
```
# Create our list with names in Spanish
#==================================

cols =  ["Pasajeros", "Supervivientes", "Clase", "Nombre", "Sexo", "Edad",␣
 ↪"HerEsp",
         "PaHi", "Ticket", "Tasa", "Cabina", "Embarque"]


# Assign to the columns our variable cols
#==================================
train.columns = cols


train.head()
```

[17]:
```
   Pasajeros  Supervivientes  Clase  \
0          1               0      3
1          2               1      1
2          3               1      3
3          4               1      1
```

```
4          5               0      3

                                                 Nombre    Sexo  Edad  HerEsp  \
0                             Braund, Mr. Owen Harris    male  22.0       1
1  Cumings, Mrs. John Bradley (Florence Briggs Th…  female  38.0       1
2                              Heikkinen, Miss. Laina  female  26.0       0
3        Futrelle, Mrs. Jacques Heath (Lily May Peel)  female  35.0       1
4                            Allen, Mr. William Henry    male  35.0       0

   PaHi            Ticket     Tasa Cabina Embarque
0     0         A/5 21171   7.2500    NaN        S
1     0          PC 17599  71.2833    C85        C
2     0  STON/O2. 3101282   7.9250    NaN        S
3     0            113803  53.1000   C123        S
4     0            373450   8.0500    NaN        S
```

3.3 Open txt files

In this case, we will use a file that collects data about a series of students and how the performance of extracurricular activities influences them.

To open txt files we will use the `read_csv` function.

In this case, it is a comma separated file and therefore it is the same as opening a csv file. However, on many occasions we will work with other separations such as **tabs** or separated by **semicolons**. In those cases, we can also use the `read_csv` function and we will also use the`sep =`command to indicate how our data is separated.

[18]:
```
# Open a txt file
#================================
after = pd.read_csv("AfterSchool.txt", index_col=0, sep=",")

after.head()
```

[18]:
```
    Treatment    Aggress     Delinq     Victim
ID
1           0  63.162641  44.463082  64.429964
2           0  51.827282  76.813612  64.429964
3           0  74.498000  50.933188  41.541056
4           0  40.491922  44.463082  41.541056
5           0  56.361425  44.463082  52.985510
```

4 It's all by now!

4.1 Session Information

[103]:
```
from sinfo import sinfo

sinfo()
```

```
-----
matplotlib  3.3.2
pandas      1.1.5
seaborn     0.11.1
sinfo       0.3.1
-----
IPython             7.19.0
jupyter_client      6.1.7
jupyter_core        4.7.0
jupyterlab          2.2.6
notebook            6.1.6
-----
Python 3.8.5 (default, Sep  3 2020, 21:29:08) [MSC v.1916 64 bit (AMD64)]
Windows-10-10.0.19041-SP0
8 logical CPU cores, Intel64 Family 6 Model 126 Stepping 5, GenuineIntel
-----
Session information updated at 2021-04-28 11:51
```