Python

1. How to work with JSON cells in pandas

Assume that you are dealing with a pandas DataFrame where one of your columns is in JSON format and you want to extract specific information. For this example, we will work with the `doc_report.csv` dataset from Kaggle.

```
import pandas as pd
import ast
pd.set_option("max_colwidth", 180)
doc = pd.read_csv("doc_reports.csv", index_col=0)
# print the properties column
doc['properties']
```

```
doc['properties']

0                  {'gender': 'Male', 'nationality': 'IRL', 'document_type': 'passport', 'date_of_expiry': '2019-08-12', 'issuing_country': 'IRL'}
1                    {'gender': 'Female', 'document_type': 'driving_licence', 'date_of_expiry': '2023-02-28', 'issuing_country': 'GBR'}
2                  {'gender': 'Male', 'nationality': 'ITA', 'document_type': 'passport', 'date_of_expiry': '2018-06-09', 'issuing_country': 'ITA'}
3                    {'gender': 'Male', 'issuing_date': '2007-08', 'document_type': 'national_identity_card', 'issuing_country': 'FRA'}
4       {'gender': 'Male', 'nationality': 'POL', 'document_type': 'national_identity_card', 'date_of_expiry': '2019-05-29', 'issuing_country': 'POL'}
```

If we look at the data, the `properties` field is in JSON format. This means that we need to convert it to a dictionary and then extract the required information. We will work with the `ast` library to convert it to a dictionary and then we will create separate columns for each key as follows:

```
dummy = doc['properties'].apply(lambda x: ast.literal_eval(x))
doc['gender'] = dummy.apply(lambda x:x.get('gender'))
doc['nationality'] = dummy.apply(lambda x:x.get('nationality'))
doc['document_type'] = dummy.apply(lambda x:x.get('document_type'))
doc['date_of_expiry'] = dummy.apply(lambda x:x.get('date_of_expiry'))
doc['issuing_country'] = dummy.apply(lambda x:x.get('issuing_country'))
# lets get the columns
doc[['gender', 'nationality', 'document_type', 'date_of_expiry','issuing_
country' ]]
```

	gender	nationality	document_type	date_of_expiry	issuing_country
0	Male	IRL	passport	2019-08-12	IRL
1	Female	None	driving_licence	2023-02-28	GBR
2	Male	ITA	passport	2018-06-09	ITA
3	Male	None	national_identity_card	None	FRA
4	Male	POL	national_identity_card	2019-05-29	POL
...	...	...	...	...	...
181987	Female	CHN	passport	2027-04-23	CHN
181988	Female	None	driving_licence	2026-04-20	GBR
181989	Female	GBR	passport	2023-07-11	GBR
181990	Male	PRT	passport	2019-10-16	PRT
181991	Female	GBR	passport	2018-05-22	GBR

176404 rows × 5 columns

As you can see, we converted a JSON data type cell to columns based on the key values.

2. How to change multiple column values with applymap

We will provide an example of how you can change multiple column values in pandas DataFrames using the `applymap` function. Assume that your DataFrame takes values `1`, `2`, and `3` and you want to apply the following mapping function:

- If `1`, then `0`.
- If `2` or `3`, then `1`.

```
df = pd.DataFrame({'A':[1,1,2,2,3,3],
'B':[1,2,3,1,2,3]})
df
```

```
        A       B
0       1       1
1       1       2
2       2       3
3       2       1
4       3       2
5       3       3
```

Using the `applymap` function:

```
# create the mapping dictionary
d = {1 : 0, 2: 1, 3: 1}
# apply it to all columns
df.applymap(d.get)
```

```
        A       B
0       0       0
1       0       1
2       1       1
3       1       0
4       1       1
5       1       1
```

3. How to build treemaps with Plotly

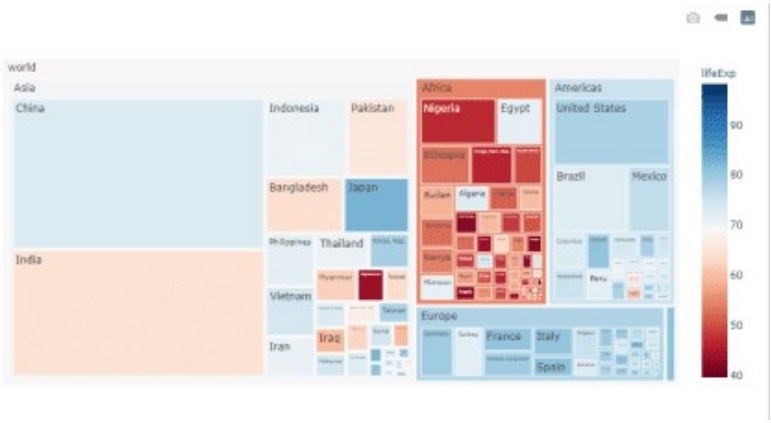
With plotly.express, you can easily create fancy treemaps. For example, let's say that we want to represent the life expectancy by country taking into consideration the continent and the population of the country. So, in the treemap below, the size of the rectangle refers to the population and the color refers to the life expectancy. The higher the life expectancy, the bluer the color is. The lower the life expectancy, the redder the color is.

```
import plotly.express as px
import numpy as np
df = px.data.gapminder().query("year == 2007")
df["world"] = "world" # in order to have a single root node
fig = px.treemap(df, path=['world', 'continent', 'country'], values='pop',
                 color='lifeExp', hover_data=['iso_alpha'],
                 color_continuous_scale='RdBu',
                 color_continuous_midpoint=np.average(df['lifeExp'],
weights=df['pop']))
fig.show()
```

```
df
```

	country	continent	year	lifeExp	pop	gdpPercap	iso_alpha	iso_num	world
11	Afghanistan	Asia	2007	43.828	31889923	974.580338	AFG	4	world
23	Albania	Europe	2007	76.423	3600523	5937.029526	ALB	8	world
35	Algeria	Africa	2007	72.301	33333216	6223.367465	DZA	12	world
47	Angola	Africa	2007	42.731	12420476	4797.231267	AGO	24	world
59	Argentina	Americas	2007	75.320	40301927	12779.379640	ARG	32	world
...	...	...	...	...	...	...	...	...	...
1655	Vietnam	Asia	2007	74.249	85262356	2441.576404	VNM	704	world
1667	West Bank and Gaza	Asia	2007	73.422	4018332	3025.349798	PSE	275	world
1679	Yemen, Rep.	Asia	2007	62.698	22211743	2280.769906	YEM	887	world
1691	Zambia	Africa	2007	42.384	11746035	1271.211593	ZMB	894	world
1703	Zimbabwe	Africa	2007	43.487	12311143	469.709298	ZWE	716	world

142 rows × 9 columns



4. How to get the correlation between two DataFrames

```
df1 = pd.DataFrame({'x11' : [10,20,30,40,50,55,60],
                    'x12' : [11,15,20,30,35,60,70]})
df2 = pd.DataFrame({'x21' : [100,150,200,250,300,400,500],
                    'x22' : [110,150,180,250,300,400,600]})
pd.concat([df1, df2], axis=1, keys=['df1', 'df2']).corr().loc['df1', 'df2']
```

```
     x21       x22
x11 0.953873 0.900050
x12 0.988908 0.975597
```

5. How to truncate dates to a month in pandas

Assume that you are dealing with the following DataFrame:

```
import pandas as pd
df = pd.DataFrame({'MyDate': ['2020-03-11', '2021-04-26', '2021-01-17']})
df['MyDate'] = pd.to_datetime(df.MyDate)
df
```

```
    MyDate
0   2020-03-11
1   2021-04-26
2   2021-01-17
```

And you want to truncate the date to a month:

```
df['Truncated'] = df['MyDate'] + pd.offsets.MonthBegin(-1)
# OR
# df['Truncated'] = df['MyDate'] - pd.offsets.MonthBegin(1)
```

```
df

  MyDate     Truncated
0 2020-03-11 2020-03-01
1 2021-04-26 2021-04-01
2 2021-01-17 2021-01-01
```

6. How to append multiple CSV files from a folder in pandas

Assume that you have multiple CSV files located in a specific folder and you want to concatenate all of them in a pandas DataFrame. We assume that our CSV files are under the `My_Folder`.

```
import os
import pandas as pd
# create an empty pandas data frame
df = pd.DataFrame()
# iterate over all files within "My_Folder"
for file in os.listdir("My_Folder"):
    if file.endswith(".csv"):
        df = pd.concat([df , pd.read_csv(os.path.join("My_Folder", file))],
axis=0 )
# reset the index
df.reset_index(drop=True, inplace=True)
df
```

Now the `df` consists of the `CSV` files within `My_Folder`.

7. How to concatenate multiple CSV files in Python

Assume that you have multiple CSV files located in a specific folder and you want to concatenate all of them and save them to a file called `merged.csv`. We can work with pandas and use the trick with `mode=a` within the `.to_csv()`, which means *append*:

```
import os
import pandas as pd
# iterate over all files within "My_Folder"
for file in os.listdir("My_Folder"):
    if file.endswith(".csv"):
        tmp = pd.read_csv(os.path.join("My_Folder", file))
        tmp.to_csv("merged.csv", index=False, header=False, mode='a')
```

8. How to concatenate multiple TXT files in Python

Assume that you have multiple `.txt` files and you want to concatenate all of them into a unique `.txt` file. Assume that your `.txt` files are within the `dataset` folder. Then you will need to get their paths:

```
import os
# find all the txt files in the dataset folder
inputs = []
for file in os.listdir("dataset"):
    if file.endswith(".txt"):
        inputs.append(os.path.join("dataset", file))
# concatanate all txt files in a file called merged_file.txt
with open('merged_file.txt', 'w') as outfile:
    for fname in inputs:
        with open(fname, encoding="utf-8", errors='ignore') as infile:
            outfile.write(infile.read())
```

With the snippet above, we managed to concatenate all of them into one file called `merged_file.txt`. In the case where the files are large, you can work as follows:

```
with open('merged_file.txt', 'w') as outfile:
    for fname in inputs:
        with open(fname, encoding="utf-8", errors='ignore') as infile:
            for line in infile:
                outfile.write(line)
```

R

9. How to get the correlation between two DataFrames

Let's see how we can get the column-wise correlation between two DataFrames in R:

```
df1 = data.frame(x11 = c(10,20,30,40,50,55,60),
                 x12 = c(11,15,20,30,35,60,70)
                 )
df2 = data.frame(x21 = c(100,150,200,250,300,400,500),
                 x22 = c(110,150,180,250,300,400,600)
                 )
cor(df1,df2)
```

```
    x21       x22
x11 0.9538727 0.9000503
x12 0.9889076 0.9755973
```

10. The "Count(Case When … Else … End)" in R

When I run queries in SQL (or even HiveQL, Spark SQL, and so on), it is quite common to use the `count(case when.. else ... end)` syntax. Today, I will provide you an example of how you run this type of command in `dplyr`. Let's start:

```
library(sqldf)
library(dplyr)
df<-data.frame(id = 1:10,
               gender = c("m","m","m","f","f","f","m","f","f","f"),
               amt= c(5,20,30,10,20,50,5,20,10,30))
df
```

	id	gender	amt
1	1	m	5
2	2	m	20
3	3	m	30
4	4	f	10
5	5	f	20
6	6	f	50
7	7	m	5
8	8	f	20
9	9	f	10
10	10	f	30

Let's get the `count` and the `sum` per gender in different columns in SQL:

```
sqldf("select count(case when gender='m' then id else null end) as male_cnt,
              count(case when gender='f' then id else null end) as female_cnt,
              sum(case when gender='m' then amt else 0 end) as male_amt,
              sum(case when gender='f' then amt else 0 end) as female_amt
              from df")
```

```
  male_cnt female_cnt male_amt female_amt
1        4          6       60        140
```

Let's get the same output in `dplyr`. We will need to subset the DataFrame based on one column:

```
df%>%summarise(male_cnt=length(id[gender=="m"]),
               female_cnt=length(id[gender=="f"]),
               male_amt=sum(amt[gender=="m"]),
               female_amt=sum(amt[gender=="f"])
               )
```

```
  male_cnt female_cnt male_amt female_amt
1        4          6       60        140
```