Data Science amb Python

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Tasca 7 - Sprint 5 : Transformació Registre Log amb Regular expressions

Exercici 1

Normalitza, identifica i enumera cada un dels atributs / variables de l'estructura de l'arxiu "Web_access_log-akumenius.com" que trobaràs al repositori de GitHub "Data-sources".

In [1]:
```
import numpy as np, pandas as pd
import re
```

Para la normalización, primero se decidió cómo dividir el encabezado del texto en varias columnas.

Investigué en el sitio web de Apache cómo se realizó un acceso al registro.

Las principales divisiones consideradas fueron:

- current_computer: computadora actual utilizada para el acceso
- ip_adress: dirección única que identifica un dispositivo
- time: hora en que se realizó el acceso
- client_request: La línea de solicitud del cliente
- HTTP_status: Este es el código de estado que el servidor envía al cliente.
- user_agent: es el encabezado de solicitud HTTP del agente de usuario.

In [2]:
```
log_columns = ['current_computer', 'ip_adress', 'time','client_request', 'H
log_columns
```

Out[2]:
```
['current_computer',
 'ip_adress',
 'time',
 'client_request',
 'HTTP_status',
 'user_agent']
```

Exercici 2

Neteja, preprocesa, estructura i transforma (dataframe) les dades del registre d'Accés a la web.

In [3]:
```
access_log = pd.read_csv('Web_access_log-akumenius.com.txt',sep=r'\s(?=(?:
                         engine='python', header=None, parse_dates=True)

access_log.head()
```

Out[3]:

	0	1	2	3	4	5	6	7	8	9	
0	localhost	127.0.0.1	-	-	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	-	"-"	"Apache (internal dummy connection)"	VLOG
1	localhost	127.0.0.1	-	-	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	-	"-"	"Apache (internal dummy connection)"	VLOG
2	localhost	127.0.0.1	-	-	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	-	"-"	"Apache (internal dummy connection)"	VLOG
3	localhost	127.0.0.1	-	-	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	-	"-"	"Apache (internal dummy connection)"	VLOG
4	localhost	127.0.0.1	-	-	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	-	"-"	"Apache (internal dummy connection)"	VLOG

In [4]:
```
#Remove columns with dash ("-")

access_log = access_log.drop([2, 3,7,8, 10], axis=1)
access_log
```

Out[4]:

	0	1	4	5	6	
0	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
1	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
2	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
3	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
4	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
...	...	...	...	...	...	
261868	www.akumenius.com	5.255.253.53	[02/Mar/2014:03:05:39 +0100]	"GET / HTTP/1.1"	200	"Mo (com Yandexl
261869	www.akumenius.com	74.86.158.107	[02/Mar/2014:03:09:52 +0100]	"HEAD / HTTP/1.1"	200	"Mozi (com UptimeRo
261870	localhost	127.0.0.1	[02/Mar/2014:03:10:18 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
261871	localhost	127.0.0.1	[02/Mar/2014:03:10:18 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne
261872	localhost	127.0.0.1	[02/Mar/2014:03:10:18 +0100]	"OPTIONS * HTTP/1.0"	200	"Apache (conne

261873 rows × 6 columns

In [5]:

```
access_log.columns = log_columns
access_log.head()
```

Out[5]:

	current_computer	ip_adress	time	client_request	HTTP_status	user_a
0	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Ap (int du connect
1	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Ap (int du connect
2	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Ap (int du connect
3	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Ap (int du connect
4	localhost	127.0.0.1	[23/Feb/2014:03:10:31 +0100]	"OPTIONS * HTTP/1.0"	200	"Ap (int du connect

In [6]:

```
#change time column and convert it to date time
access_log.time = access_log.time.str.replace('[', '').str.replace(']', ''

access_log.head()
```

Out[6]:

	current_computer	ip_adress	time	client_request	HTTP_status	user_ag
0	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	"OPTIONS * HTTP/1.0"	200	"Apa (inte dur connecti
1	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	"OPTIONS * HTTP/1.0"	200	"Apa (inte dur connecti
2	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	"OPTIONS * HTTP/1.0"	200	"Apa (inte dur connecti
3	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	"OPTIONS * HTTP/1.0"	200	"Apa (inte dur connecti
4	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	"OPTIONS * HTTP/1.0"	200	"Apa (inte dur connecti

In [7]:
```
access_log.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 261873 entries, 0 to 261872
Data columns (total 6 columns):
 #   Column            Non-Null Count   Dtype 
---  ------            --------------   ----- 
 0   current_computer  261873 non-null  object
 1   ip_adress         261873 non-null  object
 2   time              261873 non-null  object
 3   client_request    261873 non-null  object
 4   HTTP_status       261873 non-null  int64 
 5   user_agent        261873 non-null  object
dtypes: int64(1), object(5)
memory usage: 12.0+ MB
```

In [8]:
```
#from datetime import datetime

access_log['time'] = pd.to_datetime(access_log['time'],format='%d/%b/%Y:%H
access_log.head()
```

Out[8]:

	current_computer	ip_adress	time	client_request	HTTP_status	user_agent
0	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	"OPTIONS * HTTP/1.0"	200	"Apache (internal dummy connection)"
1	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	"OPTIONS * HTTP/1.0"	200	"Apache (internal dummy connection)"
2	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	"OPTIONS * HTTP/1.0"	200	"Apache (internal dummy connection)"
3	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	"OPTIONS * HTTP/1.0"	200	"Apache (internal dummy connection)"
4	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	"OPTIONS * HTTP/1.0"	200	"Apache (internal dummy connection)"

In [9]:
```
access_log.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 261873 entries, 0 to 261872
Data columns (total 6 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   current_computer  261873 non-null  object
 1   ip_adress         261873 non-null  object
 2   time              261873 non-null  datetime64[ns, pytz.FixedOffset(60)
]
 3   client_request    261873 non-null  object
 4   HTTP_status       261873 non-null  int64
 5   user_agent        261873 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), int64(1), object(4)
memory usage: 12.0+ MB
```

In [10]:
```
access_log.isnull().sum()
```

Out[10]:
```
current_computer    0
ip_adress           0
time                0
client_request      0
HTTP_status         0
user_agent          0
dtype: int64
```

Exercici 2

Geolocalitza les IP's.

IP geocalization I used, it was the free Geolite2 IP :
https://dev.maxmind.com/geoip/geoip2/geolite2/

As locallhost refers to the location of the system being used (the user's "home"), I decided to remove it because the country where the IP is located would not be shown.

In [12]:
```
#Remove the 'locallhost' data
access_new = access_log[(access_log['current_computer'] != 'localhost' )].r
access_new.head()
```

Out[12]:

	current_computer	ip_adress	time	client_request	HTTP_s
0	www.akumenius.com	66.249.76.216	2014-02-23 03:10:31+01:00	"GET /hoteles-baratos/ofertas-hotel-Club-&-Hot...	
1	www.akumenius.com	66.249.76.216	2014-02-23 03:10:33+01:00	"GET /hoteles-baratos/ofertas-hotel-Metropolis...	
2	www.akumenius.com	66.249.76.216	2014-02-23 03:10:35+01:00	"GET /hoteles-baratos/ofertas-hotel-Faena-Hote...	
3	www.akumenius.com	66.249.76.216	2014-02-23 03:10:38+01:00	"GET /hoteles-baratos/ofertas-hotel-Kensington...	
4	www.akumenius.com	66.249.76.216	2014-02-23 03:10:39+01:00	"GET /destinos-baratos/destinosEstrelles/hotel...	

In [13]:
```
access_new.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 247746 entries, 0 to 247745
Data columns (total 6 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   current_computer  247746 non-null  object
 1   ip_adress         247746 non-null  object
 2   time              247746 non-null  datetime64[ns, pytz.FixedOffset(60)
]
 3   client_request    247746 non-null  object
 4   HTTP_status       247746 non-null  int64
 5   user_agent        247746 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), int64(1), object(4)
memory usage: 11.3+ MB
```

There are 247746 log access. However the goal is to show the location of each ip, so they will be grouped together and a table created showing them as unique.

In [14]:
```
#Creating a function to use Geolite2

from geoip import geolite2
import geoip2.database

def ip_info(ip):
    with geoip2.database.Reader('GeoLite2-Country.mmdb') as reader:
        response = reader.country(ip)
        return response.country.name
```

In [15]:
```
access_country = access_new.copy()

access_country['country'] = access_country.loc[:,'ip_adress'].apply(lambda

access_country.head()
```

Out[15]:

	current_computer	ip_adress	time	client_request	HTTP_s
0	www.akumenius.com	66.249.76.216	2014-02-23 03:10:31+01:00	"GET /hoteles-baratos/ofertas-hotel-Club-&-Hot...	
1	www.akumenius.com	66.249.76.216	2014-02-23 03:10:33+01:00	"GET /hoteles-baratos/ofertas-hotel-Metropolis...	
2	www.akumenius.com	66.249.76.216	2014-02-23 03:10:35+01:00	"GET /hoteles-baratos/ofertas-hotel-Faena-Hote...	
3	www.akumenius.com	66.249.76.216	2014-02-23 03:10:38+01:00	"GET /hoteles-baratos/ofertas-hotel-Kensington...	
4	www.akumenius.com	66.249.76.216	2014-02-23 03:10:39+01:00	"GET /destinos-baratos/destinosEstrelles/hotel...	

In [ ]:
```
```

Exercici 3

Mostra'm la teva creativitat, Sorprèn-me fes un pas més enllà amb l'anàlisi anterior.

In [32]:
```
import matplotlib.pyplot as plt
import seaborn as sns
```

In [24]:
```
#Information about the new table
access_country.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 247746 entries, 0 to 247745
Data columns (total 7 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   current_computer  247746 non-null  object
 1   ip_adress         247746 non-null  object
 2   time              247746 non-null  datetime64[ns, pytz.FixedOffset(60)
]
 3   client_request    247746 non-null  object
 4   HTTP_status       247746 non-null  int64
 5   user_agent        247746 non-null  object
 6   country           246765 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), int64(1), object(5)
memory usage: 13.2+ MB
```

In [25]:
```
access_country.isnull().sum()
```

Out[25]:
```
current_computer      0
ip_adress             0
time                  0
client_request        0
HTTP_status           0
user_agent            0
country             981
dtype: int64
```

There are 981 access without information about the country. The table will be filled with 'unspecified country'

In [27]:
```
access_country["country"].fillna("unspecified country", inplace = True)
access_country.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 247746 entries, 0 to 247745
Data columns (total 7 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   current_computer  247746 non-null  object
 1   ip_adress         247746 non-null  object
 2   time              247746 non-null  datetime64[ns, pytz.FixedOffset(60)
]
 3   client_request    247746 non-null  object
 4   HTTP_status       247746 non-null  int64
 5   user_agent        247746 non-null  object
 6   country           247746 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), int64(1), object(5)
memory usage: 13.2+ MB
```

In [40]:
```
#How many access per country

access_country['country'].value_counts().head(10)
```

Out[40]:
```
Spain             149117
United States      69890
China               6976
Netherlands         6305
Germany             1987
France              1724
Mexico              1244
Brazil              1101
United Kingdom      1073
Italy               1042
Name: country, dtype: int64
```

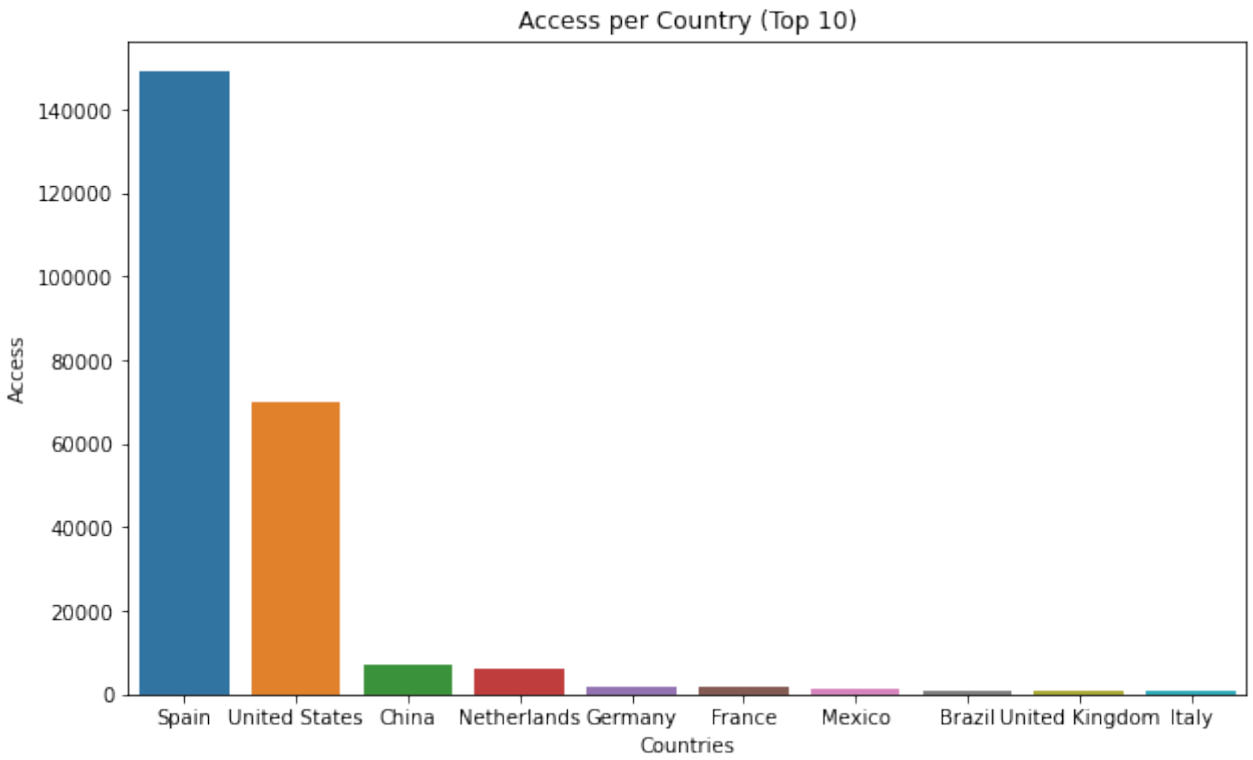
In [51]:
```
#Top 10 access country

plt.figure(figsize=(10,6))

#seaborn.barplot(x=df.reputation.value_counts().index, y=df.reputation.valu

sns.barplot(x= access_country['country'].value_counts().head(10).index, y=a
plt.xlabel("Countries")
plt.ylabel('Access')
plt.title('Access per Country (Top 10)')
```

Out[51]:
```
Text(0.5, 1.0, 'Access per Country (Top 10)')
```



In [45]:
```
# Time access

df_box = access_country.copy()
df_box.reset_index(inplace=True)
df_box['hour'] = [d.hour for d in df_box.time]

df_box.head()
```

Out[45]:

	index	current_computer	ip_adress	time	client_request
0	0	www.akumenius.com	66.249.76.216	2014-02-23 03:10:31+01:00	"GET /hoteles-baratos/ofertas-hotel-Club-&-Hot...
1	1	www.akumenius.com	66.249.76.216	2014-02-23 03:10:33+01:00	"GET /hoteles-baratos/ofertas-hotel-Metropolis...
2	2	www.akumenius.com	66.249.76.216	2014-02-23 03:10:35+01:00	"GET /hoteles-baratos/ofertas-hotel-Faena-Hote...
3	3	www.akumenius.com	66.249.76.216	2014-02-23 03:10:38+01:00	"GET /hoteles-baratos/ofertas-hotel-Kensington...
4	4	www.akumenius.com	66.249.76.216	2014-02-23 03:10:39+01:00	"GET /destinos-baratos/destinosEstrelles/hotel...

In [48]:
```
df_box['hour'].value_counts().sort_values()
```

Out[48]:
```
6       3027
7       3329
5       3958
2       4157
4       5140
1       5351
3       5596
8       6458
0       8187
23      8358
9       9058
21      9679
10      9740
22     10310
19     11664
14     11880
20     13302
18     14360
11     14435
13     14935
17     16778
16     19074
15     19210
12     19760
Name: hour, dtype: int64
```

In [50]:
```
plt.figure(figsize=(10,6))
sns.barplot(x=df_box['hour'].value_counts().sort_values().index, y=df_box[
plt.xlabel("Hour")
plt.ylabel('Access per Hour')
plt.title('Access ')
```

Out[50]: Text(0.5, 1.0, 'Access ')