Sprint 4: S04 T01: Transformació Registre Log amb Regular expressions

Nivell 1

Exercici 1

Estandaritza, 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 [245…

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import re
import requests
import json
import warnings

warnings.filterwarnings('ignore')
```

In [246…

```
data = pd.read_fwf(r"C:\Users\hecto\OneDrive\Documentos\IT Data Science\Sprint4\Spri
data
```

Out[246…

	0
0	localhost 127.0.0.1 - - [23/Feb/2014:03:10:31 ...
1	localhost 127.0.0.1 - - [23/Feb/2014:03:10:31 ...
2	localhost 127.0.0.1 - - [23/Feb/2014:03:10:31 ...
3	localhost 127.0.0.1 - - [23/Feb/2014:03:10:31 ...
4	localhost 127.0.0.1 - - [23/Feb/2014:03:10:31 ...
...	...
261868	www.akumenius.com 5.255.253.53 - - [02/Mar/201...
261869	www.akumenius.com 74.86.158.107 - - [02/Mar/20...
261870	localhost 127.0.0.1 - - [02/Mar/2014:03:10:18 ...
261871	localhost 127.0.0.1 - - [02/Mar/2014:03:10:18 ...
261872	localhost 127.0.0.1 - - [02/Mar/2014:03:10:18 ...

261873 rows × 1 columns

Para realizar la conversión del archivo he utilizado una Regular Expression que estaba definida en la libreria de regex previamente por otro usuario.

Se ha verificado que la expresión definida coincidía con un registro aleatorio de la lectura de "data" y renombrado alguno de los campos

https://regex101.com/r/HD415R/1

In [247…
```
regex = r'^(?P<hostTitle>.*?[A-Za-z\.]*) (?P<ip>[0-9\.]*) - - \[(?P<dateTime>.*)\] "
```

In [248…
```
dataRegEx = data[0].str.extract(regex, flags=re.MULTILINE)
dataRegEx
```

Out[248…

	hostTitle	ip	dateTime	request	requested	protocol	cod
0	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	OPTIONS	*	HTTP/1.0	20
1	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	OPTIONS	*	HTTP/1.0	20
2	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	OPTIONS	*	HTTP/1.0	20
3	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	OPTIONS	*	HTTP/1.0	20
4	localhost	127.0.0.1	23/Feb/2014:03:10:31 +0100	OPTIONS	*	HTTP/1.0	20
…	…	…	…	…	…	…	.
261868	www.akumenius.com	5.255.253.53	02/Mar/2014:03:05:39 +0100	GET	/	HTTP/1.1	20
261869	www.akumenius.com	74.86.158.107	02/Mar/2014:03:09:52 +0100	HEAD	/	HTTP/1.1	20
261870	localhost	127.0.0.1	02/Mar/2014:03:10:18 +0100	OPTIONS	*	HTTP/1.0	20
261871	localhost	127.0.0.1	02/Mar/2014:03:10:18 +0100	OPTIONS	*	HTTP/1.0	20
261872	localhost	127.0.0.1	02/Mar/2014:03:10:18 +0100	OPTIONS	*	HTTP/1.0	20

261873 rows × 10 columns

In [249…
```
dataRegEx.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 261873 entries, 0 to 261872
Data columns (total 10 columns):
 #   Column      Non-Null Count   Dtype 
---  ------      --------------   ----- 
 0   hostTitle   171674 non-null  object
 1   ip          171674 non-null  object
```

```
 2   dateTime    171674 non-null  object
 3   request     171674 non-null  object
 4   requested   171674 non-null  object
 5   protocol    171674 non-null  object
 6   code        171674 non-null  object
 7   code2       171674 non-null  object
 8   code_body   171674 non-null  object
 9   userAccess  171674 non-null  object
dtypes: object(10)
memory usage: 20.0+ MB
```

Nivell II

Exercici 2

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

Modificamos el Formato con datatime y pasamos el mes a número para facilitar los cálculos entre diferente fechas

In [250…

```
from datetime import datetime
dataRegEx['dateTime'] = pd.to_datetime(dataRegEx['dateTime'], format="%d/%b/%Y:%H:%M
dataRegEx
```

Out[250…

	hostTitle	ip	dateTime	request	requested	protocol	code	coc
0	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	OPTIONS	*	HTTP/1.0	200	
1	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	OPTIONS	*	HTTP/1.0	200	
2	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	OPTIONS	*	HTTP/1.0	200	
3	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	OPTIONS	*	HTTP/1.0	200	
4	localhost	127.0.0.1	2014-02-23 03:10:31+01:00	OPTIONS	*	HTTP/1.0	200	
…	…	…	…	…	…	…	…	
261868	www.akumenius.com	5.255.253.53	2014-03-02 03:05:39+01:00	GET	/	HTTP/1.1	200	7!
261869	www.akumenius.com	74.86.158.107	2014-03-02 03:09:52+01:00	HEAD	/	HTTP/1.1	200	
261870	localhost	127.0.0.1	2014-03-02 03:10:18+01:00	OPTIONS	*	HTTP/1.0	200	

	hostTitle	ip	dateTime	request	requested	protocol	code	coc
261871	localhost	127.0.0.1	2014-03-02 03:10:18+01:00	OPTIONS	*	HTTP/1.0	200	
261872	localhost	127.0.0.1	2014-03-02 03:10:18+01:00	OPTIONS	*	HTTP/1.0	200	

261873 rows × 10 columns

In [251…
```
dataRegEx.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 261873 entries, 0 to 261872
Data columns (total 10 columns):
 #   Column      Non-Null Count   Dtype
---  ------      --------------   -----
 0   hostTitle   171674 non-null  object
 1   ip          171674 non-null  object
 2   dateTime    171674 non-null  datetime64[ns, pytz.FixedOffset(60)]
 3   request     171674 non-null  object
 4   requested   171674 non-null  object
 5   protocol    171674 non-null  object
 6   code        171674 non-null  object
 7   code2       171674 non-null  object
 8   code_body   171674 non-null  object
 9   userAccess  171674 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), object(9)
memory usage: 20.0+ MB
```

In [252…
```
print("Periodo temporal del Data Frame de: ", dataRegEx.dateTime.min(),"a ", dataReg
```

```
Periodo temporal del Data Frame de:  2014-02-23 03:10:31+01:00 a  2014-03-02 03:10:1
8+01:00
```

Exercici 3

3.1 Geolocalitza les IP's.

3.1.1 Agrupamos las ip por número de visitas

In [253…
```
ipNumVisits = dataRegEx["ip"].value_counts().rename_axis("ip").reset_index(name = "N
ipNumVisits
```

Out[253…

	ip	NumVisits
0	66.249.76.216	45500
1	127.0.0.1	13892
2	80.28.221.123	12259
3	217.125.71.222	4014
4	66.249.75.148	3426
…	…	…

	ip	NumVisits
2479	200.98.200.32	1
2480	77.7.126.108	1
2481	200.46.114.194	1
2482	87.221.5.240	1
2483	206.198.5.33	1

2484 rows × 2 columns

Observaciones:

a) Reducción del Data Framen eliminando los registros correspondientes al localhost que son 13.892, al no tener asignada geolocalización y evitar errores en el siguente paso.

b) Adicionalmene hemos usado una APi que tiene restringido el número de llamadas para conocer la localización en funcion de la latitud y longitud informada de una ip. Hemos aplicado un filtro para consultar sólo las ip con visitas supreriores a 200.

In [254…
```
ipNumVisits = ipNumVisits[(ipNumVisits["ip"] != "127.0.0.1") & (ipNumVisits["NumVisi
ipNumVisits
```

Out[254…

	ip	NumVisits
0	66.249.76.216	45500
2	80.28.221.123	12259
3	217.125.71.222	4014
4	66.249.75.148	3426
5	62.117.197.230	2460
...	...	...
69	77.228.79.234	215
70	84.76.76.26	214
71	62.117.179.122	213
72	217.125.108.49	205
73	188.119.219.26	204

73 rows × 2 columns

In [255…
```
ipNumVisits.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 73 entries, 0 to 73
Data columns (total 2 columns):
 #   Column     Non-Null Count  Dtype 
---  ------     --------------  ----- 
 0   ip         73 non-null     object
 1   NumVisits  73 non-null     int64 
dtypes: int64(1), object(1)
memory usage: 1.7+ KB
```

In [256…
```
print("Número de visitas Totales", ipNumVisits.NumVisits.sum())
```

```
Número de visitas Totales 96905
```

Vemos que las ip con visitas superiores a 200 corresponden a 73 registros

In [257…

```
dataIps = pd.DataFrame({"ip": ipNumVisits["ip"].unique()})
dataIps.head(10)
```

Out[257…

	ip
0	66.249.76.216
1	80.28.221.123
2	217.125.71.222
3	66.249.75.148
4	62.117.197.230
5	162.243.192.191
6	176.31.255.177
7	198.143.133.154
8	81.39.110.171
9	80.58.250.94

In [258…

```
dataIps.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 73 entries, 0 to 72
Data columns (total 1 columns):
 #   Column  Non-Null Count  Dtype 
---  ------  --------------  ----- 
 0   ip      73 non-null     object
dtypes: object(1)
memory usage: 712.0+ bytes
```

Hemos verificado que esos registros se corresponden con ip´s únicas

3.1.2 Seleccionamos la localización georáfica de las ip, a partir de las latitud y la longitud, mendiante una API de geolocalización que nos devuelve el país y la region.

In [259…

```
countError=0
# Definimos los parametros de respuesta que queremos obtener
parametros = 'status,country,countryCode,region,regionName,city,zip,lat,lon,timezone
data = {"fields":parametros}
response_text_list = []
api_url = "http://ip-api.com/json/"
for ip in dataIps["ip"]:
    try:
        if __name__ == '__main__':
            #print("ip: ",ip)
            # Llamamos a la función ip_scraping y mostramos los resultados
            res = requests.get(api_url+ip, data=data)
            # Obtenemos y procesamos la respuesta JSON
            api_json_res = json.loads(res.content)
            response_text_list.append(api_json_res)
            #print("algo :", api_json_res)
    except TypeError:
        countError =countError+1
        pass
```

```
print("Registro con ip erróneo: ",countError)
```

```
Registro con ip erróneo:  0
```

In [260…
```
geo_ip = pd.DataFrame.from_dict(response_text_list)
```

In [261…
```
geo_ip.head(5)
```

Out[261…

	status	country	countryCode	region	regionName	city	zip	lat	lon	
0	success	United States	US	CA	California	Mountain View	94043	37.4220	-122.08400	Amer
1	success	Spain	ES	MD	Madrid	Madrid	28760	40.5167	-3.66479	
2	success	Spain	ES	AN	Andalusia	Tocina	41340	37.6025	-5.73070	
3	success	United States	US	CO	Colorado	Aurora	80014	39.6663	-104.83430	
4	success	Spain	ES	MD	Madrid	Madrid	28012	40.4163	-3.69340	

In [262…
```
geo_ip.rename(columns={'query': 'ip'}, inplace=True)
geo_ip.head(5)
```

Out[262…

	status	country	countryCode	region	regionName	city	zip	lat	lon	
0	success	United States	US	CA	California	Mountain View	94043	37.4220	-122.08400	Amer
1	success	Spain	ES	MD	Madrid	Madrid	28760	40.5167	-3.66479	
2	success	Spain	ES	AN	Andalusia	Tocina	41340	37.6025	-5.73070	
3	success	United States	US	CO	Colorado	Aurora	80014	39.6663	-104.83430	
4	success	Spain	ES	MD	Madrid	Madrid	28012	40.4163	-3.69340	

Simplificamos el Data Frame para obtener las coordenadas que usaremos como base del

mapa de geolocalizaciones

In [263…
```
df_grafico =pd.DataFrame(geo_ip, columns=["ip", "country","regionName", "lat","lon"]
df_grafico.head(5)
```

Out[263…

	ip	country	regionName	lat	lon
0	66.249.76.216	United States	California	37.4220	-122.08400
1	80.28.221.123	Spain	Madrid	40.5167	-3.66479
2	217.125.71.222	Spain	Andalusia	37.6025	-5.73070
3	66.249.75.148	United States	Colorado	39.6663	-104.83430
4	62.117.197.230	Spain	Madrid	40.4163	-3.69340

In [264…
```
import geopandas as gpd
from shapely.geometry import Point, Polygon
```

In [265…
```
# sistema de referència de coordenades
#crs = 'epsg:4269'
crs = "epsg:4326","epsg:4269"
```

In [266…
```
geometry = [Point(xy) for xy in zip(df_grafico["lon"], df_grafico["lat"])]
```

In [267…
```
df_geo = gpd.GeoDataFrame(df_grafico, geometry=geometry)
df_geo.head(5)
```

Out[267…

	ip	country	regionName	lat	lon	geometry
0	66.249.76.216	United States	California	37.4220	-122.08400	POINT (-122.08400 37.42200)
1	80.28.221.123	Spain	Madrid	40.5167	-3.66479	POINT (-3.66479 40.51670)
2	217.125.71.222	Spain	Andalusia	37.6025	-5.73070	POINT (-5.73070 37.60250)
3	66.249.75.148	United States	Colorado	39.6663	-104.83430	POINT (-104.83430 39.66630)
4	62.117.197.230	Spain	Madrid	40.4163	-3.69340	POINT (-3.69340 40.41630)

In [268…
```
df_geo_merger = df_geo[["ip", "country", "regionName","lat", "lon","geometry"]]
df_geo_NumVisits = pd.merge(ipNumVisits, df_geo_merger, on="ip")
df_geo_NumVisits.head(10)
```

Out[268…

	ip	NumVisits	country	regionName	lat	lon	geometry
0	66.249.76.216	45500	United States	California	37.4220	-122.08400	POINT (-122.08400 37.42200)
1	80.28.221.123	12259	Spain	Madrid	40.5167	-3.66479	POINT (-3.66479 40.51670)
2	217.125.71.222	4014	Spain	Andalusia	37.6025	-5.73070	POINT (-5.73070 37.60250)
3	66.249.75.148	3426	United States	Colorado	39.6663	-104.83430	POINT (-104.83430 39.66630)

	ip	NumVisits	country	regionName	lat	lon	geometry
4	62.117.197.230	2460	Spain	Madrid	40.4163	-3.69340	POINT (-3.69340 40.41630)
5	162.243.192.191	2049	United States	New York	40.7597	-73.98100	POINT (-73.98100 40.75970)
6	176.31.255.177	1044	France	Hauts-de-France	50.6917	3.20157	POINT (3.20157 50.69170)
7	198.143.133.154	1038	United States	Illinois	41.8786	-87.63110	POINT (-87.63110 41.87860)
8	81.39.110.171	1006	Spain	Madrid	40.4163	-3.69340	POINT (-3.69340 40.41630)
9	80.58.250.94	928	Spain	Madrid	40.5167	-3.66479	POINT (-3.66479 40.51670)

In [269…

```
sumaNumVisits_200 =df_geo_NumVisits.NumVisits.sum()
print("Total visitas de las ip´s con >200 :",sumaNumVisits_200)
```

```
Total visitas de las ip´s con >200 : 96905
```

In [270…

```
df_geo_NumVisits["pct_NumVisits"] = (df_geo_NumVisits["NumVisits"]/sumaNumVisits_200
df_geo_NumVisits.head(10)
```

Out[270…

	ip	NumVisits	country	regionName	lat	lon	geometry	pct_NumVisits
0	66.249.76.216	45500	United States	California	37.4220	-122.08400	POINT (-122.08400 37.42200)	46.953202
1	80.28.221.123	12259	Spain	Madrid	40.5167	-3.66479	POINT (-3.66479 40.51670)	12.650534
2	217.125.71.222	4014	Spain	Andalusia	37.6025	-5.73070	POINT (-5.73070 37.60250)	4.142201
3	66.249.75.148	3426	United States	Colorado	39.6663	-104.83430	POINT (-104.83430 39.66630)	3.535421
4	62.117.197.230	2460	Spain	Madrid	40.4163	-3.69340	POINT (-3.69340 40.41630)	2.538569
5	162.243.192.191	2049	United States	New York	40.7597	-73.98100	POINT (-73.98100 40.75970)	2.114442
6	176.31.255.177	1044	France	Hauts-de-France	50.6917	3.20157	POINT (3.20157 50.69170)	1.077344
7	198.143.133.154	1038	United States	Illinois	41.8786	-87.63110	POINT (-87.63110 41.87860)	1.071152
8	81.39.110.171	1006	Spain	Madrid	40.4163	-3.69340	POINT (-3.69340 40.41630)	1.038130

	ip	NumVisits	country	regionName	lat	lon	geometry	pct_NumVisits
9	80.58.250.94	928	Spain	Madrid	40.5167	-3.66479	POINT (-3.66479 40.51670)	0.957639

In [271…
```
print("Suma de porcentajes de Visitas en USA + Spain :",df_geo_NumVisits.pct_NumVisi
```

```
Suma de porcentajes de Visitas en USA + Spain : 59.6037356173572
```

3.1.3 Gráfico 1: Número de Visitas por País y Región (numVisitas>200)

In [272…
```
import plotly.express as px
fig= px.scatter(df_geo_NumVisits, x="country", y="NumVisits", animation_group="count
fig.show()
fig.write_html("Grafico1_Visitas_Country_Region.html")
```

Como se observa en el gráfico dinámico, las ip con mayores accesos o "visitas" se corresponden con United States y Spain, que concentran el 59,60% de las visitas de las ip >200

In [273…
```
dfg_m =pd.DataFrame(df_grafico, columns=["lat","lon"]).copy()
dfg_m.head(5)
```

Out[273…

	lat	lon
0	37.4220	-122.08400

	lat	lon
1	40.5167	-3.66479
2	37.6025	-5.73070
3	39.6663	-104.83430
4	40.4163	-3.69340

3.1.4 Gráfico 2: Localización geográfica de las ip´s con "visitas">200

In [274…

```
# importar folio en Python
import folium
from folium.plugins import MarkerCluster

m = folium.Map(location=[40.4163,-3.69340],width="%100",height="%100")
location= dfg_m[["lat","lon"]]
#class folium.plugins.MarkerCluster(locations=None, popups=None, icons=None, name=No
MarkerCluster(location,control=True, Show=True).add_to(m)
m
```

Out[274…

In [275…

```
m.save("Grafico2_Geolocalización_Country_Region.html")
```

Nivell 3

Exercici 3

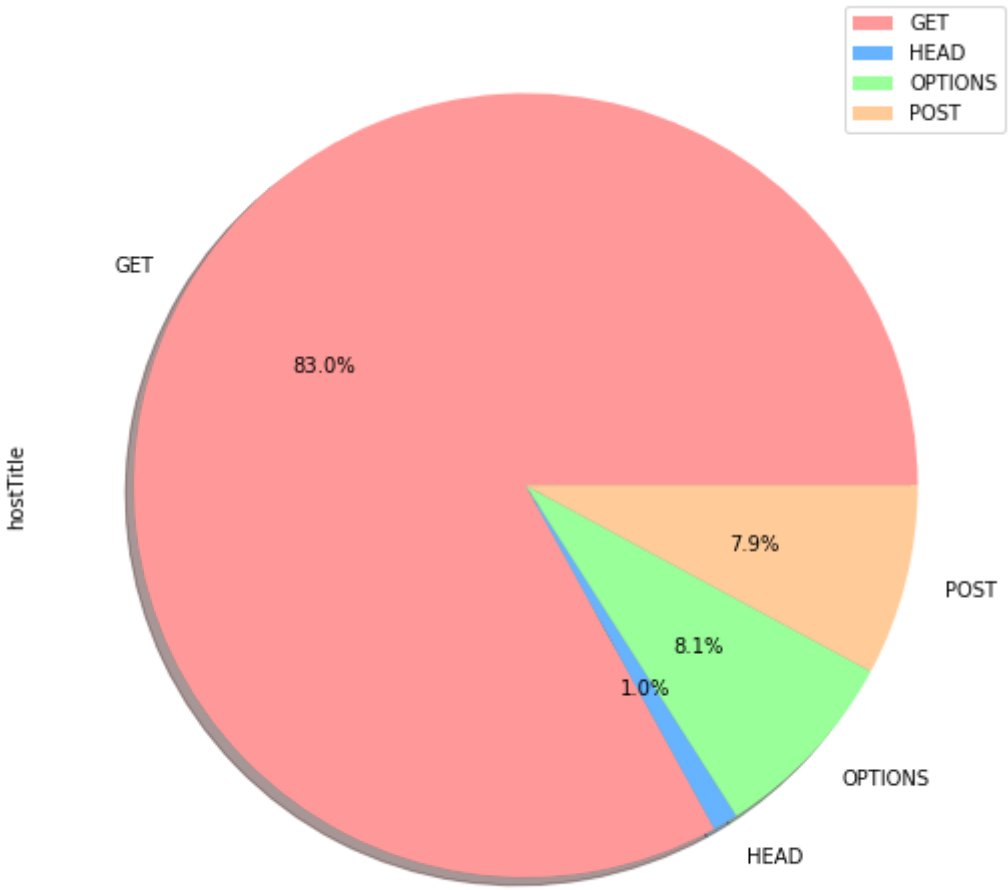
Mostra'm la teva creativitat, Sorprèn-me fes un pas més enllà amb l'anàlisi anterior.

3.1 Protocolo más común

In [276…

```
import matplotlib.pyplot as plt
from matplotlib import cm
from matplotlib import colors
```

```
colors = ['#ff9999','#66b3ff','#99ff99','#ffcc99']
dataRegEx[['request', 'hostTitle']].groupby('request').count().plot(kind='pie', figs
```

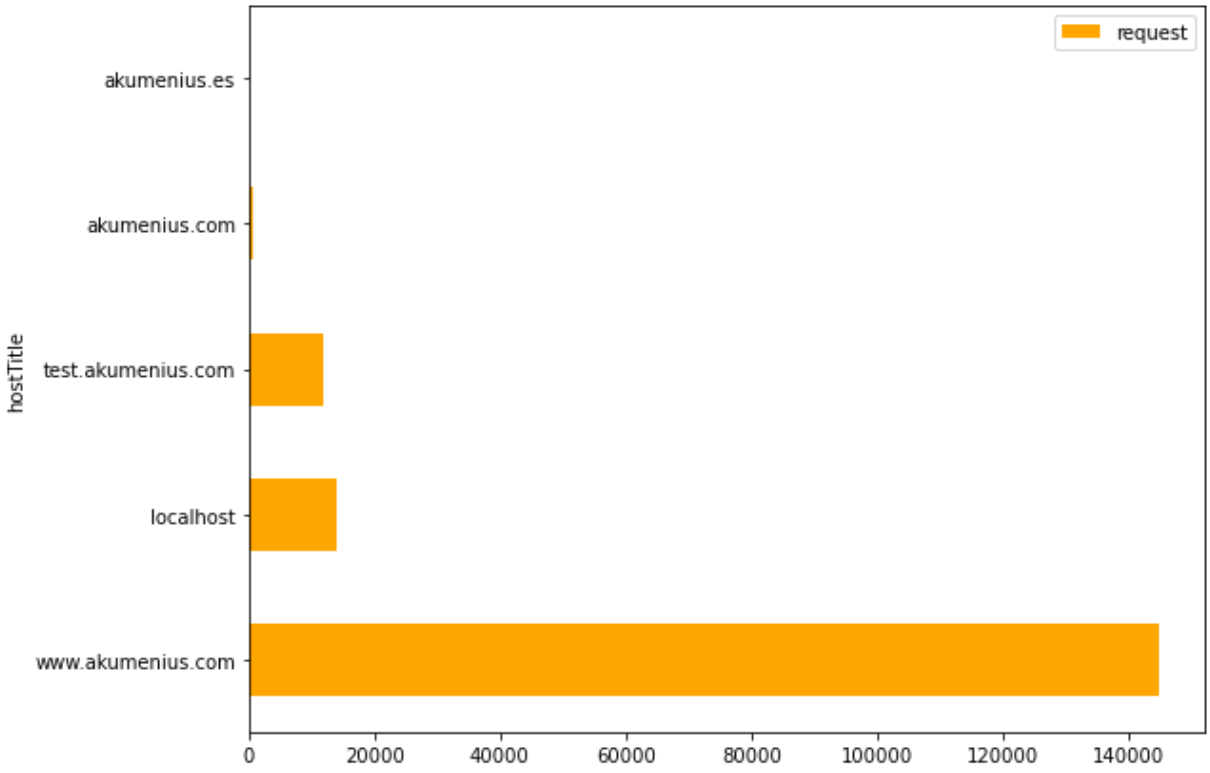


El rpotocolo más común es el GET que supone el 83,01% de los datos informados en el Data Frame original

3.2 Domínio más demandado - Relación entrel el HostTitle y el campo request:

In [277…
```
dataRegEx[['hostTitle', 'request']].groupby('hostTitle').count().sort_values(by='req
```

Out[277…
```
<AxesSubplot:ylabel='hostTitle'>
```



3.3 Elementos más solicitados - relación entre requested/request:

In [278...

```
dataRequested = dataRegEx[['request', 'requested']]
#dataRequested_ok = dataRequested[(dataRequested["request"] == "GET") & (dataRequest
dataRequested_ok = dataRequested[dataRequested["requested"] != "*"].groupby('request
dataRequested_ok.head(10)
```

Out[278...

requested	request
/destinos-get	6818
/	3927
/hotel-list-data/	2093
/hotel-list	1442
/raton-search	1341
/hotels-consulted-update	1007
/icon.png	982
/includes/css/style.css	830
/includes/images/uploaded/logo.png	780
/newdesign/libraries/anythingSlider/images/1r.png	737

In [279...

```
dataRequested_ok.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 63454 entries, /destinos-get to /wp/wp-login.php
Data columns (total 1 columns):
 #   Column   Non-Null Count  Dtype
---  ------   --------------  -----
 0   request  63454 non-null  int64
```

```
dtypes: int64(1)
memory usage: 991.5+ KB
```

Gráfico 4: Número de request por Requested (los 10 primeros)

In [280…

```
dataRequested_ok.head(10).plot(kind='barh',color="pink" ,figsize=(9,7));
```