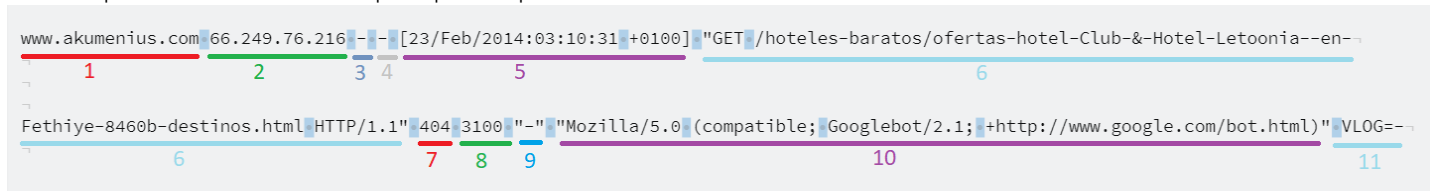


1 Exercici

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".

Fent una inspecció ocular de les dades identifiquem aquests camps:



Ajudant-nos de [documentació de registres de logs \(http://manuales.quebs.com/apache-2.0/logs.html\)](http://manuales.quebs.com/apache-2.0/logs.html) podem distingir els següents camps:

- 1 URL
- 2 Client IP
- 3 Identitat RFC
- 4 Remote User
- 5 Datetime
- 6 Request Method: Mètode, Recurs, Protocol (entre " ")
- 7 Status Code
- 8 Response size
- 9 HTTP Referer (entre " ")
- 10 User-agent (entre " ") : Navegador/versió; bot; url-bot (separats per ;)
- 11 Info

In [1]: *#generem un pattern per tots els camps que hi conté, concatenant-los amb espais (tal i com ho fa al log)*

```
sp = r" "  
#camps  
url = r'((\w+.)?\w+\.(com|es)|localhost)'  
ip = r'(\d{1,3}\.){3}\d{1,3}'  
rfc = r'([\^ ]+)'  
ruser = r'([\^ ]+)'  
#a datetime també ho podríem filtrar tb per '[(.*)\]' sense especificar el contingut  
datetime = r'\[(\d{1,2}\\w{3}\\d{4}:\d{2}:\d{2}:\d{2} \\\d{4})\]'  
request = r'"(.*)"'  
sc = r'(\d{2,5})|-'  
rsize = r'(\d+|-)'  
referer = r'"(.*)"'  
user_agent = r'"(.*)"'  
info = r'(.*)'  
camps = [url,ip,rfc,ruser,datetime,request,sc,rsize,referer,user_agent,info]  
pattern = sp.join(camps)  
pattern
```

executed in 28ms, finished 22:04:38 2021-05-06

Out[1]: '(((\w+.)?\w+\.(com|es)|localhost) ((\d{1,3}\.){3}\d{1,3}) ([\^]+) ([\^]+) \\\[(\d{1,2}\\w{3}\\d{4}:\d{2}:\d{2}:\d{2} \\\d{4})\]) (.*)" ((\d{2,5})|-) ((\d+|-) "(.*)" "(.*)" (.*)' "

2 Exercici

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

In [2]:

```
import os  
import pandas as pd  
import numpy as np  
import re
```

executed in 648ms, finished 22:04:38 2021-05-06

In [3]: *#importem el log en una columna per registre*

```
pd.options.display.max_columns = None  
datasets_path = r"D:\Oscar\FORMACIO\DIGITAL\DATA SCIENCE with Python\Datasets\Data-sources" + os.sep  
file = "Web_access_log-akumenius.com.txt"
```

```
df = pd.read_csv(datasets_path + file, names=["LOG"], engine='python', sep='sense separador')  
df.sample(2)
```

executed in 1.98s, finished 22:04:40 2021-05-06

Out[3]:

	LOG
204864	test.akumenius.com 80.28.221.123 - - [27/Feb/2...
1540	www.akumenius.com 162.243.192.191 - - [23/Feb/...

In [4]:

```
#amb el mètode extract, dels mètodes d'strings, amb La opció expands=True, treiem Les columnes pels grups del match que
#obtindrem amb el pattern de regex creat
df = df["LOG"].str.extract(pattern, expand=True)

#eliminem Les columnes dels subgrups que s'hauran generat al definir Les repeticions dels regex
df.drop(labels=[1,2,4], axis=1, inplace=True)

#renobrem Les columnes
rename = {0: "URL", 3: "IP", 5: "RFC", 6: "R_USER", 7: "TIME", 8: "REQUEST",
          9: "SC", 10: "RES_SIZE", 11: "REFERER", 12: "USER-AGENT", 13: "INFO"}
df.rename(columns=rename, inplace=True)
df.head(3)
```

executed in 4.86s, finished 22:04:45 2021-05-06

Out[4]:

	URL	IP	RFC	R_USER	TIME	REQUEST	SC	RES_SIZE	REFERER	USER-AGENT	INFO
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=-

In [5]:

```
#comprovem que no hi hagin nulls
df.isnull().sum().sum()
```

executed in 301ms, finished 22:04:46 2021-05-06

Out[5]: 0

In [6]:

```
#Podem classificar els registres pel tipus de resposta del state code (en funció del número amb el que comença)
state_codes = {"1": "Informational Response", "2": "Successful ",
               "3": "Redirection ", "4": "Client Error", "5": "Server Error"}

#creem columna pel Tipus de Status Code
df["SC_TYPE"] = df["SC"].apply(lambda x: x[0]).map(state_codes)

#podem veure el recompte dels casos
df.SC_TYPE.value_counts()
```

executed in 265ms, finished 22:04:46 2021-05-06

Out[6]: Successful 226686
Redirection 26248
Client Error 8892
Server Error 47
Name: SC_TYPE, dtype: int64

In [7]:

```
#com els camps amb valors "-" són valors nulls podriem donals-hi aquest caràcter
df.replace("-", np.nan, inplace=True)

#donem també un format numèric als Status Code i RES_SIZE així com de datetime al de la columna temporal
df["SC"] = pd.to_numeric(df.SC, downcast='integer')
df["RES_SIZE"] = pd.to_numeric(df.RES_SIZE, downcast='integer')
df["TIME"] = pd.to_datetime(df.TIME, format="%d/%b/%Y:%H:%M:%S %z")
df.info()
```

executed in 15.9s, finished 22:05:02 2021-05-06

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 261873 entries, 0 to 261872
Data columns (total 12 columns):
#   Column      Non-Null Count  Dtype
---  -
0   URL         261873 non-null  object
1   IP          261873 non-null  object
2   RFC         0 non-null      float64
3   R_USER      27 non-null     object
4   TIME        261873 non-null  datetime64[ns, pytz.FixedOffset(60)]
5   REQUEST     261836 non-null  object
6   SC          261873 non-null  int16
7   RES_SIZE    219538 non-null  float64
8   REFERER     162326 non-null  object
9   USER-AGENT  261654 non-null  object
10  INFO        261873 non-null  object
11  SC_TYPE     261873 non-null  object
dtypes: datetime64[ns, pytz.FixedOffset(60)](1), float64(2), int16(1), object(8)
memory usage: 22.5+ MB
```

In [8]:

```
#veiem que La columna RFC no ens aporta cap dada. La eliminem
df.drop(columns="RFC", inplace=True)
```

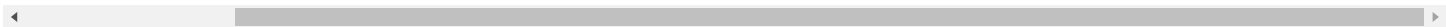
executed in 374ms, finished 22:05:02 2021-05-06

```
In [9]: #Podriem extraure en una altra columna el mètode utilitzat pel request
pattern = r'(^GET|^POST|^HEAD)'
df["REQ_METHOD"] = df["REQUEST"].str.extract(pattern, expand=True)
df.sample(3)

executed in 1.30s, finished 22:05:03 2021-05-06
```

Out[9]:

IP	R_USER	TIME	REQUEST	SC	RES_SIZE	REFERER	USER-AGENT	INFO	SC_TYPE	REQ_METHOD
88.11.41.24	NaN	2014-02-25 14:58:52+01:00	GET /modules/raton/views/themes/bcoos/images/b...	200	8158.0	http://www.akumenius.com/? gclid=CNe7y-S357wCFe...	Mozilla/5.0 (Linux; U; Android 4.2.2; es- es; S...	VLOG=-	Successful	GET
137.214.209	NaN	2014-02-25 22:13:16+01:00	GET /libraries/jqueryui/css/ui-lightness/image...	200	4369.0	http://www.akumenius.com/hoteles- baratos/ofert...	Mozilla/5.0 (Linux; U; Android 4.2.2; es- es; G...	VLOG=-	Successful	GET
30.58.250.94	NaN	2014-02-24 12:10:17+01:00	GET /modules/raton/views/themes/bcoos/googleMa...	304	NaN	http://www.akumenius.com/hotel- list	Mozilla/5.0 (Windows NT 6.1; WOW64; rv:27.0) G...	VLOG=-	Redirection	GET



3 Exercici

Geolocalitza les IP's.

Primer categoritzarem de quin tipus son les IP's per fer la geolocalització únicament d'aquelles que siguin globals. Utilitzarem la llibreria [ipaddress](https://docs.python.org/3/library/ipaddress.html#module-ipaddress) (<https://docs.python.org/3/library/ipaddress.html#module-ipaddress>) per identificarles

```
In [10]: import ipaddress

#testegem una ip local i ens retorna que no és global
ipaddress.ip_address("172.21.10.72").is_global

executed in 29ms, finished 22:05:04 2021-05-06
```

Out[10]: False

```
In [11]: #generem la columna booleana GLOBAL que ens dirà si es tracta d'un accés extern (les locals no ens interessin)
df["GLOBAL"] = df.IP.apply(lambda x: ipaddress.ip_address(x).is_global)

executed in 2.55s, finished 22:05:06 2021-05-06
```

```
In [12]: #com al log les ip's ens apareixen per cada request, sortiran repetides molts cops
df[df["GLOBAL"] == True]["IP"].value_counts().head()

executed in 251ms, finished 22:05:06 2021-05-06
```

Out[12]:

66.249.76.216	46382
80.28.221.123	14725
217.125.71.222	5201
66.249.75.148	3558
162.243.192.191	2927

Name: IP, dtype: int64

```
In [13]: #busquem IPs úniques i creem un altre dataframe amb aquesta info (ips_df) perquè ens faci les peticions/consultes,
#un cop per IP, i no gastar més quota de la necessària a les APIs que provarem
global_df = df[df["GLOBAL"]]
ips_df = pd.DataFrame(global_df['IP'].unique(), columns=["IP"])
del global_df
len(ips_df)

executed in 248ms, finished 22:05:07 2021-05-06
```

Out[13]: 2920

3.1 OPCIÓ 1

Per obtenir la geolocalització utilitzarem el recurs API de geolocalització d'IPs a [Abstract API](https://app.abstractapi.com/dashboard) (<https://app.abstractapi.com/dashboard>).

Segons la web ens permeten 20.000 calls/month de quota gratuïta

```
In [14]: #provem amb la nostra ip
import requests
API_KEY = "324b61a2c48845d696fd52317bb61012"
API_URL = "https://ipgeolocation.abstractapi.com/v1/"
IP = "139.47.119.155"
api_request = "{}?api_key={}&ip_address={}".format(API_URL, API_KEY, IP)
response = requests.get(api_request)
print(response.status_code)
print(response.content)
```

executed in 599ms, finished 22:05:07 2021-05-06

```
b'{"ip_address": "139.47.119.155", "city": "Barcelona", "city_geoname_id": 3128760, "region": "Catalonia", "region_iso_code": "CT", "region_geoname_id": 3336901, "postal_code": "08024", "country": "Spain", "country_code": "ES", "country_geoname_id": 2510769, "country_is_eu": true, "continent": "Europe", "continent_code": "EU", "continent_geoname_id": 6255148, "longitude": 2.1701, "latitude": 41.387, "security": {"is_vpn": false}, "timezone": {"name": "Europe/Madrid", "abbreviation": "CEST", "gmt_offset": 2, "current_time": "22:05:07", "is_dst": true}, "flag": {"emoji": "\xf0\x9f\x87\xaa\xf0\x9f\x87\xb8", "unicode": "U+1F1EA U+1F1F8", "png": "https://static.abstractapi.com/country-flags/ES_flag.png", "svg": "https://static.abstractapi.com/country-flags/ES_flag.svg"}, "currency": {"currency_name": "Euros", "currency_code": "EUR"}, "connection": {"autonomous_system_number": 15704, "autonomous_system_organization": "Xtra Telecom S.A.", "connection_type": "Corporate", "isp_name": "Xtra Telecom S.A.", "organization_name": "MasMovil - Spain"}'
```

```
In [15]: #iterarem el dataframe de IPs per obtinde amb una petició La informació de totes Les columnes que hi agregarem
keys = ["city", "region", "country", "continent", "longitude", "latitude"]

for i in ips_df.index:
    ip = ips_df.IP[i]
    api_request = "{}?api_key={}&ip_address={}".format(API_URL, API_KEY, ip)
    response = requests.get(api_request)
    for k in keys:
        ips_df.loc[i, k] = response.json()[k]
```

executed in 934ms, finished 22:05:08 2021-05-06

```
-----
KeyError                                Traceback (most recent call last)
<ipython-input-15-80e0da57dbf2> in <module>
      7     response = requests.get(api_request)
      8     for k in keys:
----> 9         ips_df.loc[i, k] = response.json()[k]

KeyError: 'city'
```

```
In [16]: #no ens deixa fer més d'una petició per segon :( Hem de pagar per fer sollicituds amb una freqüència major
response.json()
```

executed in 15ms, finished 22:05:18 2021-05-06

```
Out[16]: {'error': {'message': 'Free plan is limited to 1 request per second. Please wait or upgrade to remove this restriction.',
  'code': 'too_many_requests',
  'details': None}}
```

```
In [17]: #esborrem Les columnes generades del primer request
ips_df = ips_df["IP"]
ips_df = pd.DataFrame(ips_df, columns=['IP'])
```

executed in 13ms, finished 22:05:20 2021-05-06

3.2 OPCIÓ 2

*Provem amb el paquet [ip2geotools 0.1.5 \(https://pypi.org/project/ip2geotools/\)](https://pypi.org/project/ip2geotools/)

(no hem trobat les especificacions de quota)

```
In [22]: import json

#si hi hagués excepció en el request agregarem null values a la resposta
keys = ["ip_address", "city", "region", "country", "latitude", "longitude"]
values = [np.nan] * 6
void_response = dict(zip(keys, values))

#iterarem el dataframe de IPs per obtinde de cada petició La informació de totes Les columnes que hi agregarem
n=0
for i in ips_df.index:
    n += 1
    ip = ips_df.IP[i]
    try:
        response = DbIpCity.get(ip, api_key='free')
        response_dic = json.loads(response.to_json())
    except InvalidRequestError as ex:
        response_dic = void_response
        print(ip, ex)
    for key in response_dic.keys():
        ips_df.loc[i, key] = response_dic[key]
```

executed in 23.5s, finished 22:08:39 2021-05-06

...

In [26]:

```
#ens torna excepcions al cap d'una estona,
ips_df
```

executed in 35ms, finished 22:12:18 2021-05-06

Out[26]:

	IP	ip_address	city	region	country	latitude	longitude
0	66.249.76.216	66.249.76.216	Mountain View	California	US	37.389389	-122.083210
1	5.255.253.53	5.255.253.53	Moscow (Tsentrálny administrativnyy okrug)	Moscow	RU	NaN	NaN
2	157.55.35.112	157.55.35.112	Newark	New Jersey	US	40.735657	-74.172367
3	193.111.141.116	193.111.141.116	Amsterdam (Nieuwmarkt en Lastage)	North Holland	NL	52.367431	4.901221
4	5.10.83.71	5.10.83.71	London	England	GB	51.507322	-0.127647
...
2915	46.222.83.180	NaN	NaN	NaN	NaN	NaN	NaN
2916	79.155.78.117	NaN	NaN	NaN	NaN	NaN	NaN
2917	217.174.248.179	NaN	NaN	NaN	NaN	NaN	NaN
2918	188.135.173.80	NaN	NaN	NaN	NaN	NaN	NaN
2919	206.198.5.33	NaN	NaN	NaN	NaN	NaN	NaN

2920 rows × 7 columns

In [25]:

```
#mirem de fer una peticio manual
from ip2geotools.databases.noncommercial import DbIpCity
IP = "8.8.8.8"
response = DbIpCity.get(IP, api_key='free')
response.to_json()
```

executed in 95ms, finished 22:10:32 2021-05-06

InvalidRequestError

Traceback (most recent call last)

<ipython-input-25-739f4cec6354> in <module>

2 from ip2geotools.databases.noncommercial import DbIpCity

3 IP = "8.8.8.8"

----> 4 response = DbIpCity.get(IP, api_key='free')

5 response.to_json()

C:\Installed\Anaconda3\envs\datascience3.9\lib\site-packages\ip2geotools\databases\noncommercial.py in get(ip_address, api_key, db_path, username, password)

58 raise PermissionRequiredError()

59 else:

----> 60 raise InvalidRequestError()

61

62 # prepare return value

InvalidRequestError:

Amb el **ip2geotools** ens passa una cosa semblant. Va retornant les requests, però al cap d'una estona d'estar en bucle ens comença a donar un **InvalidRequestError**.

Segurament és una limitació de quota per sol·licituds doncs ens ha omplert quasi 1000 registres al dataframe (hem fet unes poques proves abans).

Podem pensar que la quota és de 1000 sol·licituds (possiblement per dia)

In [28]:

```
#esborrem Les columnes generades
ips_df = ips_df["IP"]
ips_df = pd.DataFrame(ips_df, columns=['IP'])
```

executed in 17ms, finished 22:13:18 2021-05-06

3.3 OPCió 3

Api de [ip-api \(https://ip-api.com/\)](https://ip-api.com/)

Ens especifiquen unes quotes bastant més grans, sobretot per la possibilitat de multiconsulta de 100 IPs per request:

Batch processing gives you the ability to query multiple IP addresses in one HTTP request. This is significantly faster than submitting individual queries.

Building a request

A request needs to formatted as a JSON array, containing up to 100 IP addresses or objects. HTTP 422 Unprocessable Entity will be returned for requests containing more than the beforementioned amount.

Usage limits

This endpoint is limited to **15** requests per minute from an IP address.

If you go over the limit your requests will be throttled (**HTTP 429**) until your rate limit window is reset. If you constantly go over the limit your IP address will be banned for 1 hour.

The returned HTTP header **X-R1** contains the number of requests remaining in the current rate limit window. **X-Tt1** contains the seconds until the limit is reset.

Your implementation should always check the value of the **X-R1** header, and if its is 0 you **must not** send any more requests for the duration of **X-Tt1** in seconds.

We do not allow commercial use of this endpoint. Please see our [pro service](#) for SSL access, unlimited queries and commercial support.

Per salvar les limitacions de quota haurem d'implementar un codi que ens faci paquets de queries de 100 ips per request, i ens envii 15 requests per minut. Si tenim en compte que així podem obtenir 1500 geolocalitzacions per minut, i tenim 2920 ips úniques per geolocalitzar, ho podem tenir tot en dos minuts

In [30]: `import requests`

```
#fem una prova de query multiple a ip-api on veiem que ens retorna una llista de diccionaris i tots els camps
#d'informació de la geolocalització, a no ser que li especifiquem els que volem en concret
URL = "http://ip-api.com/batch"
query = [{ 'query': '208.80.152.201', 'fields': 'query,city,region,country,lat,lon', 'lang': 'en'},
          { 'query': '8.8.8.8' },
          { 'query': '139.47.119.155' } ]
response = requests.post(URL, json=query)
response.json()
```

executed in 127ms, finished 22:14:27 2021-05-06

Out[30]: `[{'country': 'United States',
 'region': 'IL',
 'city': 'Chicago',
 'lat': 41.8781,
 'lon': -87.6298,
 'query': '208.80.152.201'},
{'status': 'success',
 'country': 'United States',
 'countryCode': 'US',
 'region': 'VA',
 'regionName': 'Virginia',
 'city': 'Ashburn',
 'zip': '20149',
 'lat': 39.03,
 'lon': -77.5,
 'timezone': 'America/New_York',
 'isp': 'Google LLC',
 'org': 'Google Public DNS',
 'as': 'AS15169 Google LLC',
 'query': '8.8.8.8'},
{'status': 'success',
 'country': 'Spain',
 'countryCode': 'ES',
 'region': 'CT',
 'regionName': 'Catalonia',
 'city': 'Barcelona',
 'zip': '08003',
 'lat': 41.387,
 'lon': 2.1701,
 'timezone': 'Europe/Madrid',
 'isp': 'Xtra Telecom S.A.',
 'org': 'MasMovil - Spain',
 'as': 'AS15704 XTRA TELECOM S.A.',
 'query': '139.47.119.155'}]`

```
In [31]: #integrarem dos comptadors com a columnes al dataframe de Les IPs úniques que volem consultar. Un comptador de 100 en 100
#(pel màxim d'IPs per request) i l'altre de 1500 en 1500 (pel màxim de requests per minut)
#definim La funció que ho implementa
def genera_columnes_contadores(req_max_x_min, ips_max_x_req, df=ips_df):
    ips_max_x_min = req_max_x_min * ips_max_x_req

    #resetegem l'index i sumem 1 a l'index pq comenci per 1
    df.reset_index(drop=True, inplace=True)
    df.index +=1

    #afegim les columnes del número de request i del minut
    df["REQUEST"] = df.apply(lambda x: x.name // IPS_MAX_X_REQ, axis=1)
    df["MINUT"] = df.apply(lambda x: x.name // ips_max_x_min, axis=1)

#per les quotes donades en les especificacions tindrem a les columnes el paquet de ips en un request, i el minut
#en el que s'enviaran les IPs
REQ_MAX_X_MIN = 15
IPS_MAX_X_REQ = 100
genera_columnes_contadores(REQ_MAX_X_MIN, IPS_MAX_X_REQ)
ips_df.loc[1498:1501]
```

executed in 98ms, finished 22:14:36 2021-05-06

Out[31]:

	IP	REQUEST	MINUT
1498	80.26.232.117	14	0
1499	81.203.65.27	14	0
1500	77.27.141.43	15	1
1501	95.62.63.204	15	1

```
In [32]: import requests, ast, time

#definim una funció per fer un request amb les queries passades (paquet amb 150 IPs). També agregarà el response com a
#columnes al dataframe (la informació de les IPs globals del log)
def importa_info_request(queries, df=ips_df):
    URL = "http://ip-api.com/batch"
    response = requests.post(URL, json=queries)
    res_l = response.json()
    for res in res_l:
        ip = res["query"]
        i = df[df["IP"] == ip].index.tolist()[0]
        del res["query"]
        for key in res.keys():
            df.loc[i, key] = res[key]

#definim la funció que ens generarà les queries pel dataframe que li passem, i cridarà a la funció importa_info_request
#quan toqui enviar els requests tal i com els hem definit al comptador (paquets de 100 IPs)
def paquet_de_requests_minut(df):
    FIELDS = "'query,city,region,country,lat,lon'"
    LANG = "'en'"
    query_shape = '{"query': 'ip', 'fields': %s, 'lang': %s}"
    query_shape = query_shape %(FIELDS,LANG)

    queries = []
    ant_req = df.iloc[0]["REQUEST"]
    for row in df.itertuples():
        if (row.REQUEST != ant_req):
            importa_info_request(queries, ips_df)
            now = time.strftime("%H:%M:%S", time.localtime())
            print(now, "important info request", ant_req)
            ant_req = row.REQUEST
            queries = []
            query_s = query_shape.replace('ip', row.IP)
            query = ast.literal_eval(query_s)
            queries.append(query)
    importa_info_request(queries, ips_df)
    now = time.strftime("%H:%M:%S", time.localtime())
    print(now, "important info request", ant_req)

#definim la funció per llençar tot el procés, aturant cada volta del bucle (cada canvi de minut al comptador) amb un
#time.sleep. És a dir, a cada canvi de minut del comptador de minuts del dataframe el procés s'aturarà per complir la quota
def genera_columnes_geolocalitzacio(req_max_x_min, ips_max_x_req, df=ips_df):
    genera_columnes_contadores(req_max_x_min, ips_max_x_req)

    #realitzem els 15 requests de 100 consultes d'IPs per minut, esperem dos minuts (per assegurar), i reprenem el bucle
    #per cada minut al comptador (farà dues passades al bucle amb el nostre número d'IPs per aquest cas)
    for minut in ips_df.MINUT.unique().tolist():
        paquet_de_requests_minut(ips_df[ips_df["MINUT"] == minut])
        if minut != ips_df.MINUT.unique().tolist()[-1]:
            now = time.strftime("%H:%M:%S", time.localtime())
            print(now, "pausa un minut")
            time.sleep(60)
```

executed in 21ms, finished 22:14:41 2021-05-06

```
In [33]: #Llancem el procés:
REQ_MAX_X_MIN = 15
IPS_MAX_X_REQ = 100
genera_columnes_geolocalitzacio(REQ_MAX_X_MIN, IPS_MAX_X_REQ)
```

executed in 1m 13.4s, finished 22:15:59 2021-05-06

```
22:14:46 important info request 0
22:14:47 important info request 1
22:14:47 important info request 2
22:14:48 important info request 3
22:14:48 important info request 4
22:14:49 important info request 5
22:14:49 important info request 6
22:14:50 important info request 7
22:14:50 important info request 8
22:14:50 important info request 9
22:14:51 important info request 10
22:14:51 important info request 11
22:14:52 important info request 12
22:14:52 important info request 13
22:14:53 important info request 14
22:14:53 pausa un minut
22:15:53 important info request 15
22:15:54 important info request 16
22:15:54 important info request 17
22:15:55 important info request 18
22:15:55 important info request 19
22:15:56 important info request 20
22:15:56 important info request 21
22:15:56 important info request 22
22:15:57 important info request 23
22:15:57 important info request 24
22:15:58 important info request 25
22:15:58 important info request 26
22:15:59 important info request 27
22:15:59 important info request 28
22:15:59 important info request 29
```

(Hem importat 2920 geolocalitzacions en 13.4 segons + el minut de pausa cada 1500)

```
In [34]: #eliminem les columnes de comptadors del dataframe d'IPs
ips_df.drop(columns=["REQUEST", "MINUT"], inplace=True)

#comprovem que ens ha tornat informació de totes les ips
ips_df.info()
```

executed in 33ms, finished 22:17:14 2021-05-06

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2920 entries, 1 to 2920
Data columns (total 6 columns):
#   Column      Non-Null Count  Dtype
---  ---
0    IP          2920 non-null   object
1   country    2920 non-null   object
2   region     2920 non-null   object
3   city       2920 non-null   object
4   lat        2920 non-null   float64
5   lon        2920 non-null   float64
dtypes: float64(2), object(4)
memory usage: 137.0+ KB
```

```
In [35]: ips_df.sample(3)
```

executed in 24ms, finished 22:17:39 2021-05-06

Out[35]:

	IP	country	region	city	lat	lon
1754	89.129.111.153	Spain	AN	Gines	37.3865	-6.0724
1341	54.221.145.71	United States	VA	Ashburn	39.0438	-77.4874
2077	201.141.111.241	Mexico	MEX	Coacalco	19.6293	-99.1051

```
In [36]: #salvem l'arxiu per si hi hagués alguna limitació més de quota per dia..
ips_df.to_csv("ips del log geolocalitzades.csv", index=False)
```

executed in 243ms, finished 22:18:34 2021-05-06

In [37]:

```
#Fem un merge per incorporar les dades al dataframe dels registres
df = pd.merge(df, ips_df, how="left", on="IP")

#Ara tenim, a més a més, tots els requests d'accés global del Log geolocalitzats per La IP
df.sample(5)

executed in 1.02s, finished 22:18:52 2021-05-06
```

Out[37]:

ST	SC	RES_SIZE	REFERER	USER-AGENT	INFO	SC_TYPE	REQ_METHOD	GLOBAL	country	region	city	lat	lon
GET /rato...	200	17458.0	http://www.akumenius.com/destinos- caracteristi...	Mozilla/5.0 (Windows NT 6.3; WOW64) AppleWebKi...	VLOG=-	Successful	GET	True	Spain	CT	Reus	41.1607	1.1082
TP/1.1	200	428.0	http://www.akumenius.com/	Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKi...	VLOG=-	Successful	POST	True	Spain	MD	Torrelodones	40.5741	-3.9285
GET view...	200	2164.0	http://www.akumenius.com/chollos	Mozilla/5.0 (Windows NT 5.1) AppleWebKit/537.3...	VLOG=-	Successful	GET	True	Spain	AN	Alhaurin de la Torre	36.6638	-4.5618
teles- atos-...	200	8461.0	NaN	Mozilla/5.0 (compatible; Googlebot/2.1; +http:...	VLOG=-	Successful	GET	True	United States	CA	Mountain View	37.4220	-122.0840
GET ges/...	200	3175.0	http://www.akumenius.com/	Mozilla/5.0 (Windows NT 6.1) AppleWebKit/537.3...	VLOG=-	Successful	GET	True	Spain	PV	Basauri	43.2404	-2.8764



4 Exercici

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

Podriem dibuixar amb [cartopy](https://scitools.org.uk/cartopy/docs/latest/index.html) (<https://scitools.org.uk/cartopy/docs/latest/index.html>), una representació sobre el mapa desde on hi ha hagut algun request a la web

In [38]:

```
import cartopy.crs as ccrs
import cartopy.feature as cfeature
import matplotlib.pyplot as plt

fig = plt.figure(figsize=(20, 10))
ax = plt.axes(projection=ccrs.PlateCarree())

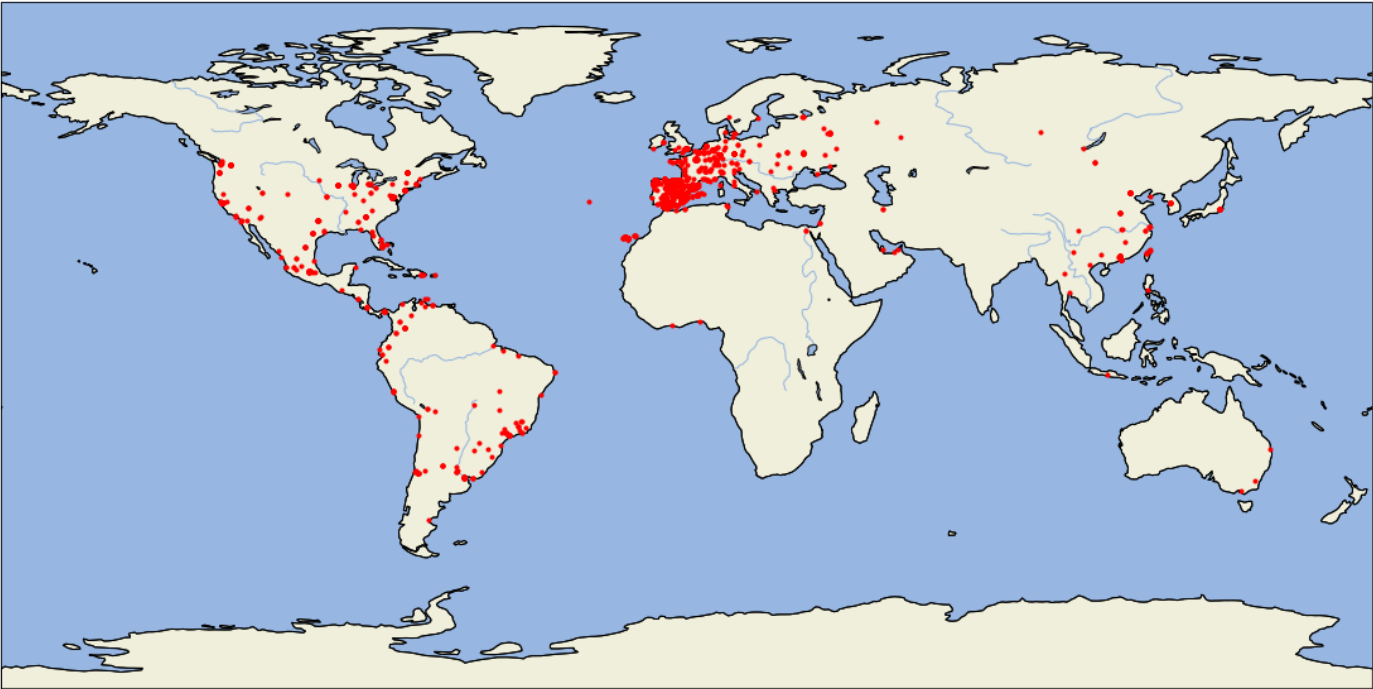
ax.set_global()

ax.coastlines(resolution='110m')
ax.add_feature(cfeature.OCEAN)
ax.add_feature(cfeature.LAND, edgecolor='black')
ax.add_feature(cfeature.LAKES, edgecolor='black')
ax.add_feature(cfeature.RIVERS)

for row in ips_df.itertuples():
    plt.plot(row.lon, row.lat, markersize=3, marker='o', color='red')

plt.show()

executed in 9.77s, finished 22:19:39 2021-05-06
```



```
In [39]: #ampliem a La zona d'europa occidental, on es veuen molt concentrats els punts
fig = plt.figure(figsize=(20, 20))
ax = plt.axes(projection=ccrs.PlateCarree())

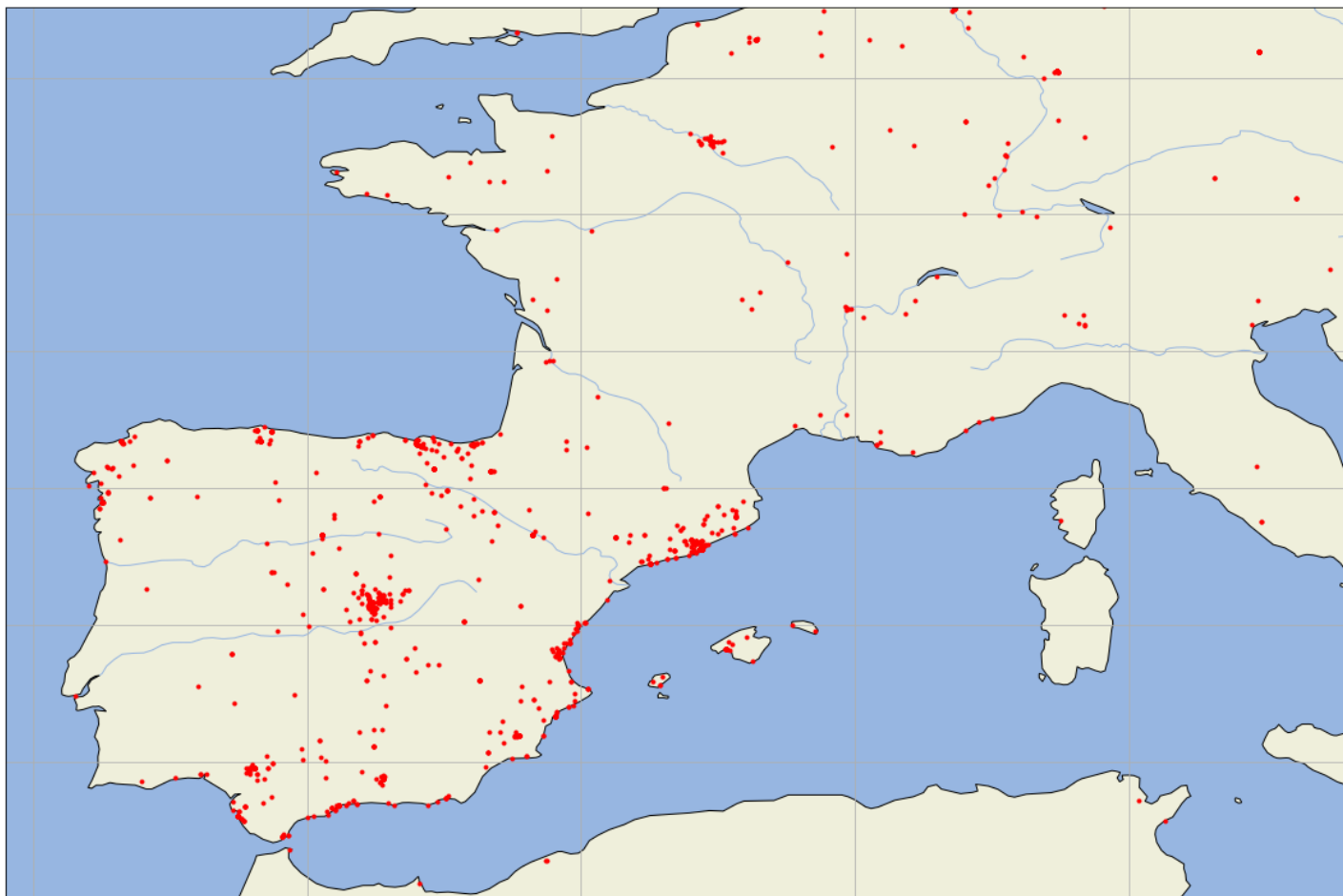
extent = (-10.5, 14, 35, 51)
ax.set_extent(extent)

for row in ips_df.itertuples():
    plt.plot(row.lon, row.lat, markersize=3, marker='o', color='red')

ax.add_feature(cfeature.OCEAN)
ax.add_feature(cfeature.LAND, edgecolor='black')
ax.add_feature(cfeature.LAKES, edgecolor='black')
ax.add_feature(cfeature.RIVERS)
ax.gridlines()

plt.show()
```

executed in 10.7s, finished 22:19:53 2021-05-06



```
In [40]: #Per exemple, com estem tractant el tema de La geolocalització, podriem graficar, per països, els percentatges d'accésos
#de clients a la web (no contarem la quantitat de clics que ha donat a la pàgina, és a dir de requests. (Contarem per client)
#com hi han 62 països diferents mostrarem els 15 amb més visitants i els demés els agruparem mostrant els seus noms
clients_x_pais = ips_df.groupby("country")["IP"].count()

#19 països amb més visitants
data = clients_x_pais.sort_values(ascending=False)[:15]

#els altres països
altres_s = clients_x_pais.sort_values(ascending=False)[15:]
paisos = "\n".join(altres_s.index.to_list())
altres_txt = "ALTRES PAÏSOS ({0} VISITANTS O MENYS):\n{1}".format(altres_s.max(), paisos)
altres_s = pd.Series(index=["Altres països"], data=altres_s.sum())

#afegim els països amb menys visitants a les dades a visualitzar
data = data.append(altres_s)
titol = "Visitants per països"

plt.figure(figsize=(15, 15))

plt.pie(data.values, labels=data.index, rotatelabels=True, labeldistance=1.02,
        wedgeprops={'linewidth': 3, 'edgecolor': 'w'}, shadow = True,
        autopct='%1.0f%%', pctdistance=.95, )

plt.title(titol, fontsize=20, color='#6146C6', alpha=0.9, loc="center")
plt.text(1.23,-.7, altres_txt, fontdict={"size":8, "color":"brown"})
plt.show()
```

executed in 907ms, finished 22:20:04 2021-05-06

