Jorge Gerardo Iglesias Ortiz - A01653261

Alejandro Hernández De la Torre - A01651516

Santiago Orozco Quintero - A01658308

Carlos Andres Barredeaz Rios - A01653183

Jorge Yepez Frutos - A01652661

Trabajo en el reto

In [1]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.cluster import KMeans
from sklearn.metrics import pairwise_distances_argmin_min
from wordcloud import WordCloud
import ast
import re

%matplotlib inline
from mpl_toolkits.mplot3d import Axes3D
plt.rcParams['figure.figsize'] = (16, 9)
plt.style.use('ggplot')

dfv = pd.read_csv("covid19_tweets.csv",parse_dates=["date"], index_col="date")
print(dfv)

df = pd.read_csv('covid19_tweets.csv')
```

```
                                   user_name          user_location  \
date                                                                  
2020-07-25 12:27:21                    ᏉᎥ☻լꂅϮ            astroworld   
2020-07-25 12:27:17               Tom Basile 🇺🇸          New York, NY   
2020-07-25 12:27:14             Time4fisticuffs       Pewee Valley, KY   
2020-07-25 12:27:10                 ethel mertz  Stuck in the Middle   
2020-07-25 12:27:08                    DIPR-J&K      Jammu and Kashmir   
...                                          ...                    ...   
2020-08-04 03:13:29                Laura Wolfrom         Lexington, KY   
2020-08-04 03:13:26     Professor Tonya M. Evans         😷 #stayathome   
2020-08-04 03:13:22            People's Daily app         北京，中华人民共和国   
2020-08-04 03:13:19                        M0ser                    NaN   
2020-08-04 03:13:15        Your Friend & Sabre ⚔          Chicago, IL   

                                                        user_description  \
date                                                                       
2020-07-25 12:27:21  wednesday addams as a disney princess keepin i...   
2020-07-25 12:27:17  Husband, Father, Columnist & Commentator. Auth...   
2020-07-25 12:27:14  #Christian #Catholic #Conservative #Reagan #Re...   
2020-07-25 12:27:10  #Browns #Indians #ClevelandProud #[]_[] #Cavs ...   
2020-07-25 12:27:08  🖊️Official Twitter handle of Department of Inf...   
...                                                                ...   
2020-08-04 03:13:29            The only things I collect are memories.   
2020-08-04 03:13:26  Law Prof @DickinsonLaw & Entrepreneur | Crypto...   
2020-08-04 03:13:22  Our mission is to provide news and perspective...   
2020-08-04 03:13:19  Reagan conservative and attorney raised in the...   
```

```
2020-08-04 03:13:15  My spectral decomposition has a significant da...

                          user_created  user_followers  user_friends  \
date
2020-07-25 12:27:21  2017-05-26 05:46:42             624           950
2020-07-25 12:27:17  2009-04-16 20:06:23            2253          1677
2020-07-25 12:27:14  2009-02-28 18:57:41            9275          9525
2020-07-25 12:27:10  2019-03-07 01:45:06             197           987
2020-07-25 12:27:08  2017-02-12 06:45:15          101009           168
...                                  ...             ...           ...
2020-08-04 03:13:29  2010-09-24 02:01:15              85           586
2020-08-04 03:13:26  2013-05-14 20:15:24            4289          1066
2020-08-04 03:13:22  2018-02-04 12:36:42            1413           102
2020-08-04 03:13:19  2014-02-18 03:46:28            2554          1733
2020-08-04 03:13:15  2016-12-19 19:55:00             310          1748

                     user_favourites  user_verified  \
date
2020-07-25 12:27:21            18775          False
2020-07-25 12:27:17               24           True
2020-07-25 12:27:14             7254          False
2020-07-25 12:27:10             1488          False
2020-07-25 12:27:08              101          False
...                              ...            ...
2020-08-04 03:13:29             1902          False
2020-08-04 03:13:26            53569          False
2020-08-04 03:13:22               16          False
2020-08-04 03:13:19           129104          False
2020-08-04 03:13:15            60133          False

                                                                  text  \
date
2020-07-25 12:27:21  If I smelled the scent of hand sanitizers toda...
2020-07-25 12:27:17  Hey @Yankees @YankeesPR and @MLB - wouldn't it...
2020-07-25 12:27:14  @diane3443 @wdunlap @realDonaldTrump Trump nev...
2020-07-25 12:27:10  @brookbanktv The one gift #COVID19 has give me...
2020-07-25 12:27:08  25 July : Media Bulletin on Novel #CoronaVirus...
...                                                                ...
2020-08-04 03:13:29  So far this summer I have filled up my lawn mo...
2020-08-04 03:13:26  ICYMI: REPLAY: #TechIntersect🔗 #16: Isaiah "@B...
2020-08-04 03:13:22  Community workers in Tianshan District of Urum...
2020-08-04 03:13:19  If only we had a responsible media to warn us ...
2020-08-04 03:13:15  MAGA: #COVID19 is just a cold &amp;amp; it'd be go...

                                                 hashtags  \
date
2020-07-25 12:27:21                                   NaN
2020-07-25 12:27:17                                   NaN
2020-07-25 12:27:14                         ['COVID19']
2020-07-25 12:27:10                         ['COVID19']
2020-07-25 12:27:08       ['CoronaVirusUpdates', 'COVID19']
...                                                   ...
2020-08-04 03:13:29           ['COVID19', 'QuarantineLife']
2020-08-04 03:13:26  ['TechIntersect', 'Bitcoin', 'COVID19']
2020-08-04 03:13:22                   ['China', 'Xinjiang']
2020-08-04 03:13:19                         ['COVID19']
2020-08-04 03:13:15      ['COVID19', 'Hydroxycholoroquine']

                              source  is_retweet
date
2020-07-25 12:27:21   Twitter for iPhone       False
2020-07-25 12:27:17  Twitter for Android       False
2020-07-25 12:27:14  Twitter for Android       False
2020-07-25 12:27:10   Twitter for iPhone       False
2020-07-25 12:27:08  Twitter for Android       False
...                                  ...         ...
```

```
2020-08-04 03:13:29   Twitter for iPhone       False
2020-08-04 03:13:26      Twitter Web App       False
2020-08-04 03:13:22      Twitter Web App       False
2020-08-04 03:13:19   Twitter for iPhone       False
2020-08-04 03:13:15  Twitter for Android       False

[74436 rows x 12 columns]
```

In [2]:
```
df1=dfv.resample('H').sum()
df1 = df1.drop(df1[df1['user_verified']==0].index) #borramos las columnas donde no exist
df1.head(50)
```

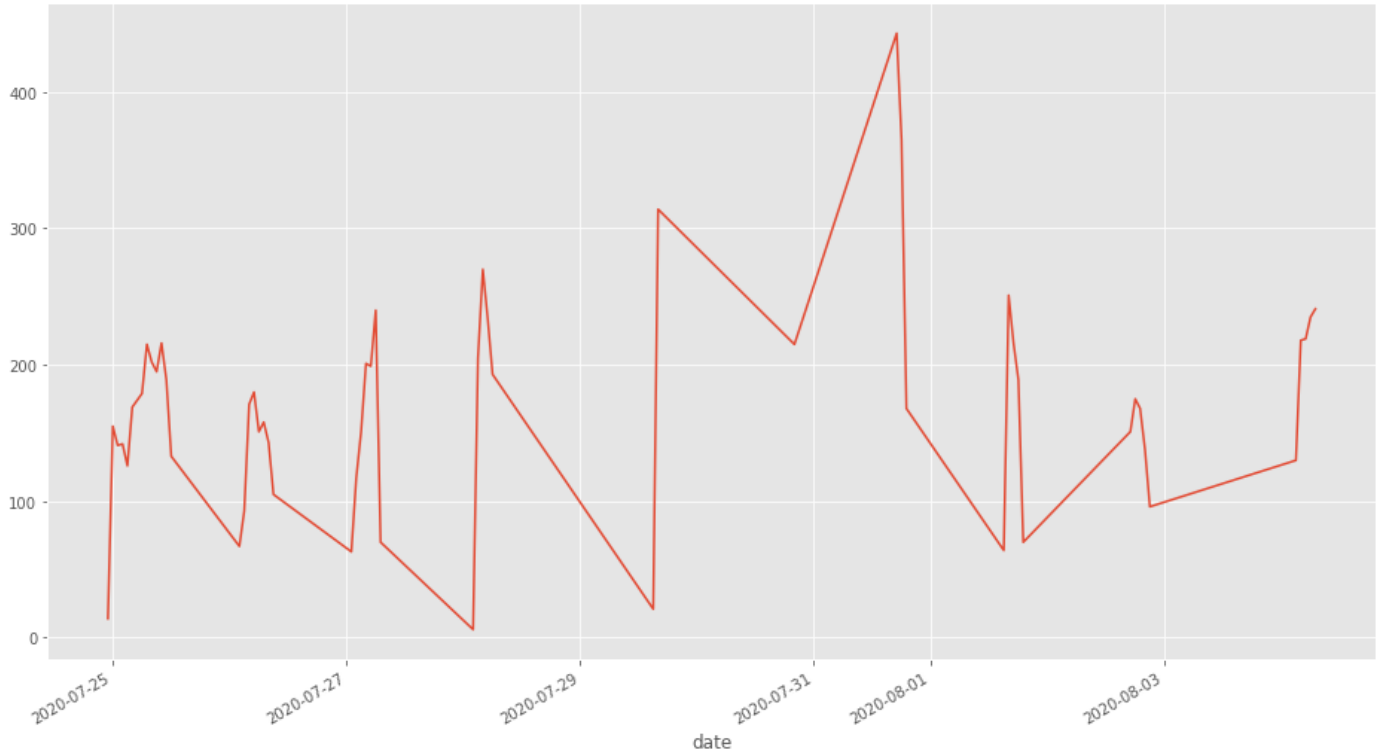
Out[2]:

date	user_followers	user_friends	user_favourites	user_verified	is_retweet
2020-07-24 23:00:00	6921791	750145	5287795	14	0
2020-07-25 00:00:00	107968868	3607161	27607518	155	0
2020-07-25 01:00:00	132829339	4358358	30945431	141	0
2020-07-25 02:00:00	157792726	2628135	17799737	142	0
2020-07-25 03:00:00	142410717	2393866	18910575	126	0
2020-07-25 04:00:00	180399160	2284165	14693968	169	0
2020-07-25 05:00:00	133326342	2212167	17266743	174	0
2020-07-25 06:00:00	209287212	2004381	12778354	179	0
2020-07-25 07:00:00	197726389	3463423	18209929	215	0
2020-07-25 08:00:00	253628491	2273076	15896482	202	0
2020-07-25 09:00:00	185120201	2243393	16097191	195	0
2020-07-25 10:00:00	199107319	2919256	17899549	216	0
2020-07-25 11:00:00	96397863	2613696	19791746	189	0
2020-07-25 12:00:00	81492917	2027260	11039827	133	0
2020-07-26 02:00:00	128054936	2042962	16535007	67	0
2020-07-26 03:00:00	106667586	2437330	15751724	93	0
2020-07-26 04:00:00	215291563	1998148	14689421	171	0
2020-07-26 05:00:00	160700137	1973463	12691694	180	0
2020-07-26 06:00:00	142105034	2292354	13261130	151	0
2020-07-26 07:00:00	135185788	2294247	13848892	158	0
2020-07-26 08:00:00	99863798	2256137	16017469	143	0
2020-07-26 09:00:00	120403761	1098053	6977080	105	0
2020-07-27 01:00:00	54514549	1160298	11546123	63	0
2020-07-27 02:00:00	146872547	2816082	20095454	117	0
2020-07-27 03:00:00	235035809	2441291	18459444	151	0
2020-07-27 04:00:00	245218077	2837185	18040029	201	0
2020-07-27 05:00:00	185243592	2442006	11190995	199	0
2020-07-27 06:00:00	164135550	2772006	19267948	240	0
2020-07-27 07:00:00	60200426	702128	4134013	70	0

2020-07-28 02:00:00	1800266	164449	1154121	6	0
2020-07-28 03:00:00	282759999	4023955	33932263	205	0
2020-07-28 04:00:00	304479917	4498063	33383244	270	0
2020-07-28 05:00:00	236318266	3141769	22958213	234	0
2020-07-28 06:00:00	166010569	2597081	19057992	193	0
2020-07-29 15:00:00	18405257	316478	2490568	21	0
2020-07-29 16:00:00	116290430	5431422	37812529	314	0
2020-07-30 20:00:00	54922705	3790860	34005785	215	0
2020-07-31 17:00:00	309921507	6777304	39960330	443	0
2020-07-31 18:00:00	195151771	7942942	54048964	365	0
2020-07-31 19:00:00	63966985	2804211	15473628	168	0
2020-08-01 15:00:00	64152982	1219039	9921677	64	0
2020-08-01 16:00:00	240608432	5042913	36197795	251	0
2020-08-01 17:00:00	91815688	5416530	41628056	216	0
2020-08-01 18:00:00	133226799	4859420	41988456	189	0
2020-08-01 19:00:00	59070790	1780192	15255423	70	0
2020-08-02 17:00:00	101175560	3642161	28544403	151	0
2020-08-02 18:00:00	102997698	4172099	30416438	175	0
2020-08-02 19:00:00	48733176	4696191	30880681	168	0
2020-08-02 20:00:00	39543180	3866011	28535602	138	0
2020-08-02 21:00:00	41606247	3150837	20540784	96	0

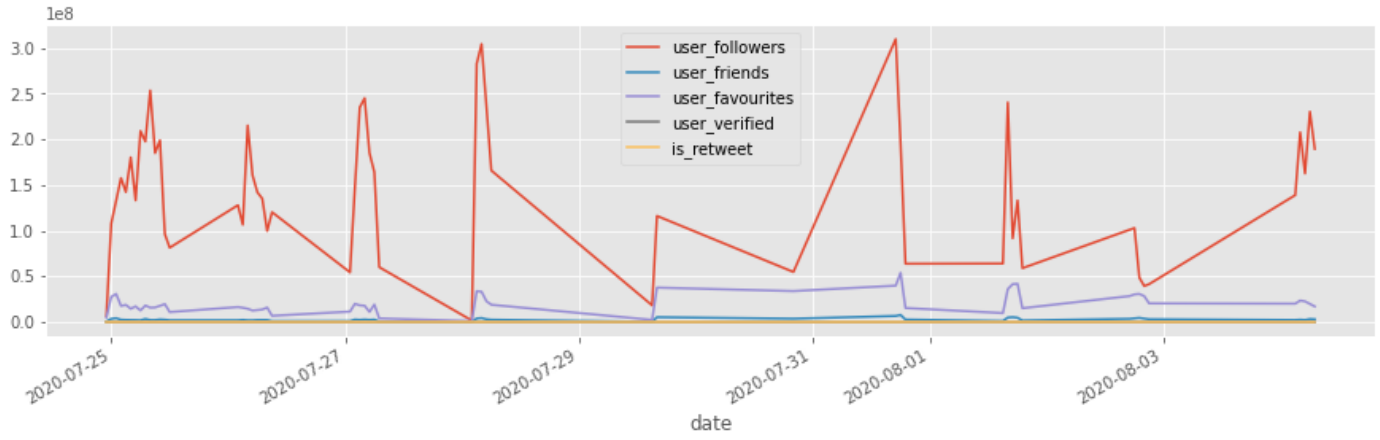
In [3]:
```
df1['user_verified'].plot()
```

Out[3]:
```
<AxesSubplot:xlabel='date'>
```



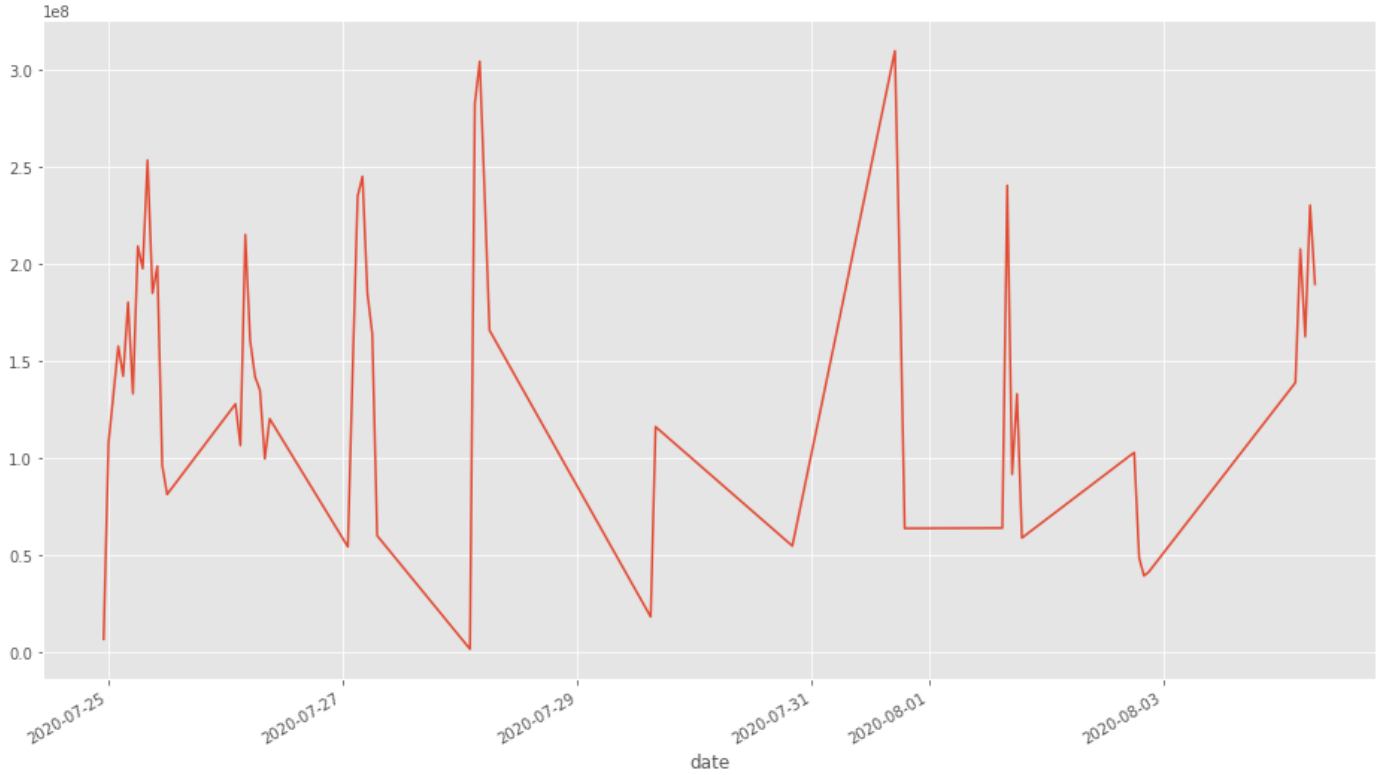
In [4]:
```
fix, ax=plt.subplots(figsize=(15,4))
df1.plot(ax=ax)
```

Out[4]:
```
<AxesSubplot:xlabel='date'>
```



In [5]:
```
df1['user_followers'].plot()
```

Out[5]:
```
<AxesSubplot:xlabel='date'>
```



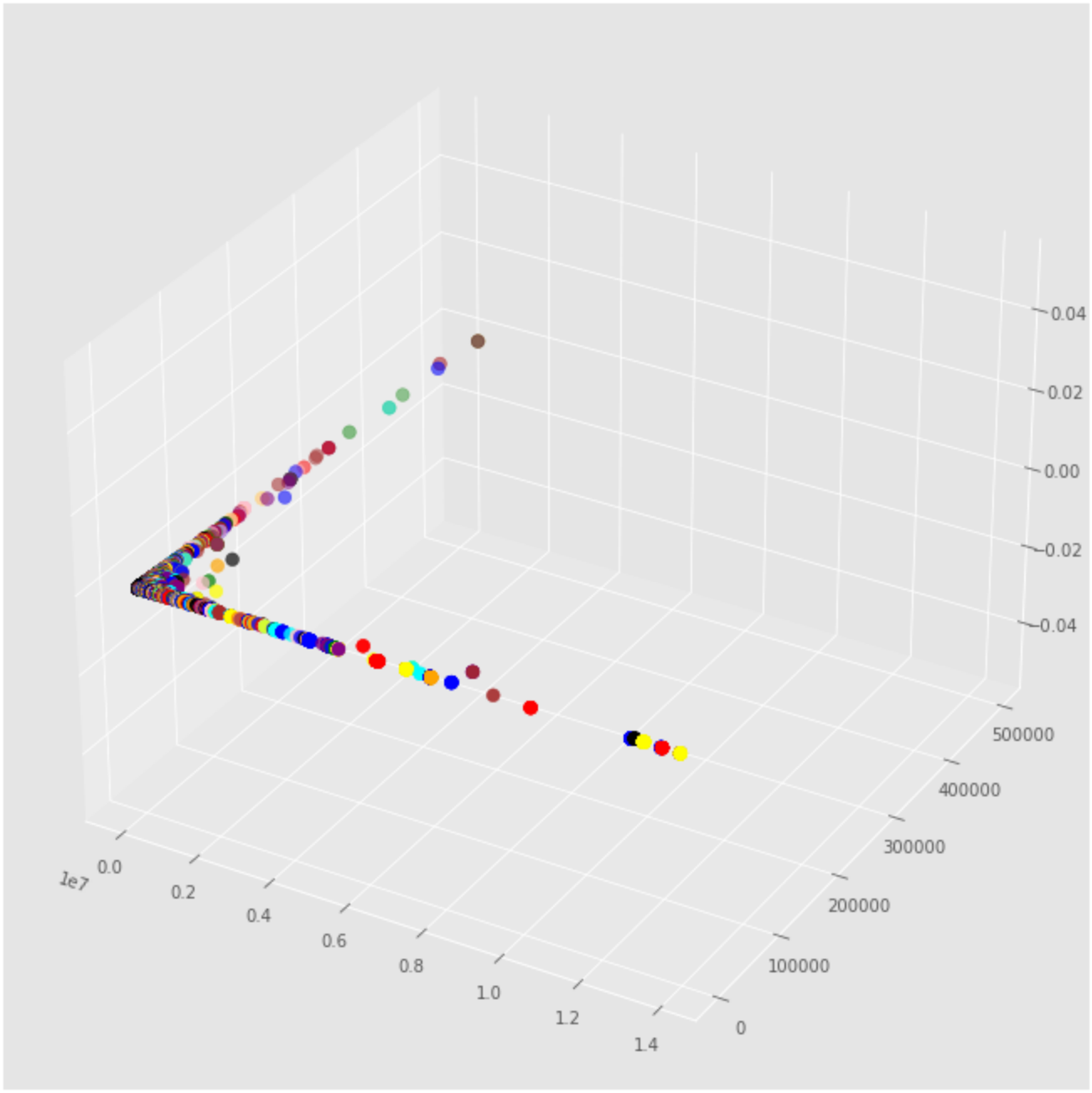
In [6]:
```
X = np.array(df[["user_followers","user_friends"]])
y = np.array(df["user_favourites"])
X.shape
```

Out[6]:
```
(74436, 2)
```

In [7]:
```
fig = plt.figure()
ax = Axes3D(fig)
colores=['blue','red','green','blue','cyan','yellow','orange','black','pink','brown','pu
asignar=[]
for row in y:
    asignar.append(colores[int(row%11)])
ax.scatter(X[:, 0], X[:, 1], c=asignar,s=60)
```

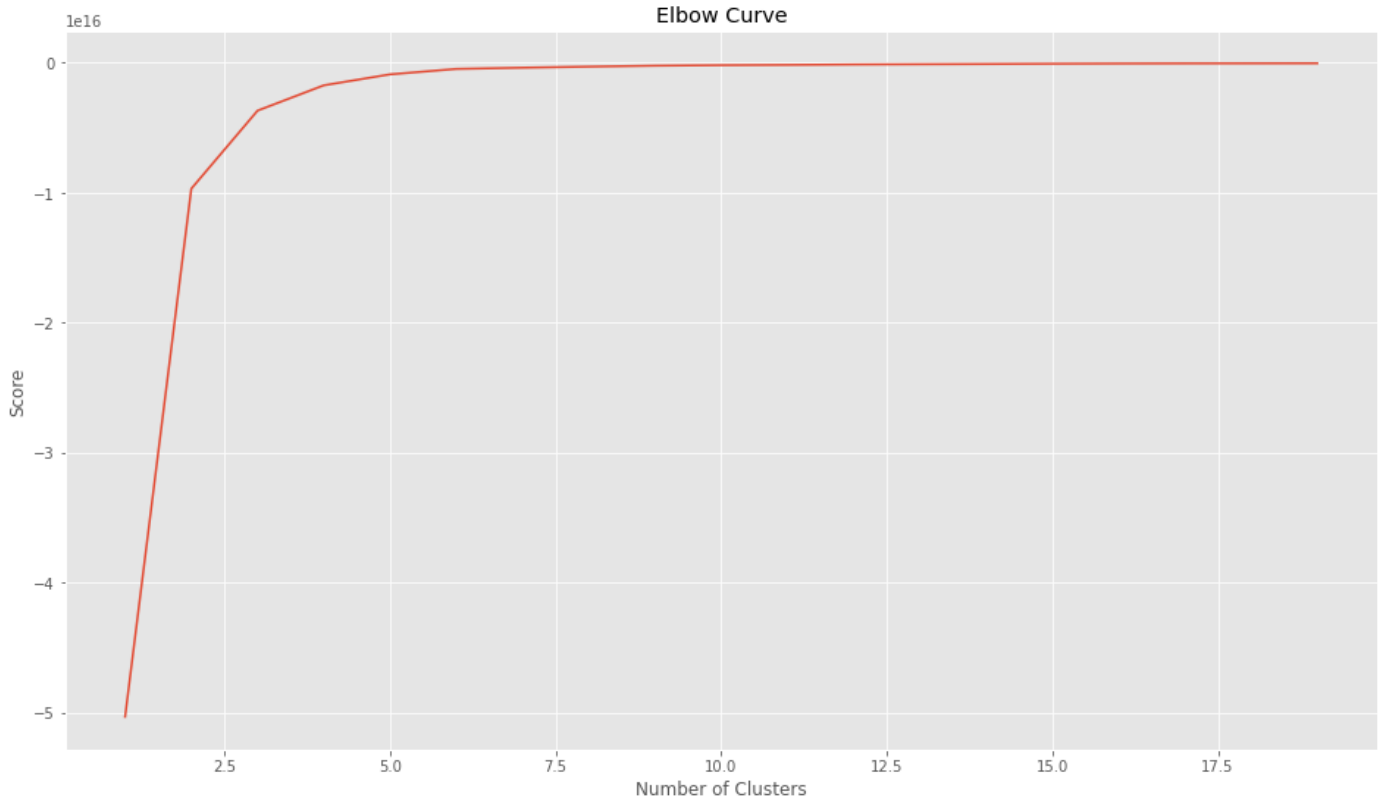
```
C:\Users\JGIO\AppData\Local\Temp\ipykernel_22712\1148580877.py:2: MatplotlibDeprecationW
arning: Axes3D(fig) adding itself to the figure is deprecated since 3.4. Pass the keywor
d argument auto_add_to_figure=False and use fig.add_axes(ax) to suppress this warning. T
he default value of auto_add_to_figure will change to False in mpl3.5 and True values wi
ll no longer work in 3.6.  This is consistent with other Axes classes.
  ax = Axes3D(fig)
```

Out[7]:
```
<mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x26bb83c6940>
```



In [8]:

```
Nc = range(1, 20)
kmeans = [KMeans(n_clusters=i) for i in Nc]
kmeans
score = [kmeans[i].fit(X).score(X) for i in range(len(kmeans))]
score
plt.plot(Nc,score)
plt.xlabel('Number of Clusters')
plt.ylabel('Score')
plt.title('Elbow Curve')
plt.show()
```



In [9]:
```
kmeans = KMeans(n_clusters=4).fit(X)
centroids = kmeans.cluster_centers_
print(centroids)
```

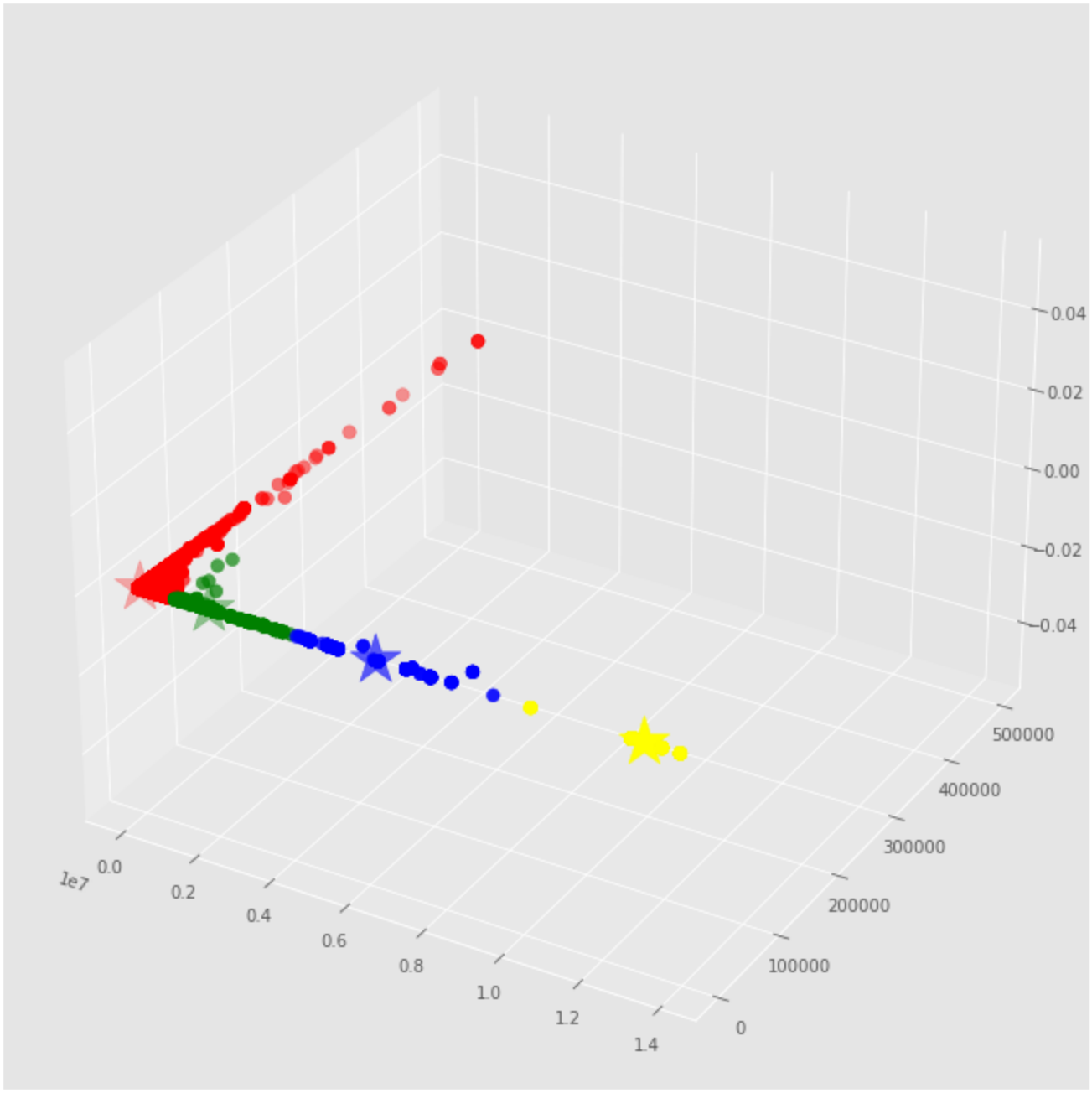
```
[[1.83148000e+04 2.17754637e+03]
 [6.23958658e+06 7.68970414e+02]
 [1.30086912e+07 2.19937888e+02]
 [1.88081638e+06 1.20131633e+03]]
```

In [10]:
```
labels = kmeans.predict(X)
C = kmeans.cluster_centers_
colores=['red','blue','yellow','green']
asignar=[]
for row in labels:
    asignar.append(colores[row])

fig = plt.figure()
ax = Axes3D(fig)
ax.scatter(X[:, 0], X[:, 1], c=asignar,s=60)
ax.scatter(C[:, 0], C[:, 1], marker='*', c=colores, s=1000)
```

```
C:\Users\JGIO\AppData\Local\Temp\ipykernel_22712\3406312632.py:9: MatplotlibDeprecationWarning: Axes3D(fig) adding itself to the figure is deprecated since 3.4. Pass the keyword argument auto_add_to_figure=False and use fig.add_axes(ax) to suppress this warning. The default value of auto_add_to_figure will change to False in mpl3.5 and True values will no longer work in 3.6.  This is consistent with other Axes classes.
  ax = Axes3D(fig)
```

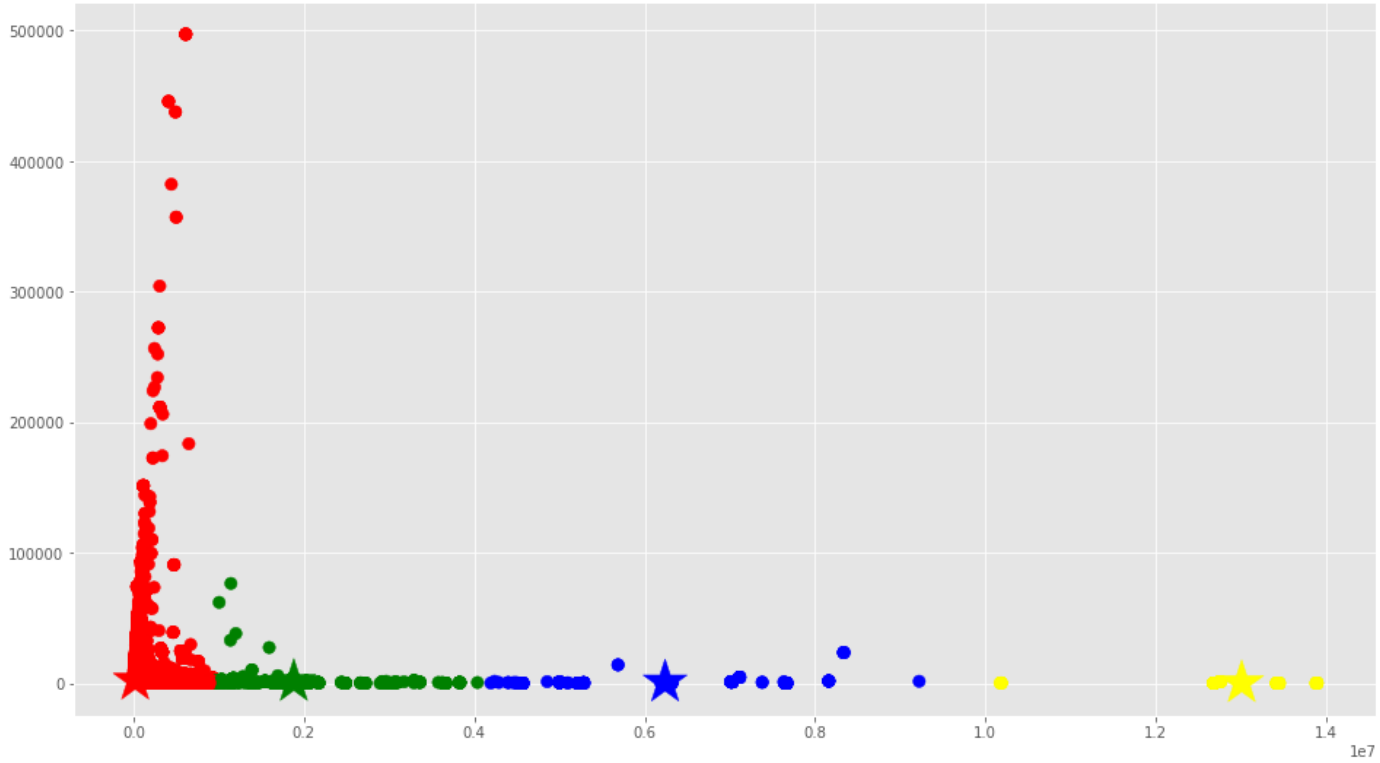
Out[10]:
```
<mpl_toolkits.mplot3d.art3d.Path3DCollection at 0x26bb8570fa0>
```



In [11]:

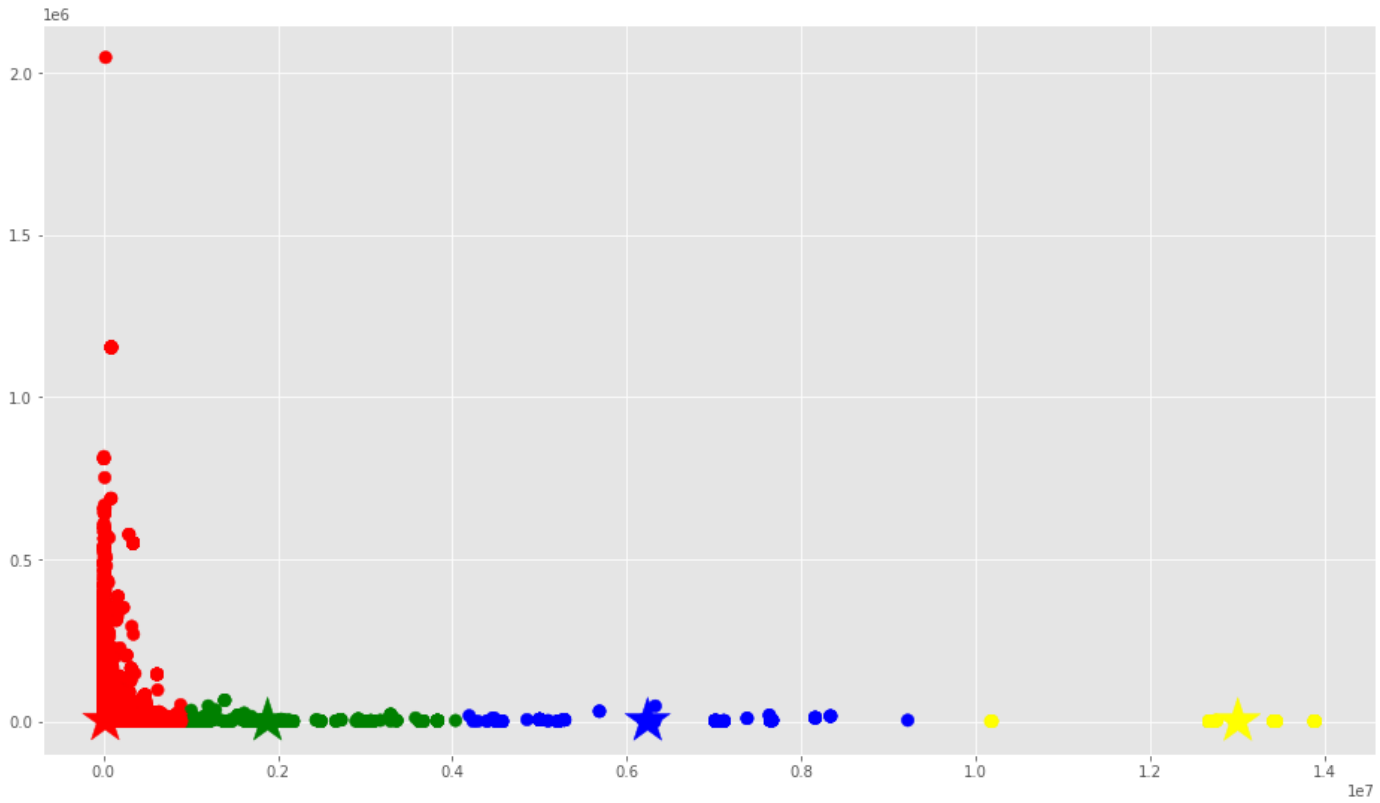
```
f1 = df["user_followers"].values
f2 = df["user_friends"].values

plt.scatter(f1, f2, c=asignar, s=70)
plt.scatter(C[:, 0], C[:, 1], marker='*', c=colores, s=1000)
plt.show()
```



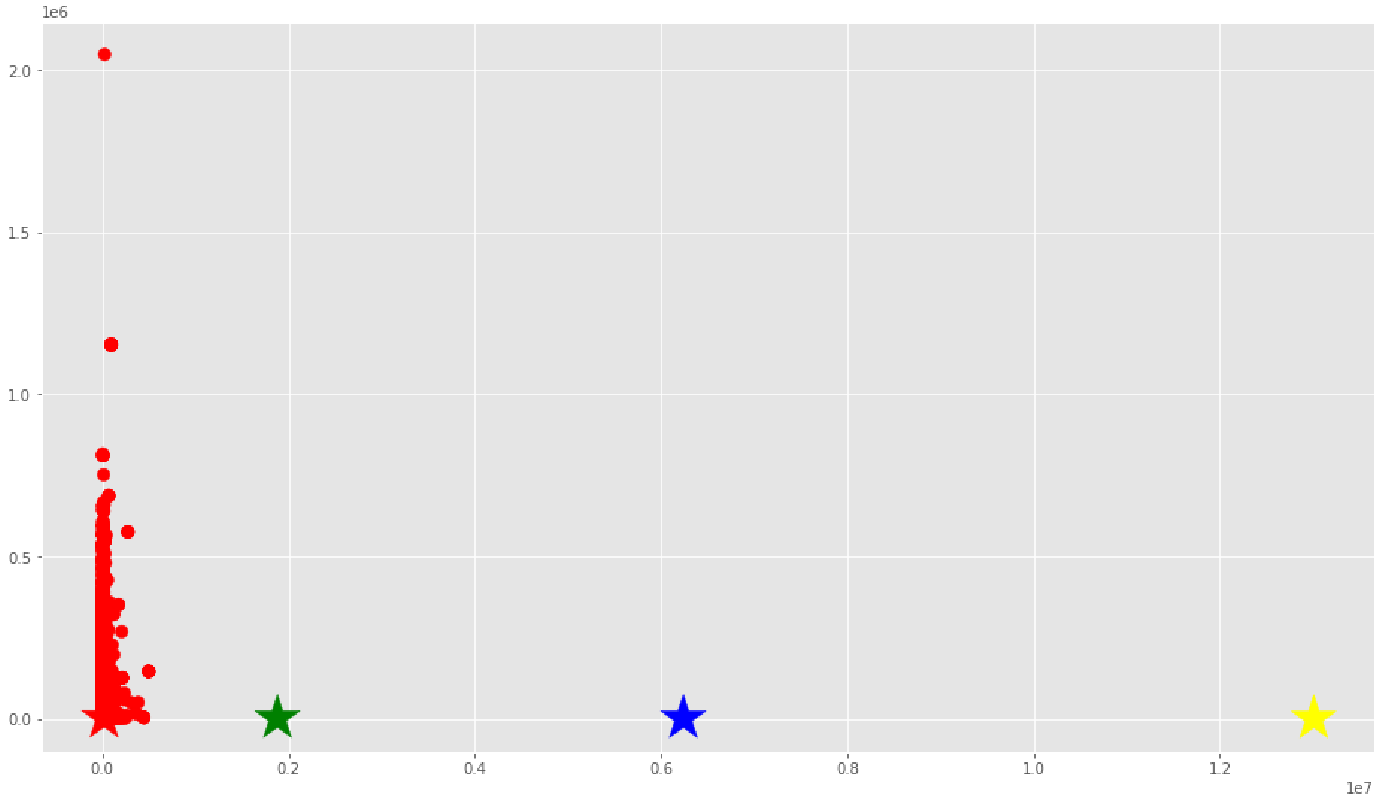
In [12]:
```
f1 = df["user_followers"].values
f2 = df["user_favourites"].values

plt.scatter(f1, f2, c=asignar, s=70)
plt.scatter(C[:, 0], C[:, 1], marker='*', c=colores, s=1000)
plt.show()
```



In [13]:
```
f1 = df["user_friends"].values
f2 = df["user_favourites"].values

plt.scatter(f1, f2, c=asignar, s=70)
plt.scatter(C[:, 0], C[:, 1], marker='*', c=colores, s=1000)
plt.show()
```



In [14]:
```
copy =  pd.DataFrame()
copy['usuario']=df['user_name'].values
copy['categoria']=df['user_favourites'].values
copy['label'] = labels;
cantidadGrupo =  pd.DataFrame()
cantidadGrupo['color']=colores
cantidadGrupo['cantidad']=copy.groupby('label').size()
cantidadGrupo
```

Out[14]:

	color	cantidad
0	red	73082
1	blue	507
2	yellow	161
3	green	686

In [15]:
```
group_referrer_index = copy['label'] ==0
group_referrals = copy[group_referrer_index]

diversidadGrupo =  pd.DataFrame(df)
#diversidadGrupo['categoria']=[0,1,2,3,4,5,6,7,8,9,10]
#print(group_referrals)
diversidadGrupo['cantidad']=group_referrals.groupby('usuario').size()
diversidadGrupo
```

Out[15]:

	user_name	user_location	user_description	user_created	user_followers	user_friends	user_favourites	u
0	ᖇi☻⌊₠†	astroworld	wednesday addams as a disney princess keepin i...	2017-05-26 05:46:42	624	950	18775	
1	Tom Basile us	New York, NY	Husband, Father, Columnist & Commentator. Auth...	2009-04-16 20:06:23	2253	1677	24	

2	Time4fisticuffs	Pewee Valley, KY	#Christian #Catholic #Conservative #Reagan #Re...	2009-02-28 18:57:41	9275	9525	7254
3	ethel mertz	Stuck in the Middle	#Browns #Indians #ClevelandProud #[]_[] #Cavs ...	2019-03-07 01:45:06	197	987	1488
4	DIPR-J&K	Jammu and Kashmir	🖉Official Twitter handle of Department of Inf...	2017-02-12 06:45:15	101009	168	101
...	...	...	...	...	...	...	...
74431	Laura Wolfrom	Lexington, KY	The only things I collect are memories.	2010-09-24 02:01:15	85	586	1902
74432	Professor Tonya M. Evans	😷 #stayathome	Law Prof @DickinsonLaw & Entrepreneur | Crypto...	2013-05-14 20:15:24	4289	1066	53569
74433	People's Daily app	北京, 中华人民共和国	Our mission is to provide news and perspective...	2018-02-04 12:36:42	1413	102	16
74434	M0ser	NaN	Reagan conservative and attorney raised in the...	2014-02-18 03:46:28	2554	1733	129104
74435	Your Friend & Sabre ⚔	Chicago, IL	My spectral decomposition has a significant da...	2016-12-19 19:55:00	310	1748	60133

74436 rows × 14 columns

In [16]:
```
closest, _ = pairwise_distances_argmin_min(kmeans.cluster_centers_, X)
closest
```

Out[16]:
```
array([25836,  2851, 70675, 72372], dtype=int64)
```

In [17]:
```
users=df['user_name'].values
for row in closest:
    print(users[row])
```

```
Fatima Alasrar
SkyNews
The Times Of India
UN Women
```

In [18]:
```
co_df_std = df.groupby('user_location').agg({'user_followers' : 'std'}).sort_values('use
co_df_mn = df.groupby('user_location').agg({'user_followers' : 'mean'}).sort_values('use
co_df_mdn = df.groupby('user_location').agg({'user_followers' : 'median'}).sort_values('
```

In [19]:
```
print(df.dtypes)
```

```
user_name           object
user_location       object
```

```
user_description     object
user_created         object
user_followers        int64
user_friends          int64
user_favourites       int64
user_verified          bool
date                 object
text                 object
hashtags             object
source               object
is_retweet             bool
cantidad            float64
dtype: object
```

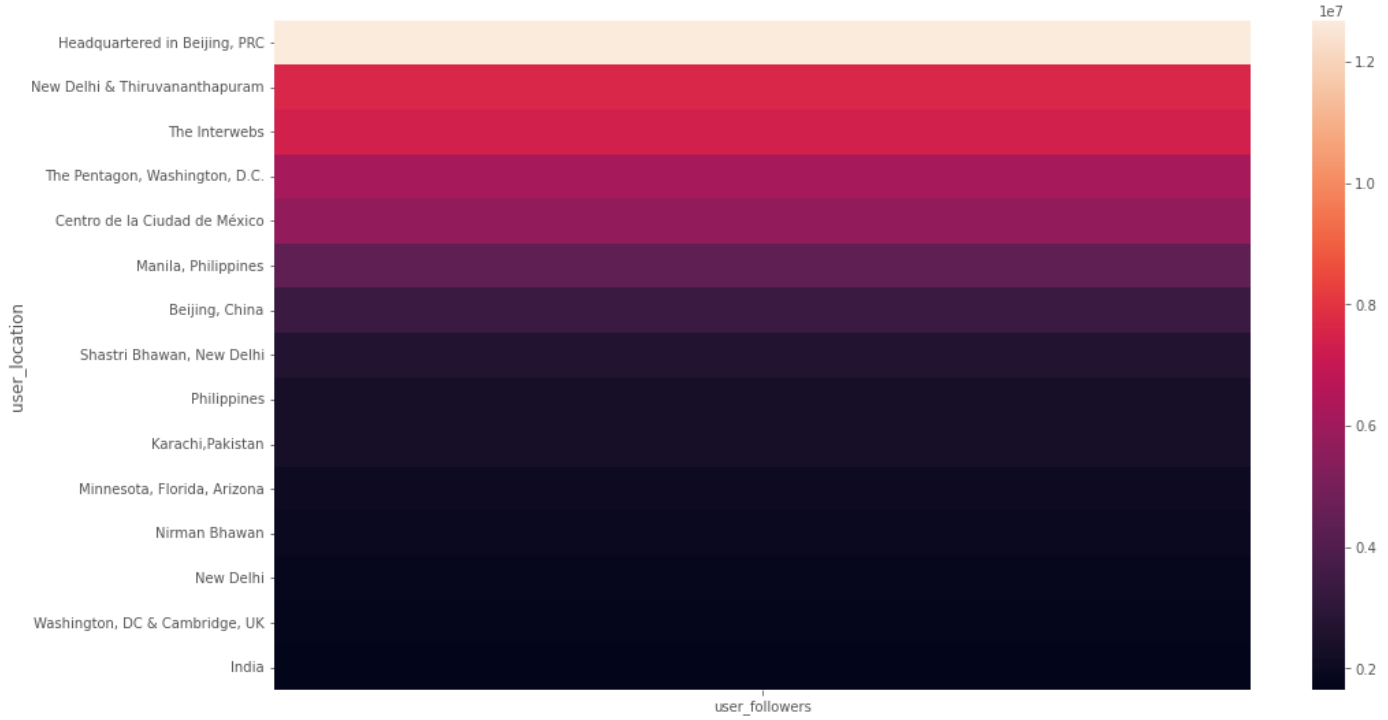
In [20]:
```
co_df_mn.head(15)
```

Out[20]:

user_location	user_followers
Headquartered in Beijing, PRC	1.268052e+07
New Delhi & Thiruvananthapuram	7.635618e+06
The Interwebs	7.379812e+06
The Pentagon, Washington, D.C.	6.186636e+06
Centro de la Ciudad de México	5.686527e+06
Manila, Philippines	4.391670e+06
Beijing, China	3.356276e+06
Shastri Bhawan, New Delhi	2.663792e+06
Philippines	2.318235e+06
Karachi,Pakistan	2.299001e+06
Minnesota, Florida, Arizona	2.026184e+06
Nirman Bhawan	1.911736e+06
New Delhi	1.817613e+06
Washington, DC & Cambridge, UK	1.753387e+06
India	1.647559e+06

In [21]:
```
sns.heatmap(co_df_mn.head(15))
```

Out[21]:
```
<AxesSubplot:ylabel='user_location'>
```



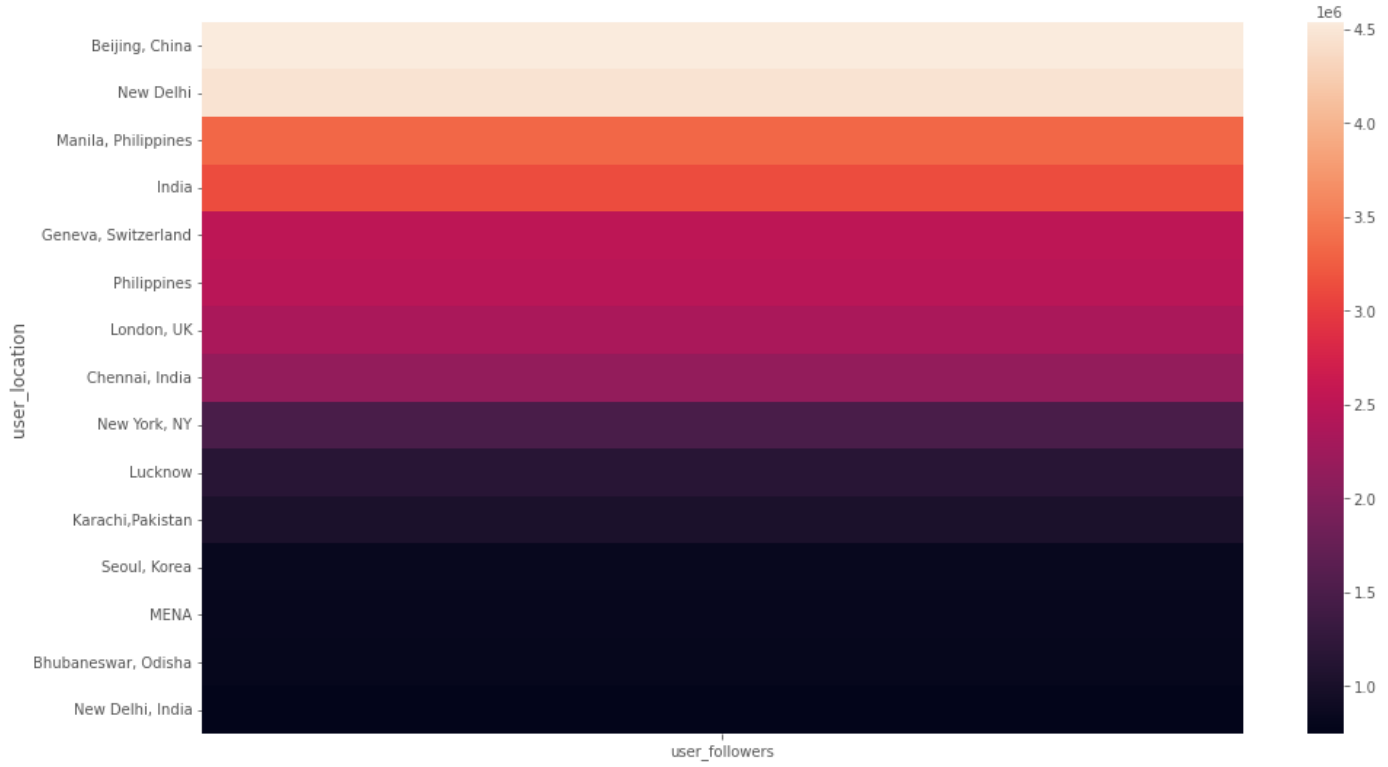
In [22]:
```
co_df_mdn.head(15)
```

Out[22]:

user_location	user_followers
Headquartered in Beijing, PRC	12680958.0
New Delhi & Thiruvananthapuram	7635618.5
The Interwebs	7379812.0
Manila, Philippines	7015176.5
The Pentagon, Washington, D.C.	6186636.0
Centro de la Ciudad de México	5686527.0
Karachi,Pakistan	2715408.0
Shastri Bhawan, New Delhi	2663760.0
Minnesota, Florida, Arizona	2026886.0
Nirman Bhawan	1911088.0
Beijing, China	1888765.0
Washington, DC & Cambridge, UK	1755205.0
Houghton, South Africa	1591819.0
170 countries & territories	1540323.5
The 7 seas!	1440093.0

In [23]:
```
sns.heatmap(co_df_std.head(15))
```

Out[23]:
```
<AxesSubplot:ylabel='user_location'>
```



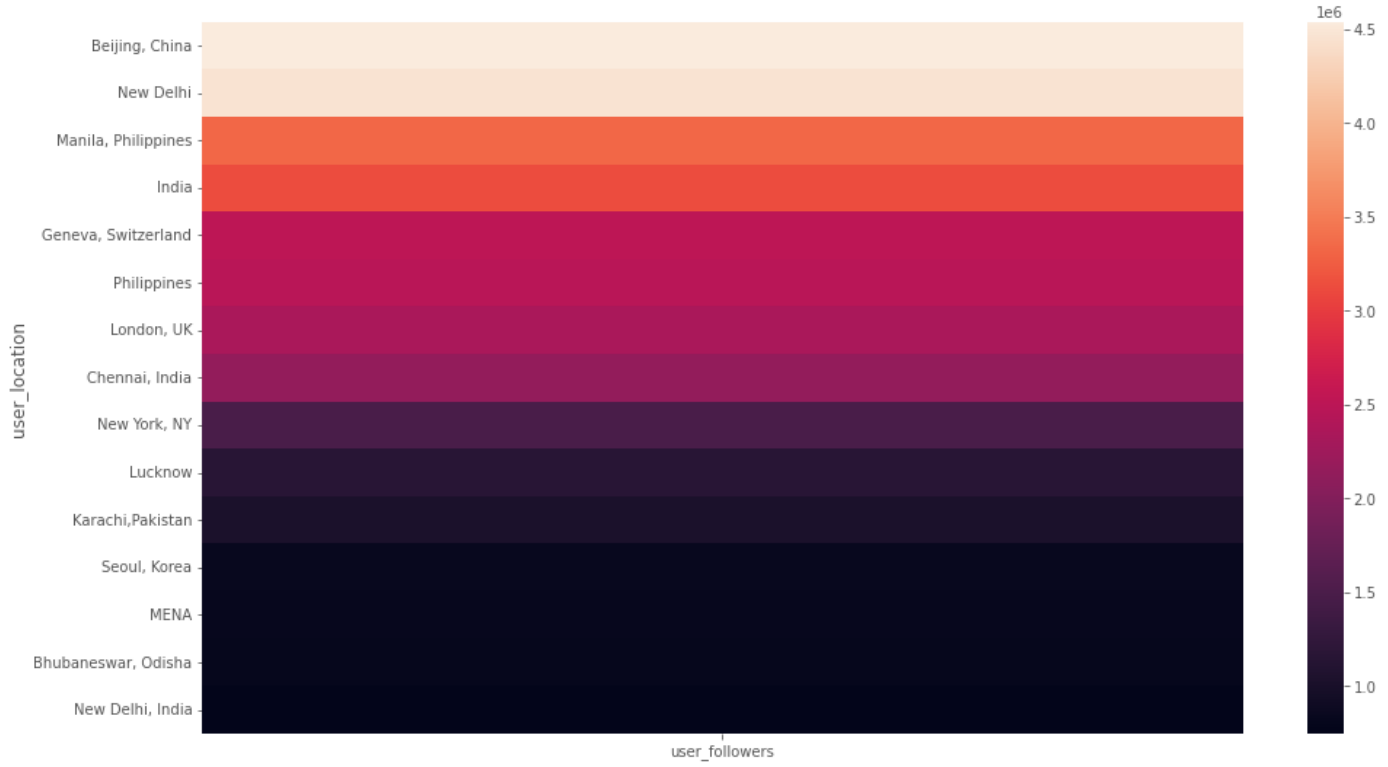
In [24]:
```
co_df_std.head(15)
```

Out[24]:

user_location	user_followers
Beijing, China	4.539737e+06
New Delhi	4.456848e+06
Manila, Philippines	3.336275e+06
India	3.118637e+06
Geneva, Switzerland	2.511489e+06
Philippines	2.478788e+06
London, UK	2.338115e+06
Chennai, India	2.151701e+06
New York, NY	1.483196e+06
Lucknow	1.160446e+06
Karachi,Pakistan	1.018972e+06
Seoul, Korea	8.305512e+05
MENA	8.154900e+05
Bhubaneswar, Odisha	7.999587e+05
New Delhi, India	7.487397e+05

In [25]:
```
sns.heatmap(co_df_std.head(15))
```

Out[25]:
```
<AxesSubplot:ylabel='user_location'>
```



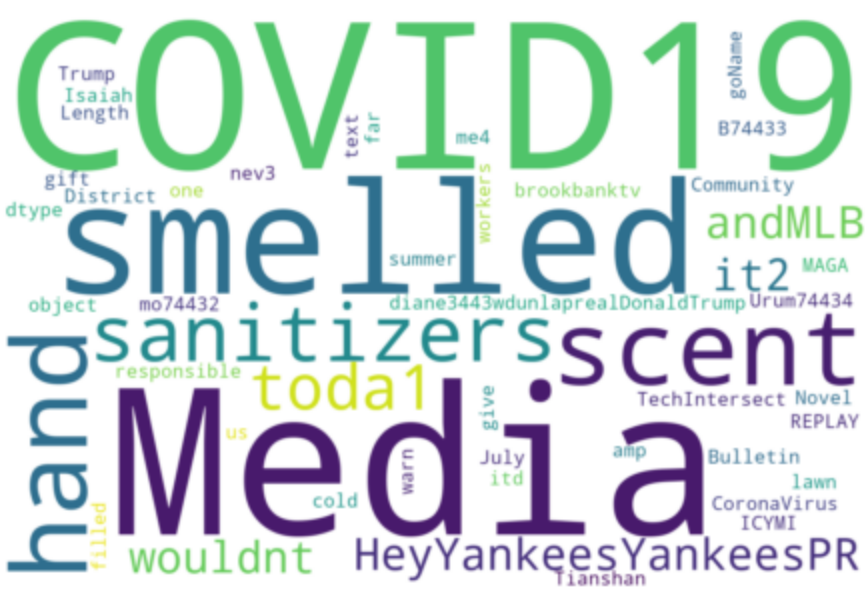
In [26]:

```
def text_cleaner(text):
    text = re.sub(r"\n", "", str(text))
    text = re.sub(r"\t", "", str(text))
    text = re.sub(r"\r", "", str(text))
    text = re.sub(r"\[", "", str(text))
    text = re.sub(r"\]", "", str(text))
    text = re.sub(r"nan", "", str(text))
    text = re. sub(r" (@)|(#)|(RT[\s]+)|(https?:\/\/\S+)|([^a-zA-Z0-9 -])", "", str(text
    text = re. sub(r"\b(\w+)( \1\b)+", r"\1", text)
    text = text.strip(" ")
    return text



wo_hs = text_cleaner(df["text"])
from wordcloud import wordcloud
def wordcloud(w):
    WC = WordCloud(width=1200, height=800,
        background_color="white",
        max_words=200)
    WC.generate(w)
    # PLot
    fig=plt.figure(figsize=(6,4))
    plt.imshow(WC,interpolation='bilinear')
    plt.axis("off")
    plt.tight_layout (pad=0)
    plt. show()

wordcloud(wo_hs)
```


COVID19
Trump
Isaiah
Length
text
far
goName
B74433
me4
gift
District
nev3
one
dtype
smelled
workers
brookbanktv
Community
andMLB
summer
it2
MAGA
object
mo74432
diane3443wdunlaprealDonaldTrump
Urum74434
hand
sanitizers
scent
responsible
toda1
TechIntersect
Novel
REPLAY
give
Media
us
July
amp
Bulletin
warn
itd
lawn
cold
CoronaVirus
ICYMI
filled
wouldnt
HeyYankeesYankeesPR
Tianshan

In [ ]: