flashpoint_analytics_python

April 23, 2023

1 Flashpoint Analytics

Flashpoint is a web-game preservation project, made in 2018 in an effort to save as many games as possible from the then upcoming Flash End-Of-Life, while also making them playable for everyone. Today, it hosts more than 170 000 games and thousands of active users all around the world.

This notebook contains a descriptive statistical analysis about the games available in Flashpoint, with an emphasis on categorical data, such as the technology that was used to make them or the publisher who used to host them in the past.

The Flashpoint database, which keeps all the data that will be used in the analysis, can be found here.

1.1 Import modules

[1]:
```
import os
import urllib.request
import sqlite3
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
import warnings
```

These are the modules that we are going to use for our analysis. Notably: * *sqlite3* allows us to communicate with a SQLite database; * *pandas* offers very useful tools for working with data; * *seaborn* and *matplotlib* come with some handful functions to display and visualize data.

1.2 Retrieve data

[2]:
```
#os.mkdir("data")

# download data from the source

url = "http://infinity.unstable.life/Flashpoint/Data/flashpoint.sqlite"
filename = "data/flashpoint.sqlite"
#urllib.request.urlretrieve(url, filename)

# connect to the database and store the "game" table in a dataframe
```

```
con = sqlite3.connect("data/flashpoint.sqlite")
df = pd.read_sql_query("SELECT * FROM game", con)
con.close()
```

1.3 Explore data

Let's have a first look at our data.

[3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 177469 entries, 0 to 177468
Data columns (total 27 columns):
 #   Column               Non-Null Count   Dtype
---  ------               --------------   -----
 0   id                   177469 non-null  object
 1   parentGameId         57600 non-null   object
 2   title                177469 non-null  object
 3   alternateTitles      177469 non-null  object
 4   series               177469 non-null  object
 5   developer            177469 non-null  object
 6   publisher            177469 non-null  object
 7   dateAdded            177469 non-null  object
 8   dateModified         177469 non-null  object
 9   platform             177469 non-null  object
 10  broken               177469 non-null  int64
 11  extreme              177469 non-null  int64
 12  playMode             177469 non-null  object
 13  status               177469 non-null  object
 14  notes                177469 non-null  object
 15  source               177469 non-null  object
 16  applicationPath      177469 non-null  object
 17  launchCommand        177469 non-null  object
 18  releaseDate          177469 non-null  object
 19  version              177469 non-null  object
 20  originalDescription  177469 non-null  object
 21  language             177469 non-null  object
 22  library              177469 non-null  object
 23  orderTitle           177469 non-null  object
 24  activeDataId         153952 non-null  float64
 25  activeDataOnDisk     177469 non-null  int64
 26  tagsStr              177469 non-null  object
dtypes: float64(1), int64(3), object(23)
memory usage: 36.6+ MB
```

There is a total of 27 variables and almost all of them belong to the *object* data type. We are going to need only some of them, so let's keep only the relevant ones.

[4]:
```
vars_to_keep = ["id", "title", "developer", "publisher", "platform",␣
 ↪"releaseDate", "language", "library", "tagsStr"]
df = df[vars_to_keep]
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 177469 entries, 0 to 177468
Data columns (total 9 columns):
 #   Column       Non-Null Count   Dtype
---  ------       --------------   -----
 0   id           177469 non-null  object
 1   title        177469 non-null  object
 2   developer    177469 non-null  object
 3   publisher    177469 non-null  object
 4   platform     177469 non-null  object
 5   releaseDate  177469 non-null  object
 6   language     177469 non-null  object
 7   library      177469 non-null  object
 8   tagsStr      177469 non-null  object
dtypes: object(9)
memory usage: 12.2+ MB
```

Among the remaining variables there are no missing values.

To complete our preliminary analysis, let's print the first rows of our dataframe.

[5]:
```
df.head()
```

[5]:

	id	title	developer	publisher	platform	releaseDate	language	library	tagsStr
0	6db72888-6aa5-34c9-0ff3-ffe4cfe0fc61	All Grown Up: Krazy Karts	Ezone	Nickelodeon	3D Groove GX			arcade	Racing
1	3bba3af6-8e76-b2c8-b423-2d2d8bdfdd50	Showdown: The Gunfighting Game	3D Groove	3D Groove	3D Groove GX			arcade	Shooter
2	fb479276-2325-4dbb-bafd-64fcc8aeb684	Hamsterball Bowling	Ezone	atv.Disney.go.com	3D Groove GX			arcade	Arcade
3	7cdff5f4-11cb-b1de-51bc-bca13ef78adb	Dunk Tank	Ezone	atv.Disney.go.com	3D Groove GX			arcade	Arcade
4	1d9ff021-2404-9785-bb7d-0fceda67a55d	Baby Knight	Pepworks	Pepworks	3D Groove GX			arcade	Platformer

1.4 Analyze data

1.4.1 Developers and Publishers

It would be interesting to know which are the most prolific developers and publishers. Let's find out by creating a frequency table for each variable and looking at the first ten entries.

[6]:
```
top_developers = df["developer"].value_counts()[:10]
top_developers
```

[6]:
```
                46151
123Bee           2730
Games2Rule       2441
Games2Jolly.com  1915
Selfdefiant      1603
WowEscape.com    1436
Top10NewGames    1144
PalmarianFire    1059
Ena Game Studio  1031
Neopets           957
Name: developer, dtype: int64
```

The first row is blank because some games (actually, most of them) do not have a developer value associated in the database. Let's filter out those entries.

[7]:
```
top_developers = df.loc[df.developer != '', "developer"].value_counts()[:10]
top_developers
```

[7]:
```
123Bee           2730
Games2Rule       2441
Games2Jolly.com  1915
Selfdefiant      1603
WowEscape.com    1436
Top10NewGames    1144
PalmarianFire    1059
Ena Game Studio  1031
Neopets           957
Mirchi Games      812
Name: developer, dtype: int64
```

These are the most represented developers in the database. It is impressive to notice that almost all of them are known to be specialised in escape games, which we can suppose to be a very popular genre; we will dig into this later. Lastly, a special mention for Neopets, which managed to build a passionate community still active after over 20 years.

[8]:
```
top_publishers = df.loc[df.publisher != '', "publisher"].value_counts()[:10]
top_publishers
```

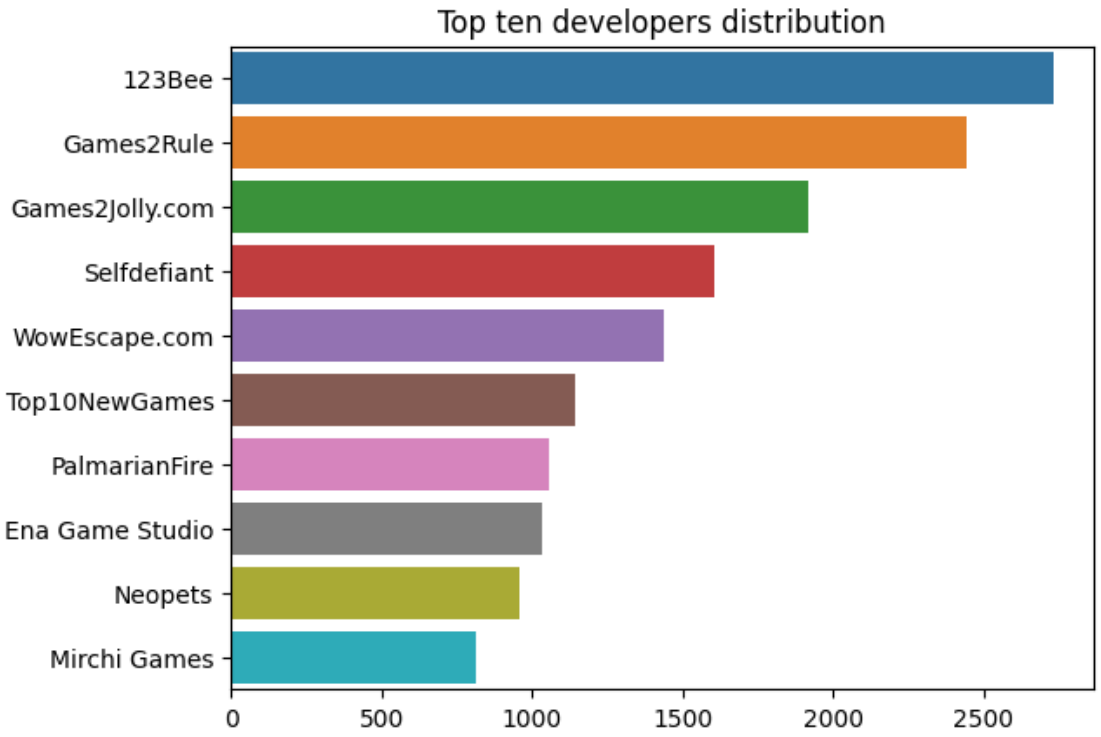
[8]:
```
DeviantArt    7655
Newgrounds    6550
```

```
Disney              2428
Nickelodeon         1659
Armor Games         1437
GameMonetize        1374
Eka's Portal        1261
Cartoon Network     1243
Kongregate          1219
Melting-Mindz       1214
Name: publisher, dtype: int64
```

Among the publishers, we can see some very renowned names, at least in the gaming community, like *Newgrounds*, *Armor Games* and *Kongregate*. There is also a considerable amount of games published by TV broadcasters, such as *Disney*, *Nickelodeon* and *Cartoon Network*, supposedly to promote their shows.

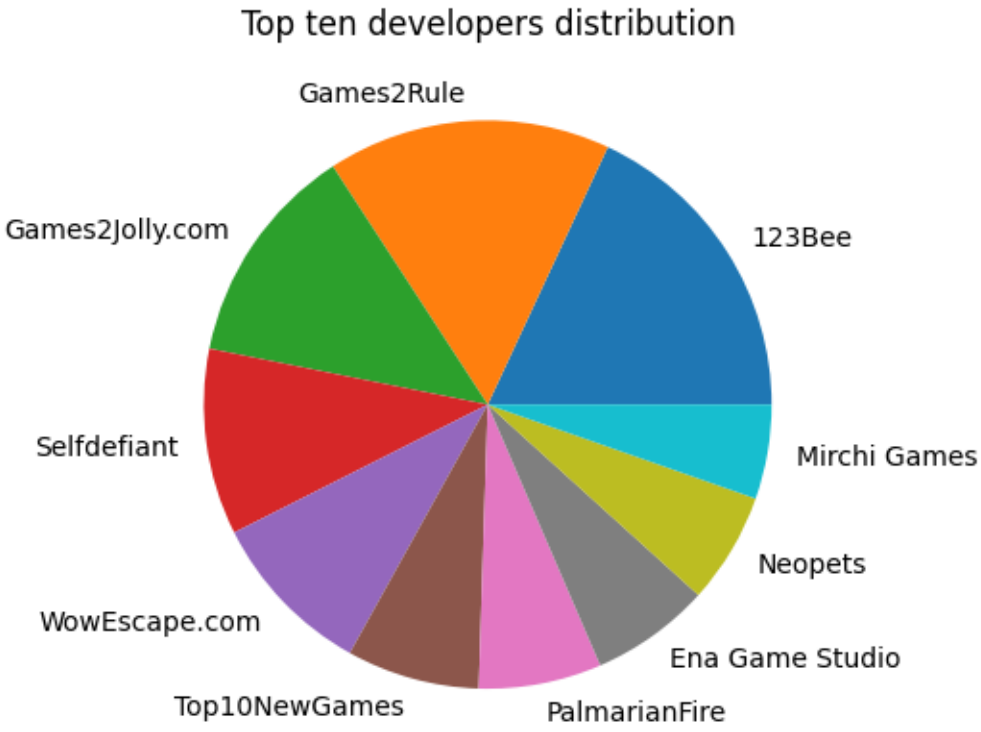
Now let's look at a visualization of the same data, by making use of bar plots and pie charts.

[9]:
```
sns.barplot(x = top_developers.values, y = top_developers.index, orient = "h").
↪set(title = "Top ten developers distribution");
```

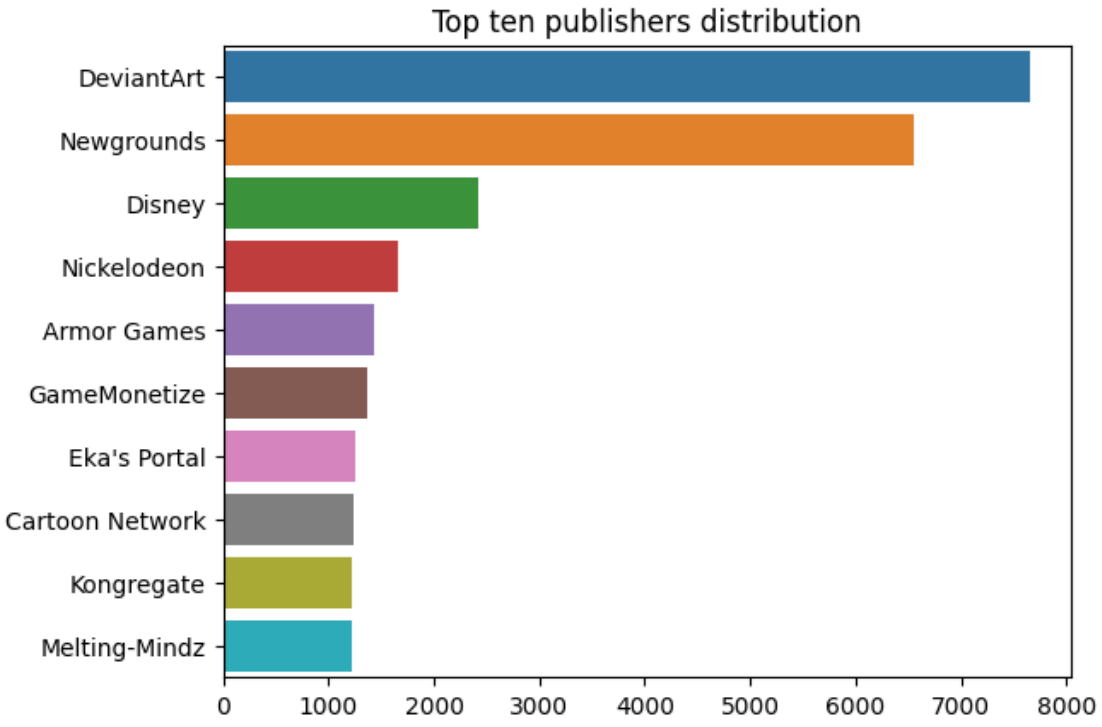


[10]:
```
labels = top_developers.index
sizes = top_developers.values / top_developers.values.sum() * 100
plt.pie(sizes, labels = labels)
plt.title("Top ten developers distribution")
```

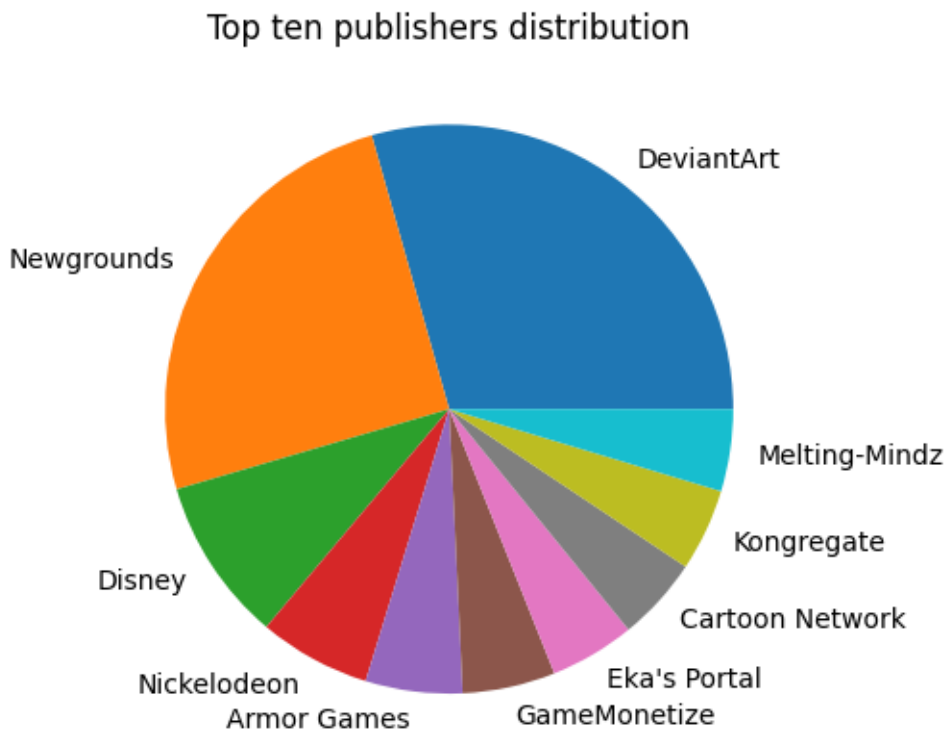
```
plt.show()
```



[11]:
```
sns.barplot(x = top_publishers.values, y = top_publishers.index, orient = "h").
↪set(title = "Top ten publishers distribution");
```



[12]:
```
labels = top_publishers.index
sizes = top_publishers.values / top_publishers.values.sum() * 100
plt.pie(sizes, labels = labels)
plt.title("Top ten publishers distribution")
plt.show()
```



1.4.2 Release Dates and Platforms

Flash games started to appear towards the end of the twentieth century and became popular in the next decade. Let's observe the release dates we have got here, being aware that they are not specified for all games.

[13]:
```
df_dates = df.loc[(df.releaseDate != ""), ["title", "releaseDate", "platform",␣
↪"library"]].sort_values(by=["releaseDate"])
df_dates
```

[13]:

	title	releaseDate	platform	library
26897	TankTrouble	16-12-2007	Flash	arcade
47769	Blastar	1984	HTML5	arcade
141921	Idle Johnny	1993	Shockwave	theatre
155542	ZZZ…I want to sleep	1994	Shockwave	theatre
155541	The Health Checkup	1994	Shockwave	theatre
…	…	…	…	…
37388	GWL Hayley Footjob (Commission)	2080-10-05	Flash	arcade
50821	Havok Xtra Marble Demo	21/08/2001	Shockwave	arcade
50893	Ray Cast Car	27/06/2001	Shockwave	arcade
105547	(Gift) Luna's Christmas gift	2917-12-26	Flash	theatre
50070	Havok Xtra RC Car Demo	7/1/2002	Shockwave	arcade

```
[75997 rows x 4 columns]
```

There seems to be a problem with the data. Entries should follow the "YY-MM-DD" date format as per Flashpoint guidelines, but some games come in a different one. In addition, if the exact day or month of release is unknown, it is allowed to specify the year only. Let's clean up our data for consistency.

[14]:
```
warnings.filterwarnings("ignore", category = UserWarning)
df_dates["releaseDate"] = pd.to_datetime(df_dates["releaseDate"], errors =␣
↪"coerce")
df_dates = df_dates.dropna().sort_values("releaseDate")
df_dates
```

[14]:
```
                                          title releaseDate   platform  \
47769                                   Blastar  1984-01-01      HTML5
141921                                Idle Johnny  1993-01-01  Shockwave
155542                    ZZZ…I want to sleep  1994-01-01  Shockwave
155541                       The Health Checkup  1994-01-01  Shockwave
141942                             QP-Shot 1000  1994-01-01  Shockwave
…                                           …          …         …
175851                             Awesome Game  2022-12-23      HTML5
175933                       Christmas in Vienna  2022-12-23      HTML5
175934                         Chrysler Building  2022-12-23      HTML5
177404  T-Mobile Tuesdays: Win $2,300 for 2023!  2022-12-27      HTML5
37388           GWL Hayley Footjob (Commission)  2080-10-05      Flash

        library
47769    arcade
141921  theatre
155542  theatre
155541  theatre
141942   arcade
…          …
175851   arcade
175933   arcade
175934   arcade
177404   arcade
37388    arcade

[75989 rows x 4 columns]
```

Pandas automatically assigned January 1 as month and day for those games whose only date information was the year. There is still one odd observation, the last one, which is most likely a typo.

[15]:
```
df_dates = df_dates[:-1]
df_dates[:20]
```

[15]:

	title	releaseDate	platform	library
47769	Blastar	1984-01-01	HTML5	arcade
141921	Idle Johnny	1993-01-01	Shockwave	theatre
155542	ZZZ…I want to sleep	1994-01-01	Shockwave	theatre
155541	The Health Checkup	1994-01-01	Shockwave	theatre
141942	QP-Shot 1000	1994-01-01	Shockwave	arcade
155545	Dangerous Two	1994-01-01	Shockwave	theatre
73010	Virtual Banana Original	1994-02-01	VRML	arcade
134268	Virtual University of Auckland	1994-02-01	Hyper-G	arcade
102651	Clock Tower	1994-11-17	VRML	arcade
134765	The Austrian National Library	1994-11-17	VRML	arcade
102083	Model of the IICM institute	1994-11-17	VRML	arcade
102104	Office	1994-11-17	VRML	arcade
100915	Office	1994-11-17	Hyper-G	arcade
134763	Graz 3D Model	1994-11-17	VRML	arcade
102674	Engine	1994-11-17	VRML	arcade
102663	Cubes	1994-11-17	VRML	arcade
86424	Clock	1994-11-17	Hyper-G	arcade
134764	Fancy Cubes	1994-11-17	Hyper-G	arcade
102657	Corvette	1994-11-17	VRML	arcade
75234	Missile Commando	1995-01-01	Java	arcade

Finally, we have got our correct release dates. We see that the oldest game in the list is *Blastar*, which was released in 1984. Actually, the game present in Flashpoint is a HTML5 version, which was developed and released much more recently. Moving on, starting from 1993 we recognize some old technologies, such as *Shochwave*, *VRML* and *Hyper-G*.

We can actually distinguish between proper games and animations by looking at the *library* column: the former are labeled with *arcade*, the latter with *theatre* values. Thus, the oldest animation featured is *Idle Johnny* from 1993, while the first "true" game (not counting *Blastar*) could be either *QP-Shot 1000* (which came out at some time in 1994), or *Virtual Banana Original* and *Virtual University of Auckland*, both from February 1st, 1994.

[16]:
```
df_dates = df_dates[1:]
df_dates[-20:]
```

[16]:

	title	releaseDate	\
175058	Um Conto da Cloe	2022-12-08	
176260	Pad of Time	2022-12-08	
175153	/f/ 101	2022-12-09	
176537	Vault of the Pineapples	2022-12-09	
172001	Snowsgiving Choose Your Own Adventure	2022-12-10	
177431	look_into_my_eyes_its_open_wide.swf	2022-12-10	
176112	In the Name of Freedom: Black Apocalypse	2022-12-13	
175448	Mcdonalds Final	2022-12-13	
172414	The Smurfs Cooking	2022-12-13	
172155	Cartoon Network Winter Games	2022-12-14	
176208	Monkey Mart	2022-12-14	

```
176171                          Maptroid: Worlds  2022-12-16
176557                 Why is This a Curation?  2022-12-17
176901                   Monster Bar Simulator  2022-12-18
177091        Wubbzy explains facts about Mars.  2022-12-19
176747                       Defender of Ukraine  2022-12-20
175851                              Awesome Game  2022-12-23
175933                       Christmas in Vienna  2022-12-23
175934                         Chrysler Building  2022-12-23
177404  T-Mobile Tuesdays: Win $2,300 for 2023!  2022-12-27

               platform  library
175058            HTML5   arcade
176260            HTML5   arcade
175153            Flash   arcade
176537            HTML5   arcade
172001            HTML5   arcade
177431            Flash  theatre
176112            HTML5   arcade
175448            HTML5   arcade
172414            HTML5   arcade
172155            HTML5   arcade
176208            HTML5   arcade
176171            HTML5   arcade
176557  Lightning Strike   arcade
176901            HTML5   arcade
177091            HTML5  theatre
176747            HTML5   arcade
175851            HTML5   arcade
175933            HTML5   arcade
175934            HTML5   arcade
177404            HTML5   arcade
```

On the other side, here are the 20 most recent games. As expected, we find out that nowadays *HTML5* is the standard technology to make flash games, though some exceptions arise and there is even a *Flash* entry!

For the sake of completeness, let's restrict our search to *Flash*-only games.

[17]:
```
df_dates.loc[(df_dates.platform == "Flash")][:20]
```

[17]:
```
                                          title releaseDate platform  \
175939                                Claus.com  1995-01-01    Flash
165097                                  Artcore  1996-01-01    Flash
123757   The Simpsons 1996 website normal version  1996-01-01    Flash
104886         The Hole in the Wall website intro  1996-01-01    Flash
104785                     Animated Screen Beans  1996-01-01    Flash
105332                       Past*Present*Future  1996-01-01    Flash
97904              2 Design's Navigational Demo  1996-01-01    Flash
```

```
98020                              The Silicon Slip  1996-01-01    Flash
97944                    Good Music Company Website  1996-01-01    Flash
99690                         Simple, Tasty Buttons  1996-01-01    Flash
100122                            Discrete Keyboard  1996-01-01    Flash
104809          HK Media Association website banner  1996-01-01    Flash
97943             FutureWave Software, Inc. Website  1996-01-01    Flash
97921                                  CHAOS Website  1996-01-01    Flash
98037                              Zygomedia Website  1996-01-01    Flash
99628                         First MouseOver Button  1996-01-01    Flash
106873                     The Simpsons 1996 website  1996-01-01    Flash
104897                          Volleynerd home page  1996-01-01    Flash
115310                         Cloudberry Jam Puzzle  1997-01-01    Flash
167383  Disney 101 Dalmatians the Series microsite    1997-01-01    Flash

        library
175939   arcade
165097   arcade
123757   arcade
104886  theatre
104785  theatre
105332  theatre
97904    arcade
98020    arcade
97944    arcade
99690    arcade
100122   arcade
104809  theatre
97943    arcade
97921    arcade
98037    arcade
99628    arcade
106873  theatre
104897  theatre
115310   arcade
167383   arcade
```

The first *Flash* game is *Claus.com* from 1995. We notice that most of these are actually websites built in *Flash* and not exactly games or animations.

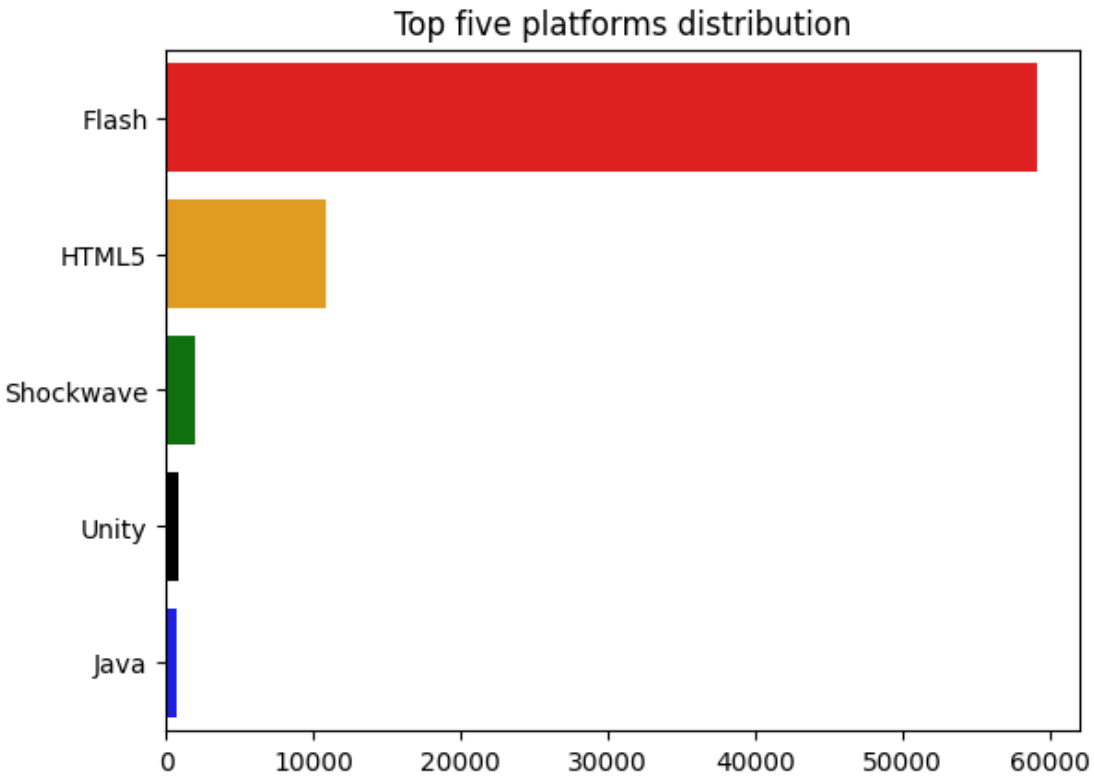
To take an overall view, let's compare the various platforms by games count, considering the top five.

[18]:
```
top_platforms = df_dates["platform"].value_counts()[:5]
top_platforms
```

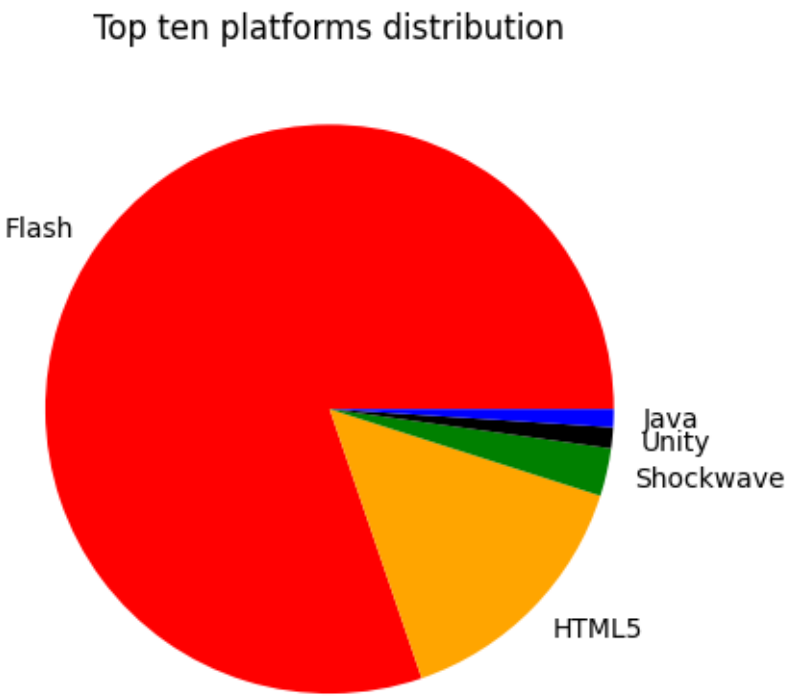
[18]:
```
Flash        59047
HTML5        10904
Shockwave     1999
```

```
Unity          875
Java           751
Name: platform, dtype: int64
```

[19]:
```
colors = ["red", "orange", "green", "black", "blue"]
sns.barplot(x = top_platforms.values, y = top_platforms.index, orient = "h",␣
 ↪palette = colors).set(title = "Top five platforms distribution");
```



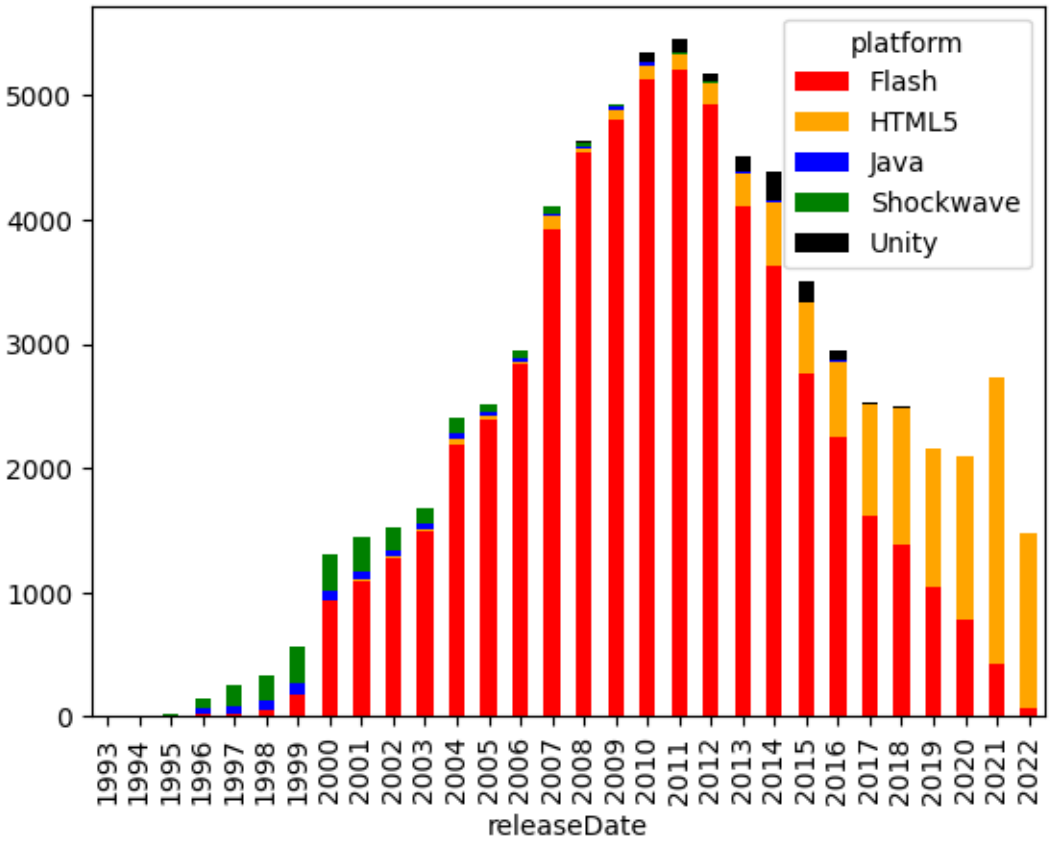
[20]:
```
labels = top_platforms.index
sizes = top_platforms.values / top_platforms.values.sum() * 100
plt.pie(sizes, labels = labels, colors = colors)
plt.title("Top ten platforms distribution")
plt.show()
```



Flash is clearly the winner, followed by a rising *HTML5* and its old companion *Shockwave*, with *Unity* and *Java* as outsiders.

Web games were at their peak in the 2000s and many gamers are nostalgic about that decade, which could be considered a golden age. Thus, we expect to see that most of the games in our database have been released between 2000 and 2009. Let's check it out, while also comparing technologies against years.

[21]:
```
df_year_platform = df_dates.loc[(df_dates["platform"].isin(top_platforms.
  ↪index)), :].copy()
years = df_year_platform["releaseDate"].astype(str).str[:4]
df_year_platform[df_year_platform.columns[1]] = years.values
df_year_platform.groupby(["releaseDate", "platform"]).size().unstack().
  ↪plot(kind = 'bar', stacked = True, color = ["red", "orange", "blue",␣
  ↪"green", "black"]);
```



Et voila! As we were expecting, web games have steadily risen in popularity in the first decade of the third millennium, reached a peak in 2011 and today their number is slowly decreasing, apart from some fluctuations. This does not mean that fewer games are being made: it could simply be that there is less incentive to curate and preserve a recent game written in a technology which will probably stay on for a long time compared to an old game with a nostalgic value that runs the risk to disappear at any time.

Flash dominated the scene between 2000 and 2017 (it's impressive to see that it lasted so long), while *HTML5* started to be relevant around 2013. *Shockwave* was most popular between 1996 and 2000, but continued to be used until 2007. *Unity* had six years of relative notoriety (2010-2016) and lastly, Java, despite being one of the first technologies eligible for making web games, has never known much use and moved off the radar around 2010.

1.5 Most common languages

Let's move on to another topic: *Flashpoint* allows non-English content as well, and it can be interesting to know which countries have contributed the most to the world of web games aside from the anglophone ones.

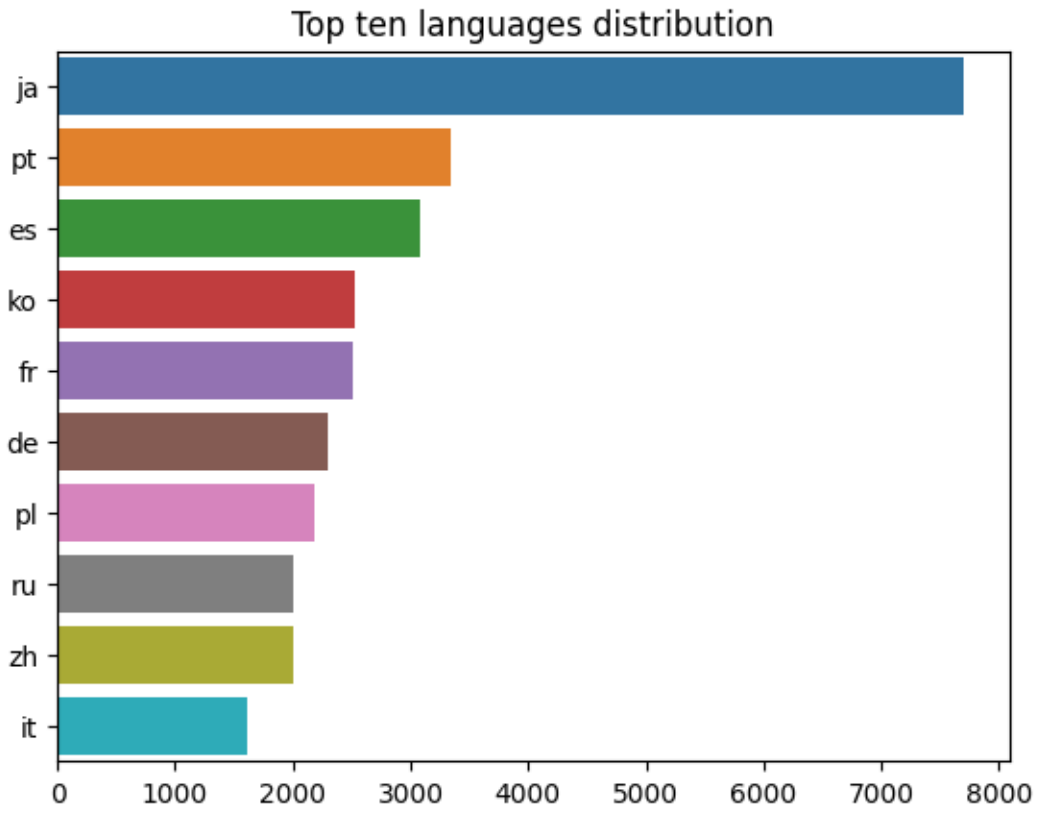
[22]:

```
top_languages = df.loc[df["language"] != "", "language"].str.split("; ").
  ↪explode().value_counts().drop("en")[:10]
top_languages
```

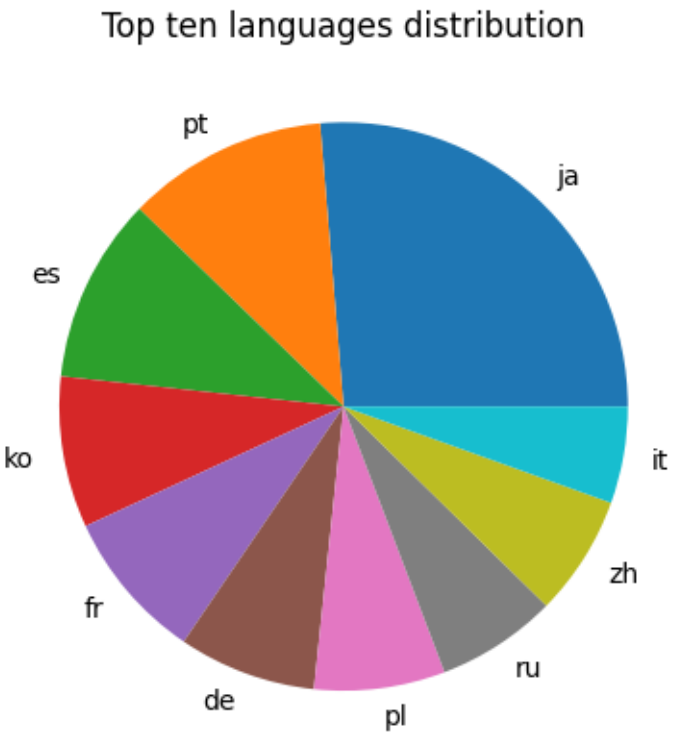
[22]:
```
ja    7708
pt    3350
es    3089
ko    2523
fr    2515
de    2295
pl    2182
ru    2010
zh    2008
it    1611
Name: language, dtype: int64
```

Since a game can come in different languages, separated by a colon and a space (";"), we had to count each occurrence individually.

[23]:
```
sns.barplot(x = top_languages.values, y = top_languages.index, orient = "h").
  ↪set(title = "Top ten languages distribution");
```



[24]:
```
labels = top_languages.index
sizes = top_languages.values / top_languages.values.sum() * 100
plt.pie(sizes, labels = labels)
plt.title("Top ten languages distribution")
plt.show()
```



We can see a strong presence of Asian content, with Japanese, Korean and Chinese among the top ten languages. The rest of the list is completed by European countries, namely Portugal, Spain, France, Germany, Poland and Italy, as well as Russia.

1.6 Most popular genres

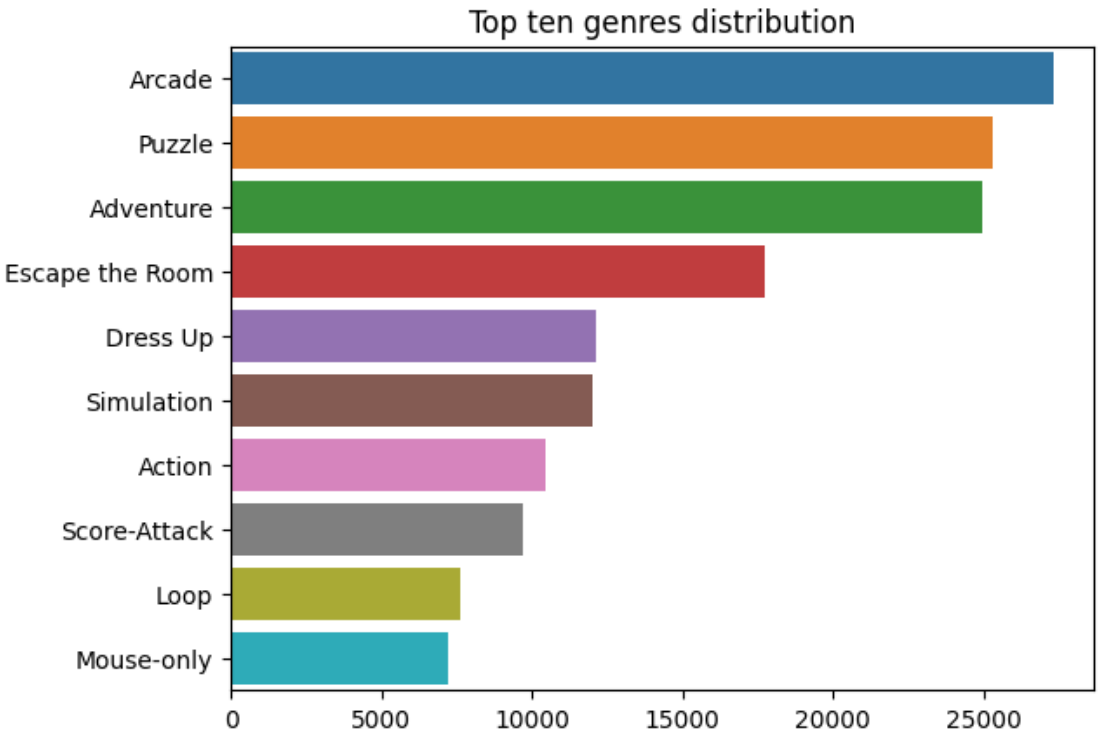
Let's now focus on game genres, featured on the *tagsStr* column, to discover the most common ones.

[25]:
```
top_genres = df.loc[df["tagsStr"] != "", "tagsStr"].str.split("; ").explode().
↪value_counts()[:10]
top_genres
```

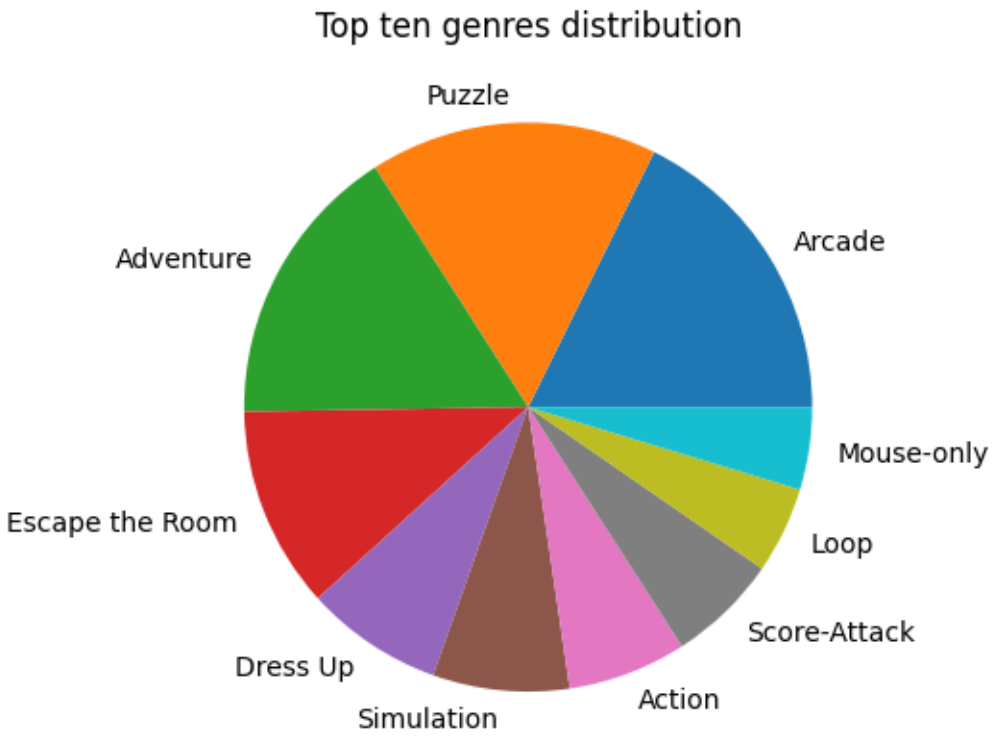
[25]:
```
Arcade              27308
Puzzle              25284
Adventure           24981
Escape the Room     17725
```

```
Dress Up            12101
Simulation          11993
Action              10452
Score-Attack         9703
Loop                 7599
Mouse-only           7232
Name: tagsStr, dtype: int64
```

[26]:
```
sns.barplot(x = top_genres.values, y = top_genres.index, orient = "h").
↪set(title = "Top ten genres distribution");
```



[27]:
```
labels = top_genres.index
sizes = top_genres.values / top_genres.values.sum() * 100
plt.pie(sizes, labels = labels)
plt.title("Top ten genres distribution")
plt.show()
```



The big three genres are *Arcade*, *Puzzle* and *Adventure* and honestly it's kind of odd to see *Action* at such a low position. Conversely, as we expected from our previous analysis on developers, *Escape the Room* is fairly popular, along with *Dress Up* and *Simulation* games.

1.7 Most played games

As a final insight, let's find out which are the most played games among the *Flashpoint* users: to do this, we are going to use some official statistics from the platform itself. Visit https://flashpoint-analytics.unstable.life/, scroll down to the corresponding section and download the data in .csv format.

[28]:
```
most_played = pd.read_csv("data/most_played.csv")
most_played.rename(columns = {"category": "id"}, inplace = True)
most_played
```

[28]:

	id	Play Count
0	83e1b5e7-4282-4bbd-868e-dcfa965e4abf	48493
1	a94d865c-cb38-4d31-96f3-dda26502c4a3	10228
2	617ca7f3-1cff-3f0c-5b53-07498b3b28d8	7454
3	8d09fc0d-6f25-4be6-b396-8fcaddad4e5e	7253
4	b0ce771e-7c02-4317-8528-ba48139e2688	6922
5	fdee4800-b5c9-49e0-b19e-22f2b0ccab68	6919
6	1e903a30-5c37-15bb-8e5e-6fea5a8103f2	6678

7	07921a2f-26fd-4364-9671-ee0c8d256ec1	6423
8	b9a8dbb9-0cd7-434b-b226-13dc9dd07b49	6341
9	a8707c0f-6aac-4c94-9d8a-cc397c97cc88	5745
10	92ba2d91-e041-2bd4-49ea-21758df711ff	5613
11	f55d6576-1aee-414a-bd1e-b7678d697dcf	5605
12	16b04977-f714-4239-b343-b759e16a33af	5579
13	5fa91cac-25c9-2a53-f391-09a099cb489b	5203
14	ed058412-fa96-4ea5-b2cb-2baff6a24b2a	5197
15	3337a4a2-dacf-4027-824c-aaf77623de65	4842
16	164e2dc8-31dd-4f59-a6be-46c2087e190f	4760
17	92781aea-6ad0-2bdb-a963-7131c49b7d07	4628
18	602762ba-a1b6-4810-8093-e5dbf0c33b61	4521
19	938f4383-8c92-8e8d-511b-004b5c69999d	4427
20	279b23ca-c7f3-4f56-a02f-3752ec7c5c5d	4407
21	6b50cb43-ad66-4ec8-9e46-3bb06821f2ab	4332
22	228087d3-c291-4a87-82e6-c6ffd3d4d2f6	4176
23	dbb21635-b0d5-78d9-a749-c4778a07e698	3958
24	de163cff-9dbe-fcbb-164c-53f5d6873fad	3883
25	16c27895-f7a6-6c65-18f3-feebcf87d28a	3874
26	c3ab2546-a7b0-89b2-82de-4044d61e1cbd	3684
27	b0d2b9a9-ab00-465e-b5a3-56031b92f070	3625
28	8f7f9fe8-4c55-43b1-a574-046c63712b39	3477
29	2ecf56d6-c5e4-a801-bc7f-60374ba1a051	3410
30	4423194a-22fe-427a-8eae-1b4d9c42395c	3247
31	9525910d-72b8-4e84-b668-43a267e00d9c	3238
32	c85ff4e3-1e2d-4b4e-8c4f-958d9db4aff2	3237
33	da6b3cb4-78a7-e998-fcf4-cb26a7950754	3227
34	2d0071b4-8ea9-40b1-a642-c970ca260cb2	3157
35	ab638461-9317-bbaa-9ccf-e7f0360e3b1b	3136
36	cf29b65d-e3e9-4da9-8201-d76de38736ea	3036
37	15ac0ed0-dbd4-8a95-5eec-4cf3e04fc771	3017
38	190c1bf6-4fcc-4b32-8278-f5b26db8eec1	2850
39	242dedc0-431a-4e4e-990c-58fe3c8ef740	2822

The file contains the *id* for the most 40 played games, along with a play count. Let's use the identifiers to find the titles of these games and their other info.

[29]:
```
df_rank = df.merge(most_played, on = "id").sort_values("Play Count", ascending␣
↪= False).reset_index()
df_rank
```

[29]:

	index	id	\
0	39	83e1b5e7-4282-4bbd-868e-dcfa965e4abf	
1	33	a94d865c-cb38-4d31-96f3-dda26502c4a3	
2	26	617ca7f3-1cff-3f0c-5b53-07498b3b28d8	
3	18	8d09fc0d-6f25-4be6-b396-8fcaddad4e5e	
4	1	b0ce771e-7c02-4317-8528-ba48139e2688	
5	35	fdee4800-b5c9-49e0-b19e-22f2b0ccab68	

```
6       3  1e903a30-5c37-15bb-8e5e-6fea5a8103f2
7      22  07921a2f-26fd-4364-9671-ee0c8d256ec1
8      30  b9a8dbb9-0cd7-434b-b226-13dc9dd07b49
9       9  a8707c0f-6aac-4c94-9d8a-cc397c97cc88
10      4  92ba2d91-e041-2bd4-49ea-21758df711ff
11     24  f55d6576-1aee-414a-bd1e-b7678d697dcf
12     19  16b04977-f714-4239-b343-b759e16a33af
13      0  5fa91cac-25c9-2a53-f391-09a099cb489b
14     37  ed058412-fa96-4ea5-b2cb-2baff6a24b2a
15     36  3337a4a2-dacf-4027-824c-aaf77623de65
16      8  164e2dc8-31dd-4f59-a6be-46c2087e190f
17     11  92781aea-6ad0-2bdb-a963-7131c49b7d07
18     20  602762ba-a1b6-4810-8093-e5dbf0c33b61
19     27  938f4383-8c92-8e8d-511b-004b5c69999d
20     31  279b23ca-c7f3-4f56-a02f-3752ec7c5c5d
21      2  6b50cb43-ad66-4ec8-9e46-3bb06821f2ab
22     15  228087d3-c291-4a87-82e6-c6ffd3d4d2f6
23     38  dbb21635-b0d5-78d9-a749-c4778a07e698
24     17  de163cff-9dbe-fcbb-164c-53f5d6873fad
25     16  16c27895-f7a6-6c65-18f3-feebcf87d28a
26     23  c3ab2546-a7b0-89b2-82de-4044d61e1cbd
27      5  b0d2b9a9-ab00-465e-b5a3-56031b92f070
28     32  8f7f9fe8-4c55-43b1-a574-046c63712b39
29     10  2ecf56d6-c5e4-a801-bc7f-60374ba1a051
30     13  4423194a-22fe-427a-8eae-1b4d9c42395c
31     29  9525910d-72b8-4e84-b668-43a267e00d9c
32     12  c85ff4e3-1e2d-4b4e-8c4f-958d9db4aff2
33     25  da6b3cb4-78a7-e998-fcf4-cb26a7950754
34     34  2d0071b4-8ea9-40b1-a642-c970ca260cb2
35     21  ab638461-9317-bbaa-9ccf-e7f0360e3b1b
36      6  cf29b65d-e3e9-4da9-8201-d76de38736ea
37     14  15ac0ed0-dbd4-8a95-5eec-4cf3e04fc771
38      7  190c1bf6-4fcc-4b32-8278-f5b26db8eec1
39     28  242dedc0-431a-4e4e-990c-58fe3c8ef740

                                      title  \
0                                  Poptropica
1                                   Jacksmith
2                              Papa's Cheeseria
3                         Strike Force Heroes 3
4                  Super Mario Bros. Crossover
5                          Strike Force Heroes
6                             Papa's Scooperia
7                                  Bloons TD 5
8                              Papa's Sushiria
9                                Papa's Bakeria
10                             Papa's Freezeria
```

```
11                            Papa's Burgeria
12                             Super Mario 63
13                       Epic Battle Fantasy 5
14                         Super Smash Flash 2
15                      Flappy Bird For Dinner
16                      Madness: Project Nexus
17                         Papa's Hot Doggeria
18                            Swords and Souls
19                            Papa's Donuteria
20                             Papa's Pizzeria
21                      Strike Force Heroes 2
22                        The Impossible Quiz
23                       Ben 10: Battle Ready
24                          Papa's Cupcakeria
25         Papa Louie 2: When Burgers Attack!
26                            Papa's Wingeria
27                  Portal: The Flash Version
28                The Last Stand: Union City
29                            Papa's Pastaria
30                               Cactus McCoy
31                          Papa's Pancakeria
32                                Age of War
33            Plants vs Zombies (Web Version)
34                                    Bowman
35         Papa Louie 3: When Sundaes Attack!
36 Electricman 2 - The Tournament of Voltagen
37                       Swords and Sandals 2
38                           Road of the Dead
39                                 Commando 2

                                   developer        publisher   platform  \
0   Sandbox Networks Inc.; Pearson Education                        Flash
1                            Flipline Studios    PapaLouie.com      Flash
2                            Flipline Studios    PapaLouie.com      Flash
3                                  Sky9 Games      Armor Games      Flash
4                            Exploding Rabbit                       Flash
5                                  Sky9 Games      Armor Games      Flash
6                            Flipline Studios    PapaLouie.com      Flash
7                                  Ninja Kiwi       Ninja Kiwi      Flash
8                            Flipline Studios    PapaLouie.com      Flash
9                            Flipline Studios    PapaLouie.com      Flash
10                           Flipline Studios      Armor Games      Flash
11                           Flipline Studios                       Flash
12                                     Runouw       Newgrounds      Flash
13                                 Kupo Games                       Flash
14                             McLeodGaming     McLeodGaming      Flash
15                                              Cooking Games      Flash
```

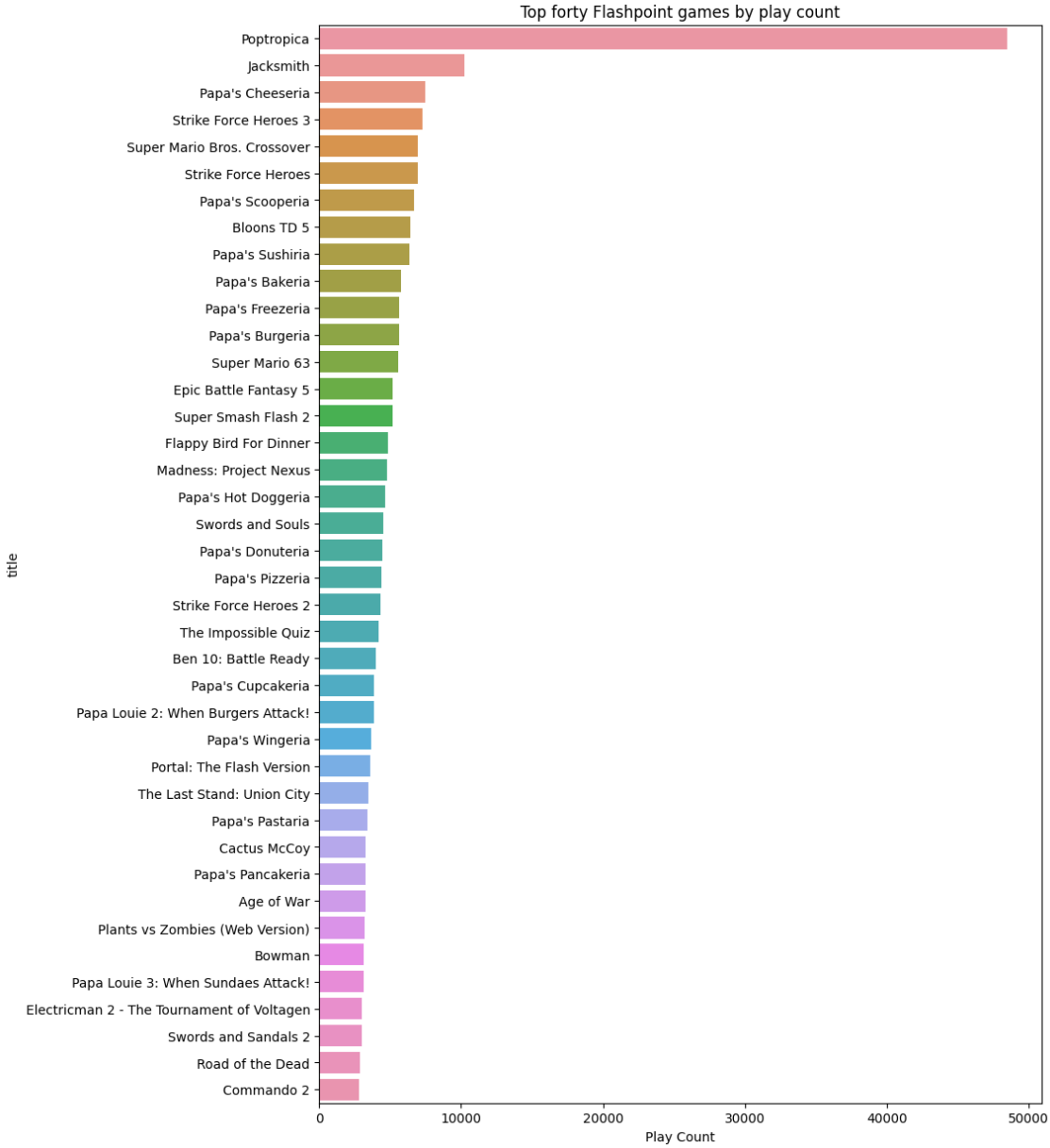
```
16       Michael Swain & Matt Krinkels Jolly       Newgrounds      Flash
17                           Flipline Studios    PapaLouie.com      Flash
18                                   SoulGame      Armor Games      Flash
19                           Flipline Studios    PapaLouie.com      Flash
20                           Flipline Studios                       Flash
21                                 Sky9 Games      Armor Games      Flash
22                               Splapp-Me-Do       Newgrounds      Flash
23                                                Cartoon Network  Shockwave
24                           Flipline Studios    PapaLouie.com      Flash
25                           Flipline Studios    PapaLouie.com      Flash
26                           Flipline Studios    PapaLouie.com      Flash
27                            We Create Stuff      Armor Games      Flash
28                                 ConArtists      Armor Games      Flash
29                           Flipline Studios    PapaLouie.com      Flash
30                           Flipline Studios                       Flash
31                           Flipline Studios    PapaLouie.com      Flash
32                                    Louissi        Max Games      Flash
33                                     PopCap                       Flash
34                                      f1ash                       Flash
35                           Flipline Studios    PapaLouie.com      Flash
36                              Damien Clarke      Armor Games      Flash
37                                3rdsense.com                       Flash
38                                    Evil Dog       Newgrounds      Flash
39                                Miniclip.com     Miniclip.com      Flash

   releaseDate language library  \
0      2007-09       en  arcade
1   2012-09-27       en  arcade
2   2015-06-10       en  arcade
3                    en  arcade
4   2010-04-27       en  arcade
5   2012-05-31       en  arcade
6   2018-07-24       en  arcade
7   2011-12-13       en  arcade
8   2016-12-13       en  arcade
9   2016-03-14       en  arcade
10  2011-08-05       en  arcade
11  2010-12-06       en  arcade
12  2009-06-10       en  arcade
13  2020-01-21           arcade
14  2007-12-25       en  arcade
15                   en  arcade
16  2012-03-25       en  arcade
17  2012-11-19       en  arcade
18  2015-10-18       en  arcade
19  2014-06-16       en  arcade
20  2007-08-07       en  arcade
```

```
21                  en  arcade
22  2007-02-20      en  arcade
23              en; ja  arcade
24  2013-08-07      en  arcade
25  2013-06-05      en  arcade
26  2012-06-13      en  arcade
27  2007-11-19      en  arcade
28  2011-07-29          arcade
29  2013-12-09      en  arcade
30  2011-03-10      en  arcade
31  2012-03-05      en  arcade
32  2008-01-14      en  arcade
33                  en  arcade
34  2004-12-05      en  arcade
35  2015-03-04      en  arcade
36  2008-01-08      en  arcade
37  2007-01-07      en  arcade
38  2010-10-13      en  arcade
39  2008-10-03          arcade
```

	tagsStr	Play Count
0	Educational; Platformer; Puzzle; Variety; Side…	48493
1	Simulation; Time Management	10228
2	Cooking; Simulation; Time Management; Achievem…	7454
3	Action; Shooter	7253
4	Arcade; Platformer; Score-Attack; Pixel; Side-…	6922
5	Shooter; Action	6919
6	Cooking; Simulation; Time Management; Achievem…	6678
7	Tower Defense; Strategy	6423
8	Cooking; Simulation; Time Management; Achievem…	6341
9	Cooking; Simulation; Time Management; Achievem…	5745
10	Cooking; Simulation; Time Management; Achievem…	5613
11	Cooking; Simulation; Time Management	5605
12	Level Editor; Platformer; Super Mario	5579
13	RPG	5203
14	Bleach; Bomberman; Chibi-Robo!; F-Zero; Fire E…	5197
15	Cooking; Simulation	4842
16	Action; Beat 'Em Up; Shooter; 3/4 View; Madnes…	4760
17	Cooking; Simulation; Time Management; Achievem…	4628
18	Role-Playing	4521
19	Cooking; Simulation; Time Management; Achievem…	4427
20	Cooking; Simulation; Time Management	4407
21	Shooter; Action	4332
22	Quiz	4176
23	Action; Ben 10	3958
24	Cooking; Simulation; Time Management; Achievem…	3883
25	Platformer; Side-Scrolling	3874

```
26  Cooking; Simulation; Time Management; Achievem…        3684
27                          Platformer; Puzzle; Portal      3625
28                                              Shooter     3477
29  Cooking; Simulation; Time Management; Achievem…        3410
30                                           Platformer     3247
31  Cooking; Simulation; Time Management; Achievem…        3238
32                                Strategy; Mouse-only      3237
33  Strategy; Tower Defense; 3/4 View; Plants vs. …        3227
34                  Action; Archery; Artillery; Blood      3157
35                         Platformer; Side-Scrolling      3136
36                         Action; Beat 'Em Up; Stick      3036
37                                       Role-Playing      3017
38     Action; Driving; Zombie; First-Person; Upgrade      2850
39                                              Shooter     2822
```

[30]:
```
fig, ax = plt.subplots(figsize=(10, 15))
sns.barplot(x = df_rank["Play Count"][:40], y = df_rank["title"][:40], orient =␣
 ↪"h", ax = ax).set(title = "Top forty Flashpoint games by play count");
```



There we go! *Poptropica* is the indisputable winner, with almost fifty thousand play counts. There is a massive presence of *Papa's Gameria* franchise, as well as all-time classics like *Strike Force Heroes*, *Super Mario 63* and *Age of War*. Finally, a special remark about *Ben 10: Battle Ready*, which was thought to be lost forever, before it was restored and made playable again on *Flashpoint*.

1.8 Conclusion

This was a thorough analysis of the *Flashpoint* catalogue, which hopefully gives some insights about the world of web-based games and their significant relevance in the history of the Internet.

The effort to preserve this kind of content has generated amazing results, saving an astounding

quantity of material which would have disappeared otherwise. Despite the concrete risk of a digital dark age, we should insist on preserving the stuff that we care about and keep it alive, not only for historical reasons, but also for the nostalgic value we associate with it.