flashpoint_analytics_r

April 24, 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]:

```
options(warn = -1)
library(RSQLite)
library(dplyr, warn.conflicts=FALSE)
library(ggplot2)
library(lubridate, warn.conflicts=FALSE)
library(tidyr)
```

These are the modules that we are going to use for our analysis. Notably: * *RSQLite* allows us to communicate with a SQLite database; * *dplyr*, *ggplot2*, *lubridate* and *tidyr* are part of the *tidyverse*, a set of very useful packages for data science.

1.2 Retrieve data

[2]:

```
dir.create("data")
url <- "http://infinity.unstable.life/Flashpoint/Data/flashpoint.sqlite"
destfile <- "data/flashpoint.sqlite"

# by default, there is a 60 seconds timeout limit when downloading a file
# this can be a problem when downloading large files, so we increase that limit
options(timeout = 300)

download.file(url, destfile)

con <- dbConnect(SQLite(), "data/flashpoint.sqlite")
```

```
games <- dbReadTable(con, "game")
dbDisconnect(con)
```

1.3 Explore data

Let's have a first look at our data.

[3]:

```
str(games)
```

```
'data.frame':	177469 obs. of  27 variables:
 $ id                  : chr  "6db72888-6aa5-34c9-0ff3-ffe4cfe0fc61"
"3bba3af6-8e76-b2c8-b423-2d2d8bdfdd50" "fb479276-2325-4dbb-bafd-64fcc8aeb684"
"7cdff5f4-11cb-b1de-51bc-bca13ef78adb" …
 $ parentGameId        : chr  "6db72888-6aa5-34c9-0ff3-ffe4cfe0fc61"
"3bba3af6-8e76-b2c8-b423-2d2d8bdfdd50" "fb479276-2325-4dbb-bafd-64fcc8aeb684"
"7cdff5f4-11cb-b1de-51bc-bca13ef78adb" …
 $ title               : chr  "All Grown Up: Krazy Karts" "Showdown: The
Gunfighting Game" "Hamsterball Bowling" "Dunk Tank" …
 $ alternateTitles     : chr  "" "" "" "" …
 $ series              : chr  "" "" "" "" …
 $ developer           : chr  "Ezone" "3D Groove" "Ezone" "Ezone" …
 $ publisher           : chr  "Nickelodeon" "3D Groove" "atv.Disney.go.com"
"atv.Disney.go.com" …
 $ dateAdded           : chr  "2019-06-23 04:12:17.521" "2019-06-16 23:56:03.150"
"2019-06-16 23:56:02.253" "2019-06-16 23:56:01.645" …
 $ dateModified        : chr  "2021-03-07 02:06:08" "2021-03-07 02:06:08"
"2022-07-24 14:10:21" "2022-07-24 14:10:21" …
 $ platform            : chr  "3D Groove GX" "3D Groove GX" "3D Groove GX" "3D
Groove GX" …
 $ broken              : int  0 0 0 0 0 0 0 0 0 0 …
 $ extreme             : int  0 0 0 0 0 0 0 0 0 0 …
 $ playMode            : chr  "Single Player" "Single Player" "Single Player"
"Single Player" …
 $ status              : chr  "Playable" "Playable" "Playable" "Playable" …
 $ notes               : chr  "" "" "" "" …
 $ source              : chr  "static.nickjr.com" "www.3dgroove.com"
"Tomysshadow" "Tomysshadow" …
 $ applicationPath     : chr  "FPSoftware\\startGroove.bat"
"FPSoftware\\startGroove.bat" "FPSoftware\\startGroove.bat"
"FPSoftware\\startGroove.bat" …
 $ launchCommand       : chr
"\"http://www.nick.com/games/data/rrgrownup/rrgp_krazykarts/code.grv\" agukart"
"\"http://www.3dgroove.com/website/gunfight.grv\" Showdown" "\"http://atv.disney
.go.com/disneychannel/disneychannelgames/games/hamsterballbowling/CODE.GRV\"
hamsterballbowling" "\"http://atv.disney.go.com/disneychannel/media/disneychanne
lgames/dunktank/CODE.GRV\" dunktank" …
 $ releaseDate         : chr  "" "" "" "" …
 $ version             : chr  "" "" "" "" …
 $ originalDescription: chr  "" "" "" "" …
 $ language           : chr  "" "" "" "" …
 $ library            : chr  "arcade" "arcade" "arcade" "arcade" …
 $ orderTitle         : chr  "all grown up: krazy karts" "showdown: the
gunfighting game" "hamsterball bowling" "dunk tank" …
 $ activeDataId       : int  NA NA NA NA NA NA NA NA NA NA …
 $ activeDataOnDisk   : int  0 0 0 0 0 0 0 0 0 0 …
 $ tagsStr            : chr  "Racing" "Shooter" "Arcade" "Arcade" …
```

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]:

```
games <- games %>% select(id, title, developer, publisher, platform,
                          releaseDate, language, library, tagsStr)


str(games)
```

```
'data.frame':   177469 obs. of  9 variables:
 $ id         : chr  "6db72888-6aa5-34c9-0ff3-ffe4cfe0fc61"
"3bba3af6-8e76-b2c8-b423-2d2d8bdfdd50" "fb479276-2325-4dbb-bafd-64fcc8aeb684"
"7cdff5f4-11cb-b1de-51bc-bca13ef78adb" …
 $ title      : chr  "All Grown Up: Krazy Karts" "Showdown: The Gunfighting
Game" "Hamsterball Bowling" "Dunk Tank" …
 $ developer  : chr  "Ezone" "3D Groove" "Ezone" "Ezone" …
 $ publisher  : chr  "Nickelodeon" "3D Groove" "atv.Disney.go.com"
"atv.Disney.go.com" …
 $ platform   : chr  "3D Groove GX" "3D Groove GX" "3D Groove GX" "3D Groove GX"
…
 $ releaseDate: chr  "" "" "" "" …
 $ language   : chr  "" "" "" "" …
 $ library    : chr  "arcade" "arcade" "arcade" "arcade" …
 $ tagsStr    : chr  "Racing" "Shooter" "Arcade" "Arcade" …
```

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

[5]:

```
head(games)
```

A data.frame: 6 × 9

	id	title
	<chr>	<chr>
1	6db72888-6aa5-34c9-0ff3-ffe4cfe0fc61	All Grown Up: Krazy Karts
2	3bba3af6-8e76-b2c8-b423-2d2d8bdfdd50	Showdown: The Gunfighting Game
3	fb479276-2325-4dbb-bafd-64fcc8aeb684	Hamsterball Bowling
4	7cdff5f4-11cb-b1de-51bc-bca13ef78adb	Dunk Tank
5	1d9ff021-2404-9785-bb7d-0fceda67a55d	Baby Knight
6	65caa1b2-6702-4aad-8108-790be1ef86e2	Yin Yang Yo: The Dangerous Comic Book of

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 <- games %>% count(developer) %>% arrange(desc(n)) %>% head(10)
     top_developers
```

A data.frame: 10 × 2

	developer	n
	<chr>	<int>
1		46151
2	123Bee	2730
3	Games2Rule	2441
4	Games2Jolly.com	1915
5	Selfdefiant	1603
6	WowEscape.com	1436
7	Top10NewGames	1144
8	PalmarianFire	1059
9	Ena Game Studio	1031
10	Neopets	957

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 <- games %>% filter(developer != "") %>% count(developer) %>%
       arrange(desc(n)) %>% head(10)
     top_developers
```

A data.frame: 10 × 2

	developer	n
	<chr>	<int>
1	123Bee	2730
2	Games2Rule	2441
3	Games2Jolly.com	1915
4	Selfdefiant	1603
5	WowEscape.com	1436
6	Top10NewGames	1144
7	PalmarianFire	1059
8	Ena Game Studio	1031
9	Neopets	957
10	Mirchi Games	812

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 <- games %>% filter(publisher != "") %>% count(publisher) %>%
       arrange(desc(n)) %>% head(10)
```

```
top_publishers
```

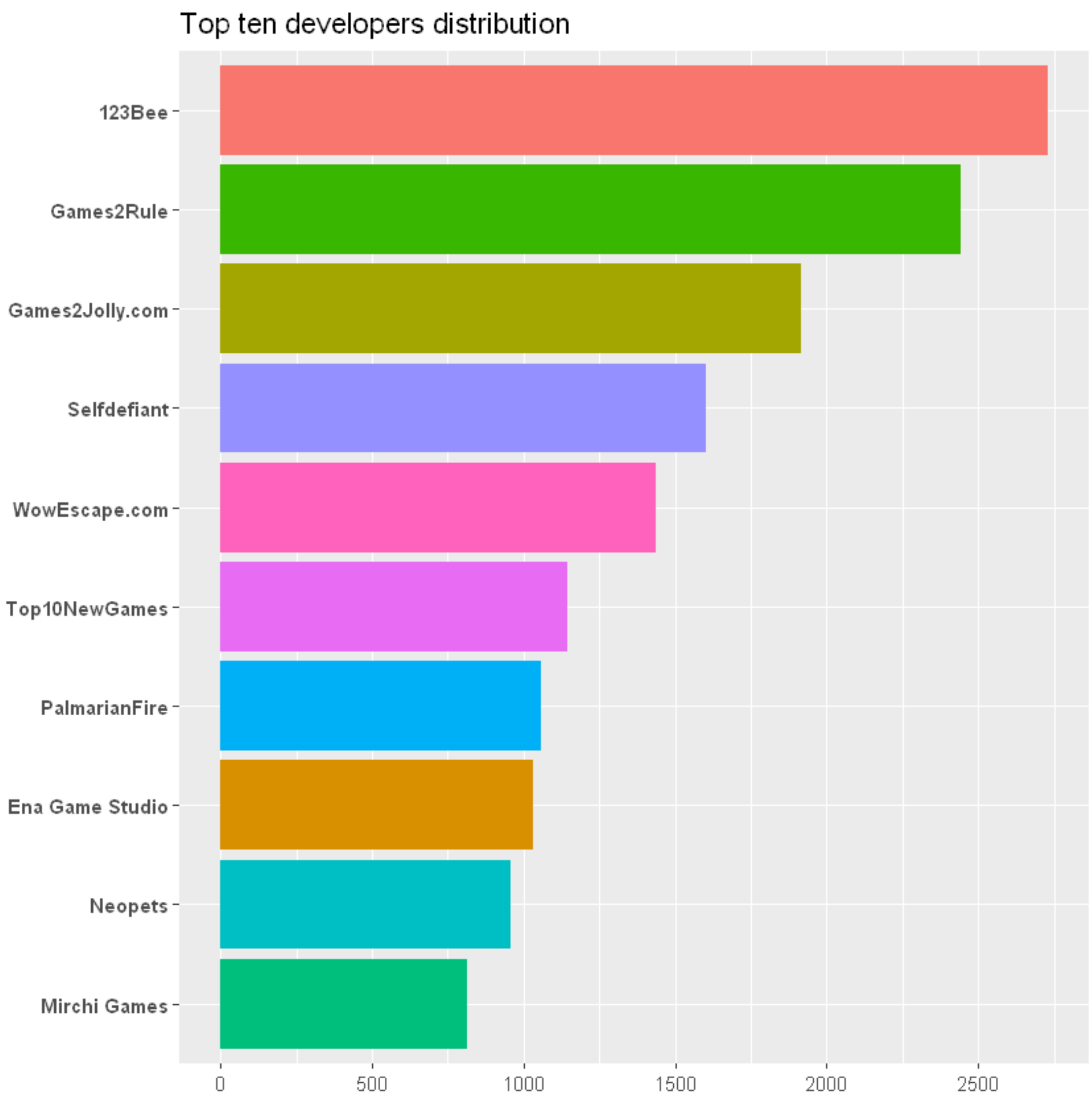
A data.frame: 10 × 2

	publisher <chr>	n <int>
1	DeviantArt	7655
2	Newgrounds	6550
3	Disney	2428
4	Nickelodeon	1659
5	Armor Games	1437
6	GameMonetize	1374
7	Eka's Portal	1261
8	Cartoon Network	1243
9	Kongregate	1219
10	Melting-Mindz	1214

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]:
```
top_developers %>% as.data.frame() %>%
  ggplot(aes(x = reorder(developer, n), y = n, fill = developer)) +
  geom_bar(stat = "identity") + coord_flip() +
  scale_y_continuous(breaks = seq(0, 2500, by = 500)) +
  ggtitle("Top ten developers distribution") +
  theme(legend.position = "none", axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        axis.text.y = element_text(face = "bold"))
```

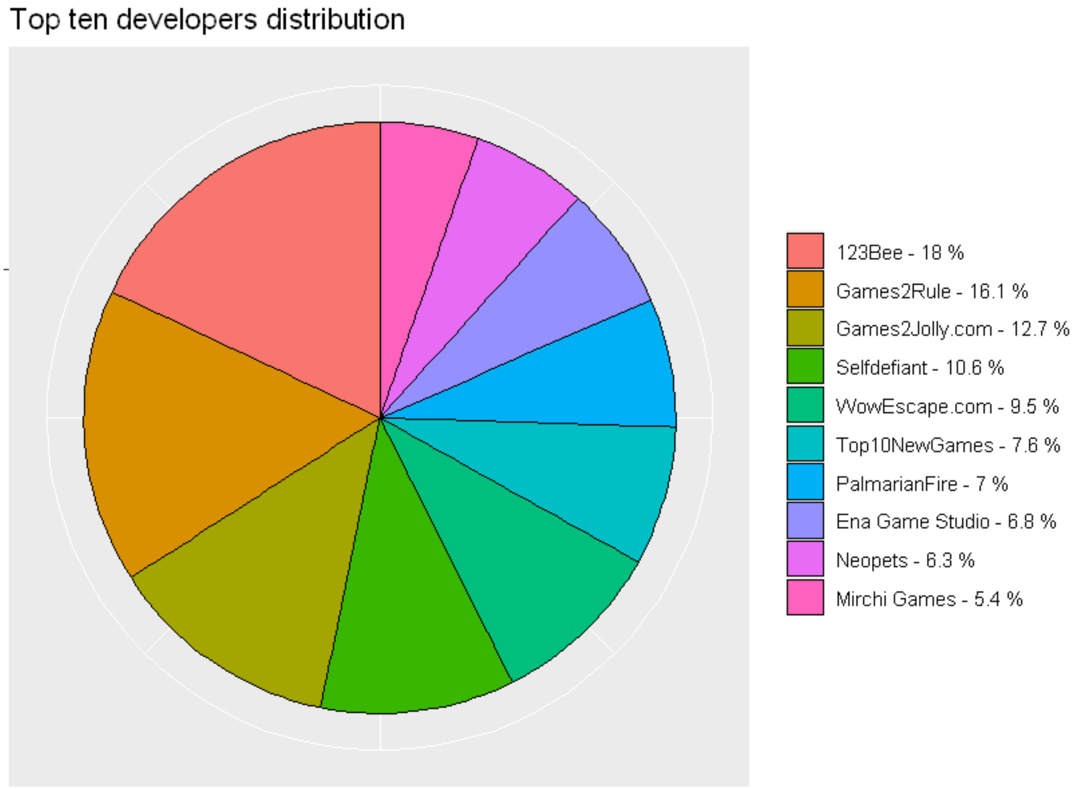


[10]:

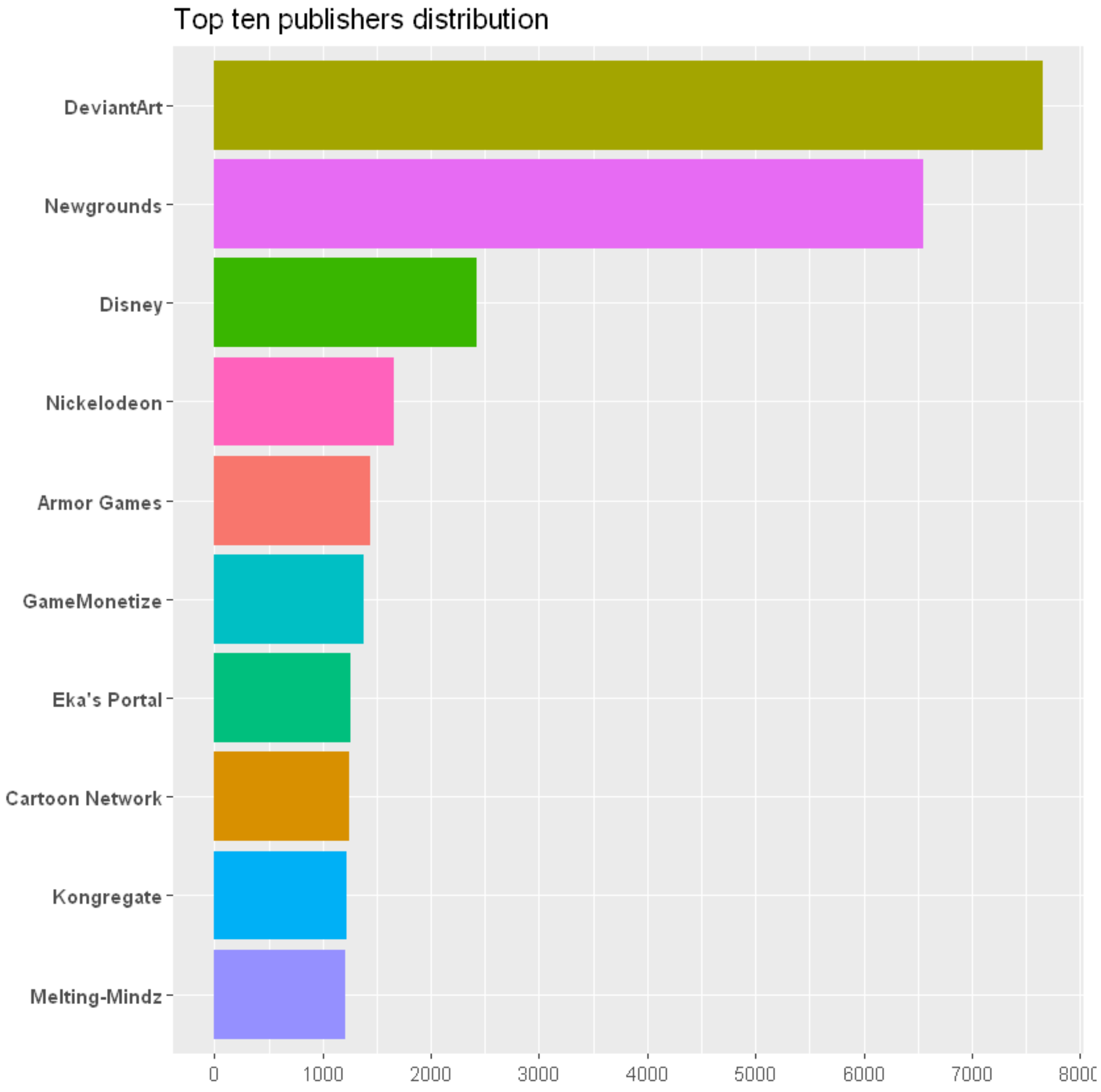
```
sizes <- round(top_developers$n / sum(top_developers$n) * 100, 1)
labels <- vector()

for(i in 1:(length(sizes))){
  labels[i] <- paste(top_developers$developer[i], "-", toString(sizes[i]), "%")
}

top_developers %>% as.data.frame() %>%
  ggplot(aes(x = "", y = sizes, fill = reorder(developer, -n))) +
  geom_bar(stat = "identity", width = 1, color = "black") +
  coord_polar(theta = "y", start = 0) +
  theme(axis.text = element_blank(), axis.title.x = element_blank(),
        axis.title.y = element_blank(),
      legend.title = element_blank()) +
  scale_fill_discrete(labels = labels) +
  ggtitle("Top ten developers distribution")
```



```
[11]: top_publishers %>% as.data.frame() %>%
        ggplot(aes(x = reorder(publisher, n), y = n, fill = publisher)) +
        geom_bar(stat = "identity") + coord_flip() +
        scale_y_continuous(breaks = seq(0, 8000, by = 1000)) +
        ggtitle("Top ten publishers distribution") +
        theme(legend.position = "none", axis.title.x = element_blank(),
              axis.title.y = element_blank(),
              axis.text.y = element_text(face = "bold"))
```

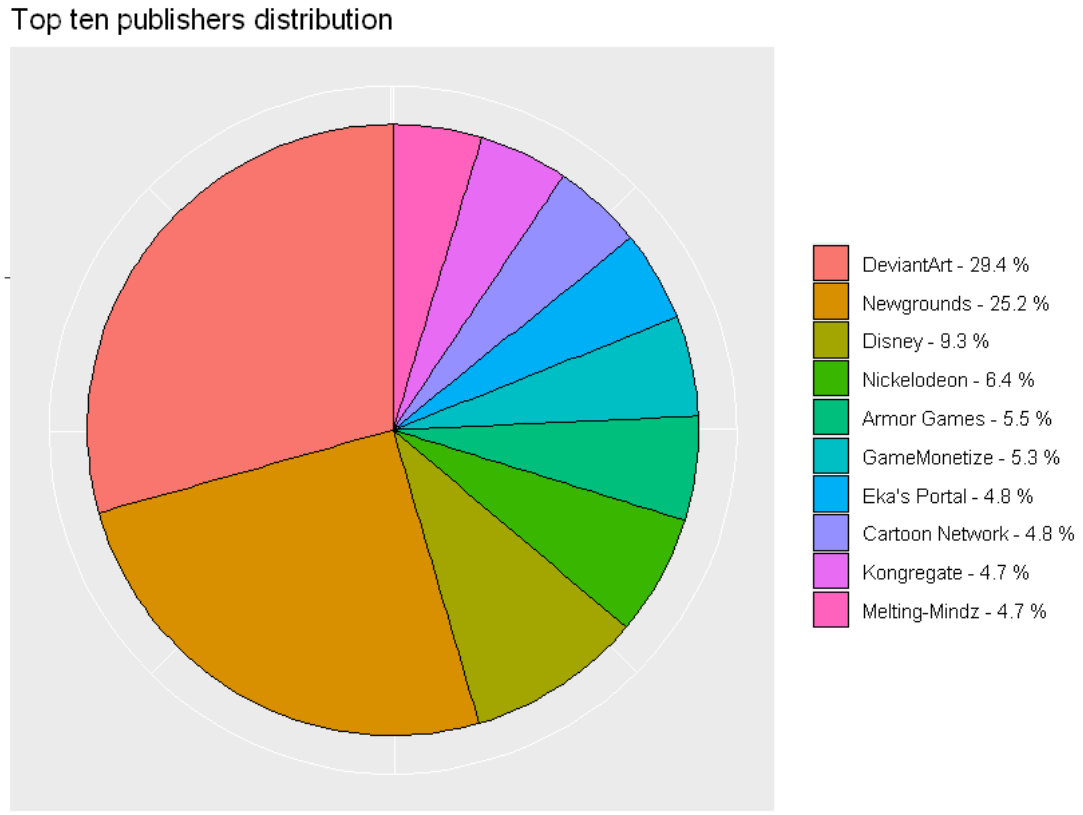


[12]:

```
sizes <- round(top_publishers$n / sum(top_publishers$n) * 100, 1)
labels <- vector()

for(i in 1:(length(sizes))){
  labels[i] <- paste(top_publishers$publisher[i], "-", toString(sizes[i]), "%")
}

top_publishers %>% as.data.frame() %>%
  ggplot(aes(x = "", y = sizes, fill = reorder(publisher, -n))) +
  geom_bar(stat = "identity", width = 1, color = "black") +
  coord_polar(theta = "y", start = 0) +
  theme(axis.text = element_blank(), axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        legend.title = element_blank()) +
  scale_fill_discrete(labels = labels) +
  ggtitle("Top ten publishers distribution")
```



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]: dates <- games %>% filter(releaseDate != "") %>%
        select(title, releaseDate, platform, library) %>%
        arrange(releaseDate)
```

```r
head(dates)
tail(dates)
```

A data.frame: 6 × 4

	title <chr>	releaseDate <chr>	platform <chr>	library <chr>
1	TankTrouble	16-12-2007	Flash	arcade
2	Blastar	1984	HTML5	arcade
3	Idle Johnny	1993	Shockwave	theatre
4	QP-Shot 1000	1994	Shockwave	arcade
5	The Health Checkup	1994	Shockwave	theatre
6	ZZZ...I want to sleep	1994	Shockwave	theatre

A data.frame: 6 × 4

	title <chr>	releaseDate <chr>	platform <chr>	library <chr>
75992	T-Mobile Tuesdays: Win $2,300 for 2023!	2022-12-27	HTML5	arcade
75993	GWL Hayley Footjob (Commission)	2080-10-05	Flash	arcade
75994	Havok Xtra Marble Demo	21/08/2001	Shockwave	arcade
75995	Ray Cast Car	27/06/2001	Shockwave	arcade
75996	(Gift) Luna's Christmas gift	2917-12-26	Flash	theatre
75997	Havok Xtra RC Car Demo	7/1/2002	Shockwave	arcade

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]:

```r
dates$releaseDate <- dates$releaseDate %>% ymd(truncated = 2)
dates <- dates %>% na.omit() %>% arrange(releaseDate)
head(dates)
tail(dates)
```

A data.frame: 6 × 4

	title <chr>	releaseDate <date>	platform <chr>	library <chr>
1	Blastar	1984-01-01	HTML5	arcade
2	Idle Johnny	1993-01-01	Shockwave	theatre
3	QP-Shot 1000	1994-01-01	Shockwave	arcade
4	The Health Checkup	1994-01-01	Shockwave	theatre
5	ZZZ...I want to sleep	1994-01-01	Shockwave	theatre
6	Dangerous Two	1994-01-01	Shockwave	theatre

A data.frame: 6 × 4

	title <chr>	releaseDate <date>	platform <chr>	library <chr>
75982	Awesome Game	2022-12-23	HTML5	arcade
75983	Christmas in Vienna	2022-12-23	HTML5	arcade
75984	Chrysler Building	2022-12-23	HTML5	arcade
75985	T-Mobile Tuesdays: Win $2,300 for 2023!	2022-12-27	HTML5	arcade
75986	GWL Hayley Footjob (Commission)	2080-10-05	Flash	arcade
75987	(Gift) Luna's Christmas gift	2917-12-26	Flash	theatre

ymd automatically assigned January 1 as month and day for those games whose only date information was the year. There are still a couple of odd observations, the last two, which are most likely typos.

[15]:

```
dates <- dates %>% slice(1:(nrow(dates)-2))
head(dates, 20)
```

A data.frame: 20 × 4

	title <chr>	releaseDate <date>	platform <chr>	library <chr>
1	Blastar	1984-01-01	HTML5	arcade
2	Idle Johnny	1993-01-01	Shockwave	theatre
3	QP-Shot 1000	1994-01-01	Shockwave	arcade
4	The Health Checkup	1994-01-01	Shockwave	theatre
5	ZZZ...I want to sleep	1994-01-01	Shockwave	theatre
6	Dangerous Two	1994-01-01	Shockwave	theatre
7	Virtual Banana Original	1994-02-01	VRML	arcade
8	Virtual University of Auckland	1994-02-01	Hyper-G	arcade
9	Clock	1994-11-17	Hyper-G	arcade
10	Office	1994-11-17	Hyper-G	arcade
11	Model of the IICM institute	1994-11-17	VRML	arcade
12	Office	1994-11-17	VRML	arcade
13	Clock Tower	1994-11-17	VRML	arcade
14	Corvette	1994-11-17	VRML	arcade
15	Cubes	1994-11-17	VRML	arcade
16	Engine	1994-11-17	VRML	arcade
17	Graz 3D Model	1994-11-17	VRML	arcade
18	Fancy Cubes	1994-11-17	Hyper-G	arcade
19	The Austrian National Library	1994-11-17	VRML	arcade
20	LED Sign	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]:

```
dates <- dates %>% slice(2:nrow(dates))
tail(dates, 20)
```

A data.frame: 20 × 4

	title	releaseDate	platform	libr
	<chr>	<date>	<chr>	<ch
75965	Um Conto da Cloe	2022-12-08	HTML5	arc
75966	Pad of Time	2022-12-08	HTML5	arc
75967	/f/ 101	2022-12-09	Flash	arc
75968	Vault of the Pineapples	2022-12-09	HTML5	arc
75969	Snowsgiving Choose Your Own Adventure	2022-12-10	HTML5	arc
75970	look_into_my_eyes_its_open_wide.swf	2022-12-10	Flash	the
75971	The Smurfs Cooking	2022-12-13	HTML5	arc
75972	Mcdonalds Final	2022-12-13	HTML5	arc
75973	In the Name of Freedom: Black Apocalypse	2022-12-13	HTML5	arc
75974	Cartoon Network Winter Games	2022-12-14	HTML5	arc
75975	Monkey Mart	2022-12-14	HTML5	arc
75976	Maptroid: Worlds	2022-12-16	HTML5	arc
75977	Why is This a Curation?	2022-12-17	Lightning Strike	arc
75978	Monster Bar Simulator	2022-12-18	HTML5	arc
75979	Wubbzy explains facts about Mars.	2022-12-19	HTML5	the
75980	Defender of Ukraine	2022-12-20	HTML5	arc
75981	Awesome Game	2022-12-23	HTML5	arc
75982	Christmas in Vienna	2022-12-23	HTML5	arc
75983	Chrysler Building	2022-12-23	HTML5	arc
75984	T-Mobile Tuesdays: Win $2,300 for 2023!	2022-12-27	HTML5	arc

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]:
```
dates %>% filter(platform == "Flash") %>% head(20)
```

A data.frame: 20 × 4

	title	releaseDate	platform	library
	<chr>	<date>	<chr>	<chr>
1	Claus.com	1995-01-01	Flash	arcade
2	2 Design's Navigational Demo	1996-01-01	Flash	arcade
3	CHAOS Website	1996-01-01	Flash	arcade
4	FutureWave Software, Inc. Website	1996-01-01	Flash	arcade
5	Good Music Company Website	1996-01-01	Flash	arcade
6	The Silicon Slip	1996-01-01	Flash	arcade
7	Zygomedia Website	1996-01-01	Flash	arcade
8	First MouseOver Button	1996-01-01	Flash	arcade
9	Simple, Tasty Buttons	1996-01-01	Flash	arcade
10	Discrete Keyboard	1996-01-01	Flash	arcade
11	Animated Screen Beans	1996-01-01	Flash	theatre
12	HK Media Association website banner	1996-01-01	Flash	theatre
13	The Hole in the Wall website intro	1996-01-01	Flash	theatre
14	Volleynerd home page	1996-01-01	Flash	theatre
15	Past*Present*Future	1996-01-01	Flash	theatre
16	The Simpsons 1996 website	1996-01-01	Flash	theatre
17	The Simpsons 1996 website normal version	1996-01-01	Flash	arcade
18	Artcore	1996-01-01	Flash	arcade
19	Advent Calendar	1997-01-01	Flash	arcade
20	Ray of Light Button	1997-01-01	Flash	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]:

```r
top_platforms <- dates %>% count(platform) %>% arrange(desc(n)) %>% head(5)
top_platforms
```

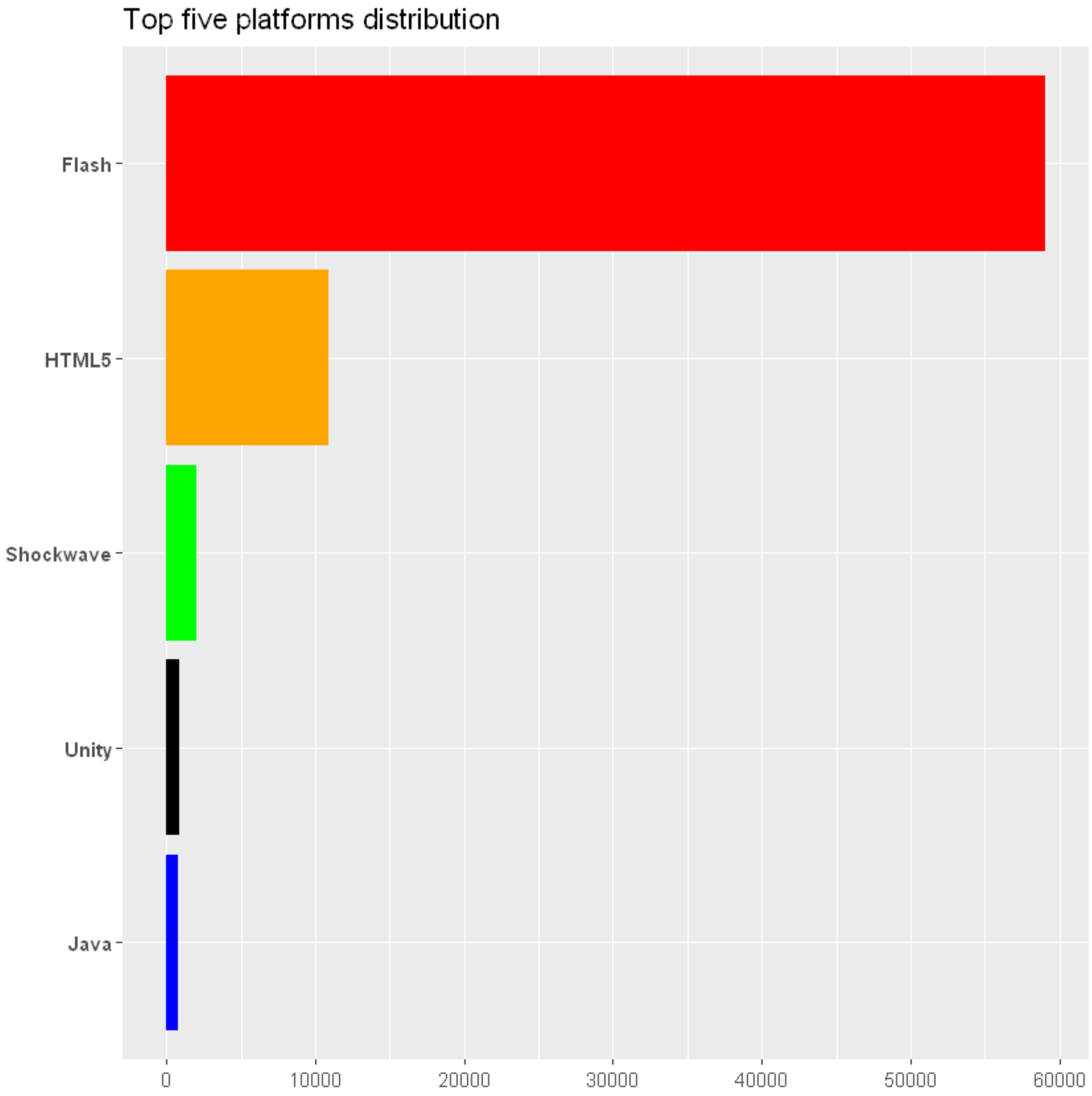
A data.frame: 5 × 2

	platform	n
	<chr>	<int>
1	Flash	59047
2	HTML5	10904
3	Shockwave	1996
4	Unity	875
5	Java	751

[19]:

```r
colors <- c("red", "orange", "blue", "green", "black")

top_platforms %>% as.data.frame() %>% arrange(platform) %>%
  ggplot(aes(x = reorder(platform, n), y = n, fill = platform)) +
  geom_bar(stat = "identity") + coord_flip() +
  scale_y_continuous(breaks = seq(0, 60000, by = 10000)) +
  ggtitle("Top five platforms distribution") +
  theme(legend.position = "none", axis.title.x = element_blank(),
        axis.title.y = element_blank(), axis.text.y = element_text(face = "bold")) +
  scale_fill_manual(values = colors)
```



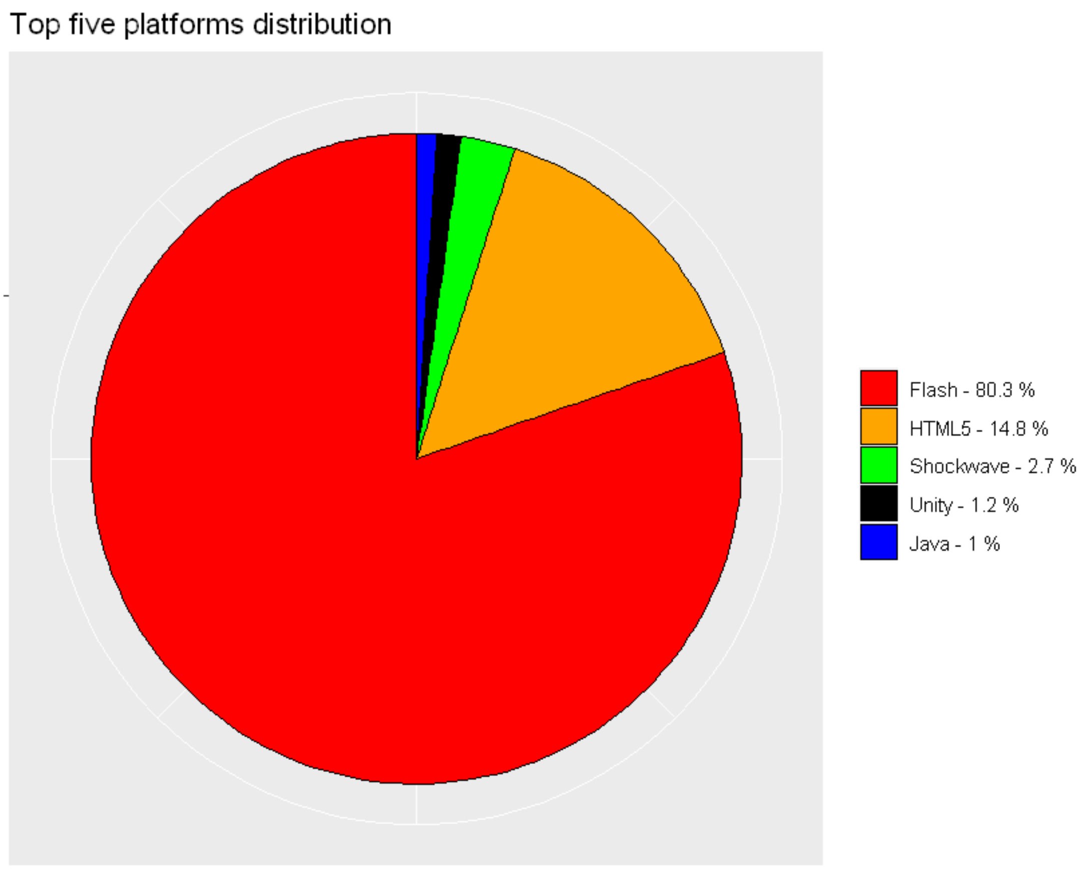
[20]:

```
sizes <- round(top_platforms$n / sum(top_platforms$n) * 100, 1)
labels <- vector()

for(i in 1:(length(sizes))){
  labels[i] <- paste(top_platforms$platform[i], "-", toString(sizes[i]), "%")
}

colors <- c("red", "orange", "green", "black", "blue")
```

```r
top_platforms %>% as.data.frame() %>%
  ggplot(aes(x = "", y = sizes, fill = reorder(platform, -n))) +
  geom_bar(stat = "identity", width = 1, color = "black") +
  coord_polar(theta = "y", start = 0) +
  theme(axis.text = element_blank(), axis.title.x = element_blank(),
        axis.title.y = element_blank(), legend.title = element_blank()) +
  scale_fill_manual(labels = labels, values = colors) +
  ggtitle("Top five platforms distribution")
```



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

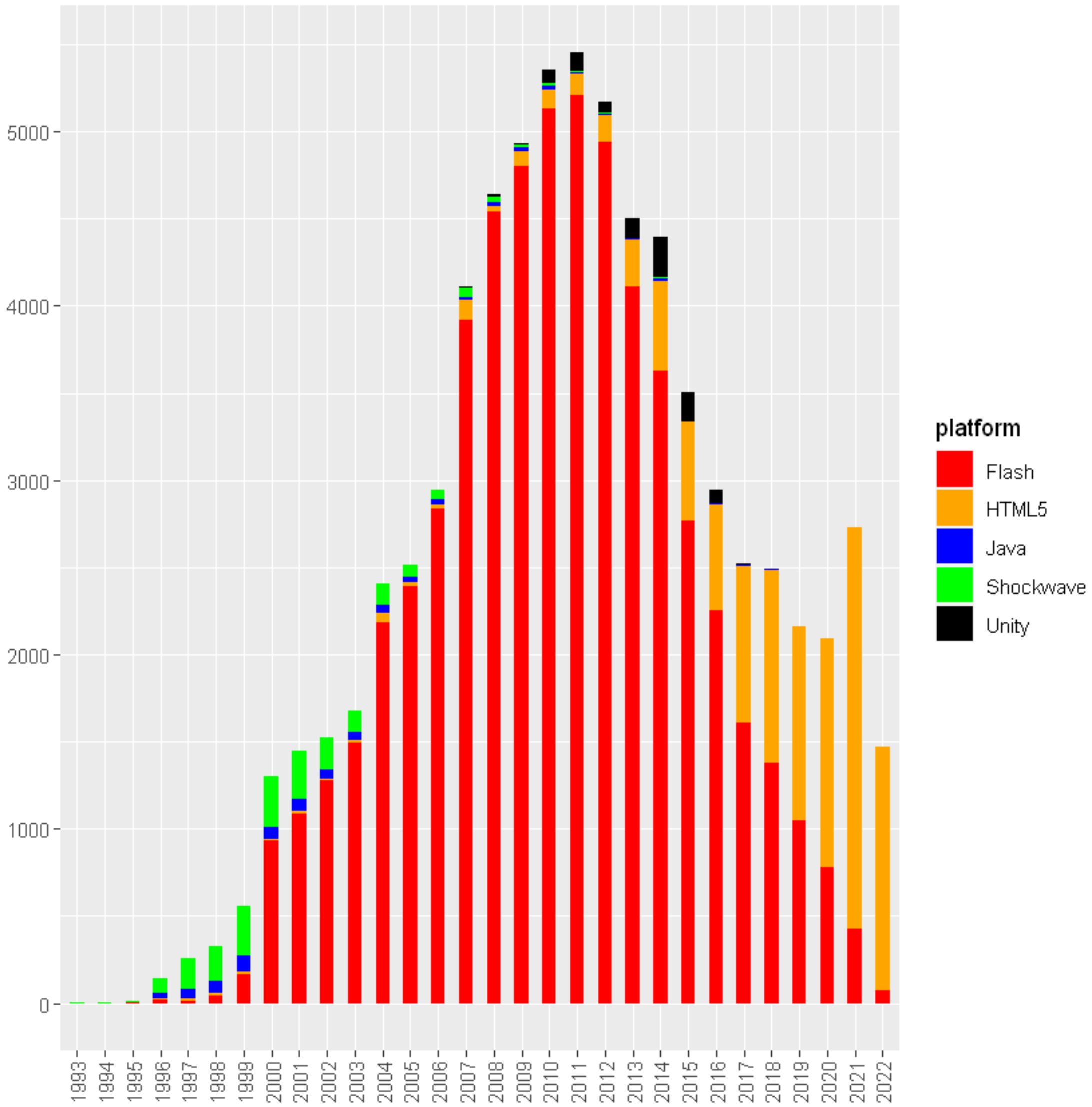
Web games were at their peak in the 2000s and many gamers are nostalgic about that decade, which could be considered a golden age. Thus, we expect to see that most of the games in our database have been released between 2000 and 2009. Let's check it out, while also comparing technologies against years.

[21]:

```
year_platform <- dates %>% filter(platform %in% top_platforms$platform)
years <- year_platform$releaseDate %>% sapply(substr, start = 1, stop = 4)
year_platform$releaseDate <- years

colors <- c("red", "orange", "blue", "green", "black")

year_platform %>% count(releaseDate, platform) %>%
  ggplot(aes(x = releaseDate, y = n, fill = platform, width = 0.5)) +
  geom_bar(position = position_stack(reverse = TRUE), stat = "identity") +
  scale_y_continuous(breaks = seq(0, 6000, by = 1000)) +
  theme(axis.title.x = element_blank(),
        axis.text.x = element_text(angle = 90, vjust = 0.5, hjust = 1),
        axis.title.y = element_blank()) +
  scale_fill_manual(values = colors)
```



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.

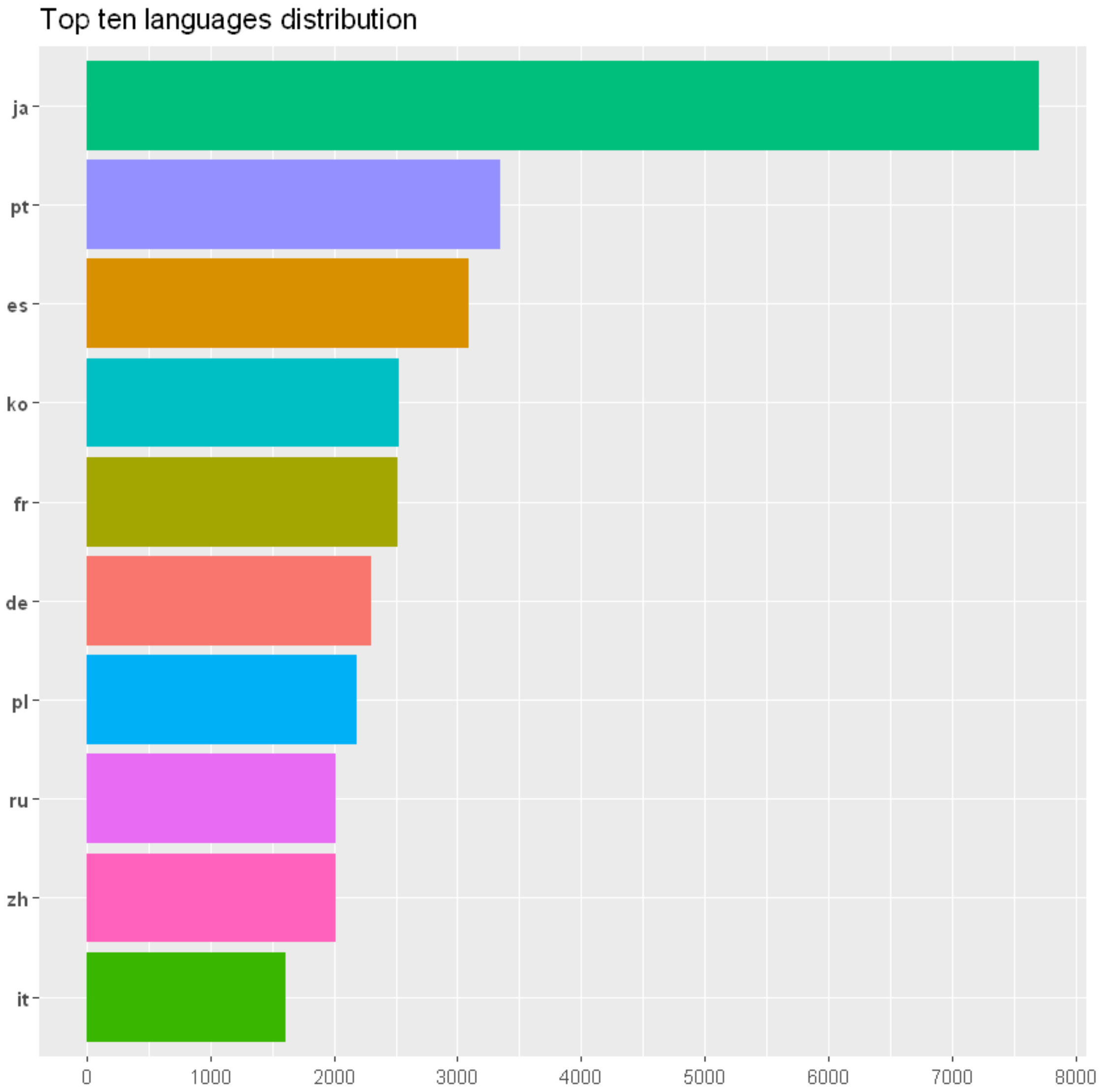
[22]:
```
top_languages <- games %>% filter(language != "") %>% { . ->> tmp } %>%
  select(language) %>%
  vapply(gsub, pattern = ",", replacement = ";", character(nrow(tmp))) %>%
  as.data.frame() %>%
  separate_rows(language, sep = "; ") %>% count(language) %>%
  arrange(desc(n)) %>%
  filter(language != "en") %>% head(10)
top_languages
```

A tibble: 10 × 2

language <chr>	n <int>
ja	7709
pt	3350
es	3095
ko	2525
fr	2519
de	2298
pl	2183
ru	2015
zh	2011
it	1612

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

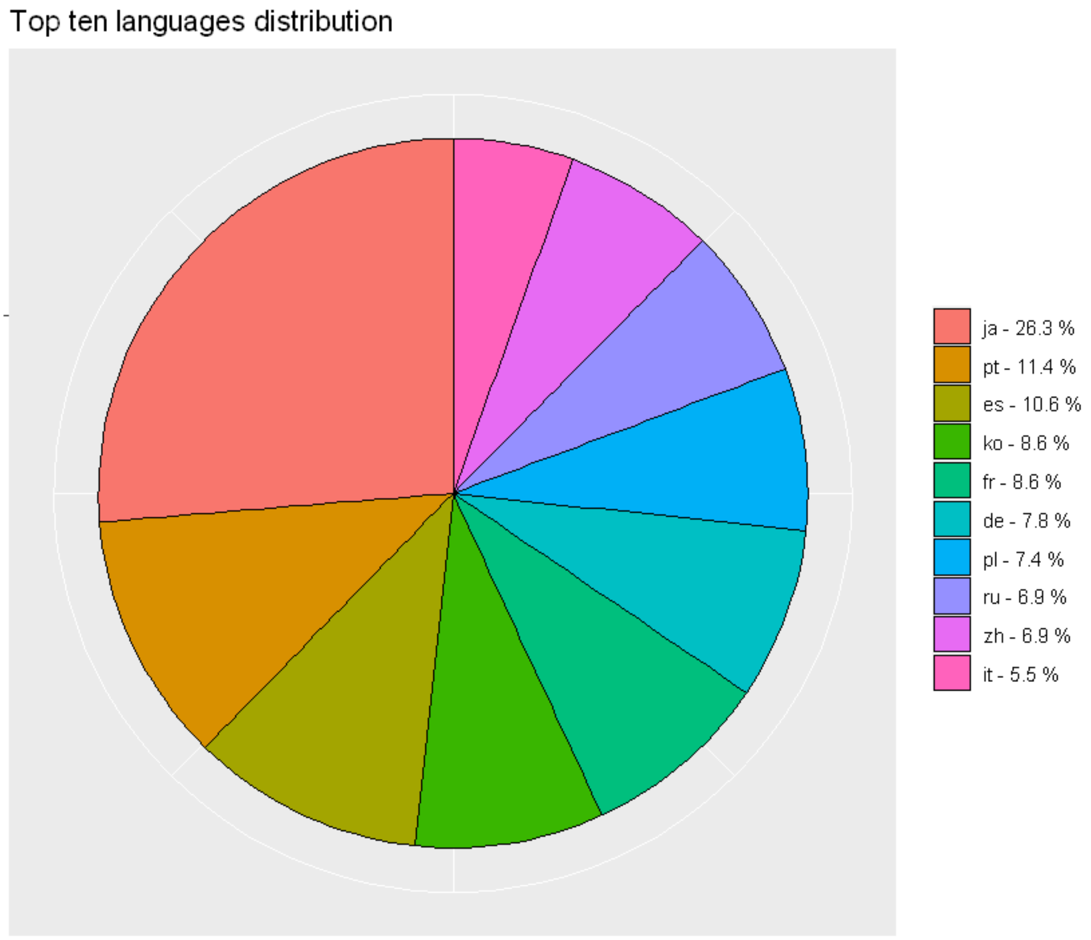
[23]:
```
top_languages %>% as.data.frame() %>% arrange(language) %>%
  ggplot(aes(x = reorder(language, n), y = n, fill = language)) +
  geom_bar(stat = "identity") + coord_flip() +
  scale_y_continuous(breaks = seq(0, 8000, by = 1000)) +
  ggtitle("Top ten languages distribution") +
  theme(legend.position = "none", axis.title.x = element_blank(),
        axis.title.y = element_blank(), axis.text.y = element_text(face =␣
↪"bold"))
```



```
[24]: sizes <- round(top_languages$n / sum(top_languages$n) * 100, 1)
      labels <- vector()

      for(i in 1:(length(sizes))){
        labels[i] <- paste(top_languages$language[i], "-", toString(sizes[i]), "%")
      }

      top_languages %>% as.data.frame() %>%
        ggplot(aes(x = "", y = sizes, fill = reorder(language, -n))) +
        geom_bar(stat = "identity", width = 1, color = "black") +
        coord_polar(theta = "y", start = 0) +
        theme(axis.text = element_blank(), axis.title.x = element_blank(),
              axis.title.y = element_blank(),
              legend.title = element_blank()) +
        scale_fill_discrete(labels = labels) +
        ggtitle("Top ten languages distribution")
```



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]:

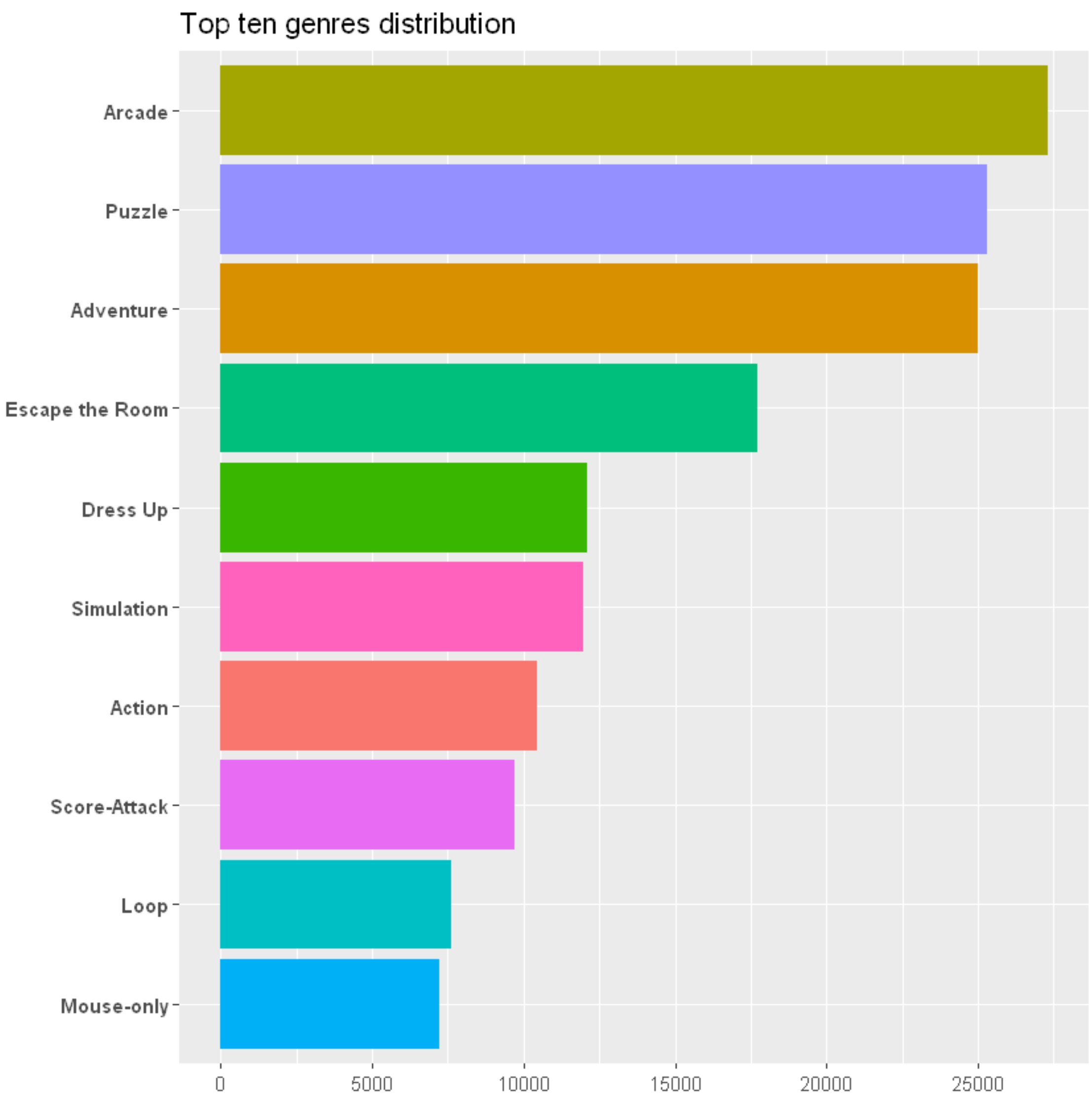
```
top_genres <- games %>% filter(tagsStr != "") %>% { . ->> tmp } %>%
  select(tagsStr) %>%
  vapply(gsub, pattern = ",", replacement = ";", character(nrow(tmp))) %>%
  as.data.frame() %>%
  separate_rows(tagsStr, sep = "; ") %>% count(tagsStr) %>%
  arrange(desc(n)) %>% head(10)
top_genres
```

A tibble: 10 × 2

tagsStr	n
<chr>	<int>
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

[26]:

```
top_genres %>% as.data.frame() %>%
  ggplot(aes(x = reorder(tagsStr, n), y = n, fill = tagsStr)) +
  geom_bar(stat = "identity") + coord_flip() +
  scale_y_continuous(breaks = seq(0, 30000, by = 5000)) +
  ggtitle("Top ten genres distribution") +
  theme(legend.position = "none", axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        axis.text.y = element_text(face = "bold"))
```

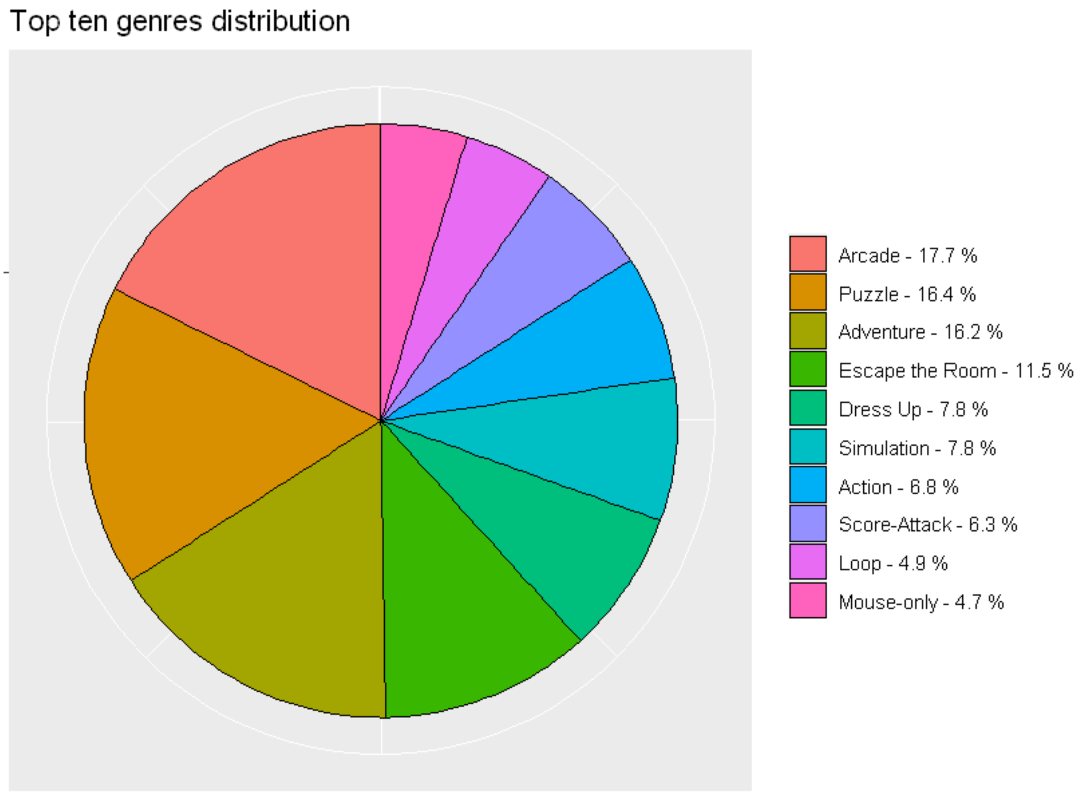


[27]:

```
sizes <- round(top_genres$n / sum(top_genres$n) * 100, 1)
labels <- vector()

for(i in 1:(length(sizes))){
  labels[i] <- paste(top_genres$tagsStr[i], "-", toString(sizes[i]), "%")
}

top_genres %>% as.data.frame() %>%
  ggplot(aes(x = "", y = sizes, fill = reorder(tagsStr, -n))) +
  geom_bar(stat = "identity", width = 1, color = "black") +
  coord_polar(theta = "y", start = 0) +
  theme(axis.text = element_blank(), axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        legend.title = element_blank()) +
  scale_fill_discrete(labels = labels) +
  ggtitle("Top ten genres distribution")
```



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 <- read.csv("data/most_played.csv") %>% rename(id = category)
most_played
```

A data.frame: 40 × 2

id <chr>	Play.Count <int>
83e1b5e7-4282-4bbd-868e-dcfa965e4abf	48493
a94d865c-cb38-4d31-96f3-dda26502c4a3	10228
617ca7f3-1cff-3f0c-5b53-07498b3b28d8	7454
8d09fc0d-6f25-4be6-b396-8fcaddad4e5e	7253
b0ce771e-7c02-4317-8528-ba48139e2688	6922
fdee4800-b5c9-49e0-b19e-22f2b0ccab68	6919
1e903a30-5c37-15bb-8e5e-6fea5a8103f2	6678
07921a2f-26fd-4364-9671-ee0c8d256ec1	6423
b9a8dbb9-0cd7-434b-b226-13dc9dd07b49	6341
a8707c0f-6aac-4c94-9d8a-cc397c97cc88	5745
92ba2d91-e041-2bd4-49ea-21758df711ff	5613
f55d6576-1aee-414a-bd1e-b7678d697dcf	5605
16b04977-f714-4239-b343-b759e16a33af	5579
5fa91cac-25c9-2a53-f391-09a099cb489b	5203
ed058412-fa96-4ea5-b2cb-2baff6a24b2a	5197
3337a4a2-dacf-4027-824c-aaf77623de65	4842
164e2dc8-31dd-4f59-a6be-46c2087e190f	4760
92781aea-6ad0-2bdb-a963-7131c49b7d07	4628
602762ba-a1b6-4810-8093-e5dbf0c33b61	4521
938f4383-8c92-8e8d-511b-004b5c69999d	4427
279b23ca-c7f3-4f56-a02f-3752ec7c5c5d	4407
6b50cb43-ad66-4ec8-9e46-3bb06821f2ab	4332
228087d3-c291-4a87-82e6-c6ffd3d4d2f6	4176
dbb21635-b0d5-78d9-a749-c4778a07e698	3958
de163cff-9dbe-fcbb-164c-53f5d6873fad	3883
16c27895-f7a6-6c65-18f3-feebcf87d28a	3874
c3ab2546-a7b0-89b2-82de-4044d61e1cbd	3684
b0d2b9a9-ab00-465e-b5a3-56031b92f070	3625
8f7f9fe8-4c55-43b1-a574-046c63712b39	3477
2ecf56d6-c5e4-a801-bc7f-60374ba1a051	3410
4423194a-22fe-427a-8eae-1b4d9c42395c	3247
9525910d-72b8-4e84-b668-43a267e00d9c	3238
c85ff4e3-1e2d-4b4e-8c4f-958d9db4aff2	3237
da6b3cb4-78a7-e998-fcf4-cb26a7950754	3227
2d0071b4-8ea9-40b1-a642-c970ca260cb2	3157
ab638461-9317-bbaa-9ccf-e7f0360e3b1b	3136
cf29b65d-e3e9-4da9-8201-d76de38736ea	3036
15ac0ed0-dbd4-8a95-5eec-4cf3e04fc771	3017
190c1bf6-4fcc-4b32-8278-f5b26db8eec1	2850
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.

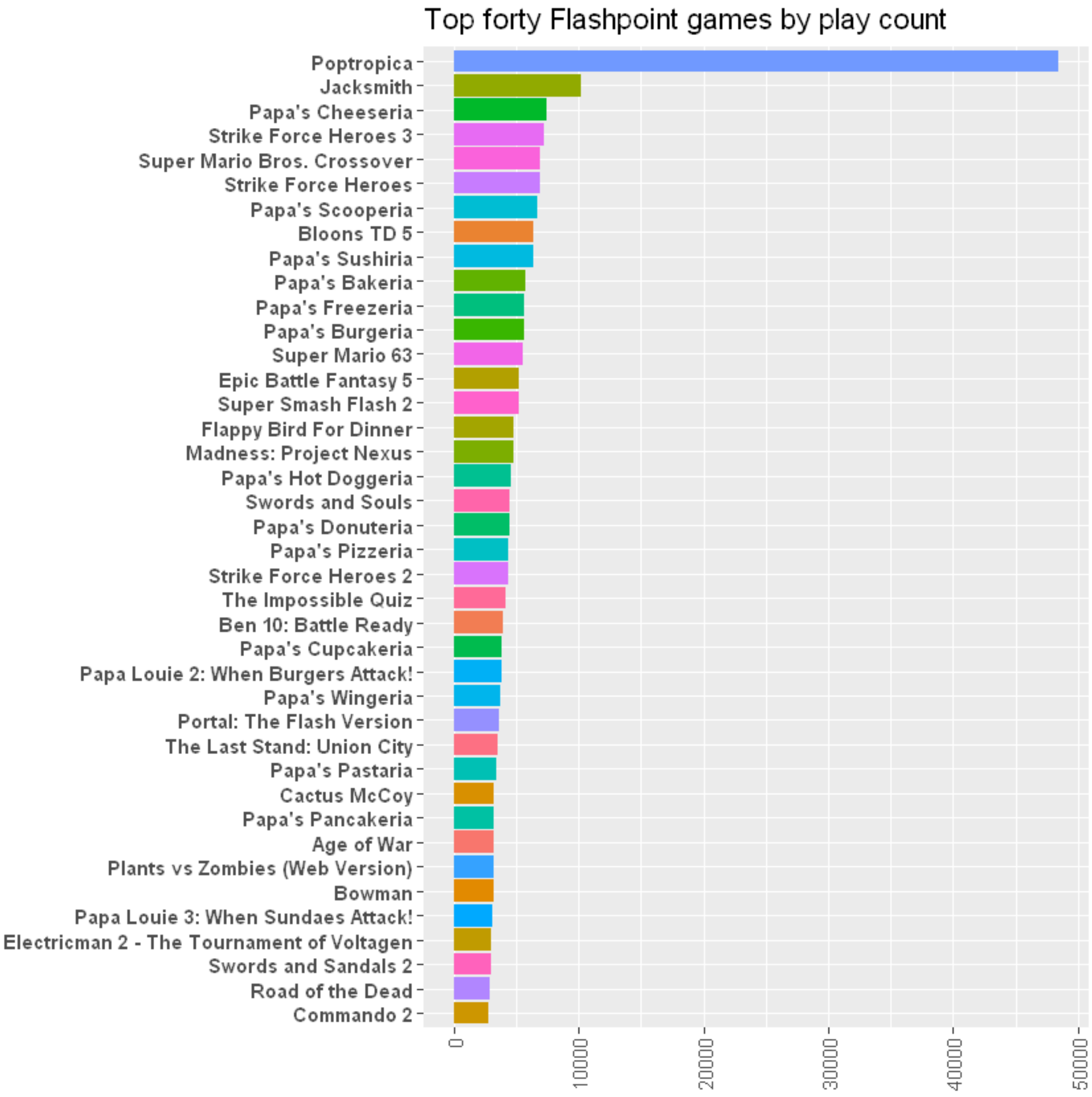
```
[29]: rank <- inner_join(games, most_played, by = join_by(id)) %>% arrange(desc(Play.
       ↪Count))
      rank
```

A data.frame: 40 × 10

id <chr>	title <chr>
83e1b5e7-4282-4bbd-868e-dcfa965e4abf	Poptropica
a94d865c-cb38-4d31-96f3-dda26502c4a3	Jacksmith
617ca7f3-1cff-3f0c-5b53-07498b3b28d8	Papa's Cheeseria
8d09fc0d-6f25-4be6-b396-8fcaddad4e5e	Strike Force Heroes 3
b0ce771e-7c02-4317-8528-ba48139e2688	Super Mario Bros. Crossover
fdee4800-b5c9-49e0-b19e-22f2b0ccab68	Strike Force Heroes
1e903a30-5c37-15bb-8e5e-6fea5a8103f2	Papa's Scooperia
07921a2f-26fd-4364-9671-ee0c8d256ec1	Bloons TD 5
b9a8dbb9-0cd7-434b-b226-13dc9dd07b49	Papa's Sushiria
a8707c0f-6aac-4c94-9d8a-cc397c97cc88	Papa's Bakeria
92ba2d91-e041-2bd4-49ea-21758df711ff	Papa's Freezeria
f55d6576-1aee-414a-bd1e-b7678d697dcf	Papa's Burgeria
16b04977-f714-4239-b343-b759e16a33af	Super Mario 63
5fa91cac-25c9-2a53-f391-09a099cb489b	Epic Battle Fantasy 5
ed058412-fa96-4ea5-b2cb-2baff6a24b2a	Super Smash Flash 2
3337a4a2-dacf-4027-824c-aaf77623de65	Flappy Bird For Dinner
164e2dc8-31dd-4f59-a6be-46c2087e190f	Madness: Project Nexus
92781aea-6ad0-2bdb-a963-7131c49b7d07	Papa's Hot Doggeria
602762ba-a1b6-4810-8093-e5dbf0c33b61	Swords and Souls
938f4383-8c92-8e8d-511b-004b5c69999d	Papa's Donuteria
279b23ca-c7f3-4f56-a02f-3752ec7c5c5d	Papa's Pizzeria
6b50cb43-ad66-4ec8-9e46-3bb06821f2ab	Strike Force Heroes 2
228087d3-c291-4a87-82e6-c6ffd3d4d2f6	The Impossible Quiz
dbb21635-b0d5-78d9-a749-c4778a07e698	Ben 10: Battle Ready
de163cff-9dbe-fcbb-164c-53f5d6873fad	Papa's Cupcakeria
16c27895-f7a6-6c65-18f3-feebcf87d28a	Papa Louie 2: When Burgers Attack!
c3ab2546-a7b0-89b2-82de-4044d61e1cbd	Papa's Wingeria
b0d2b9a9-ab00-465e-b5a3-56031b92f070	Portal: The Flash Version
8f7f9fe8-4c55-43b1-a574-046c63712b39	The Last Stand: Union City
2ecf56d6-c5e4-a801-bc7f-60374ba1a051	Papa's Pastaria
4423194a-22fe-427a-8eae-1b4d9c42395c	Cactus McCoy
9525910d-72b8-4e84-b668-43a267e00d9c	Papa's Pancakeria
c85ff4e3-1e2d-4b4e-8c4f-958d9db4aff2	Age of War
da6b3cb4-78a7-e998-fcf4-cb26a7950754	Plants vs Zombies (Web Version)
2d0071b4-8ea9-40b1-a642-c970ca260cb2	Bowman
ab638461-9317-bbaa-9ccf-e7f0360e3b1b	Papa Louie 3: When Sundaes Attack!
cf29b65d-e3e9-4da9-8201-d76de38736ea	Electricman 2 - The Tournament of Voltagen
15ac0ed0-dbd4-4a95-5eec-4cf3e04fc771	Swords and Sandals 2
190c1bf6-4fcc-4b32-8278-f5b26db8eec1	Road of the Dead
242dedc0-431a-4e4e-990c-58fe3c8ef740	Commando 2

[30]:

```
rank %>% ggplot(aes(x = reorder(title, Play.Count), y = Play.Count, fill =␣
 ↪title)) +
  geom_bar(stat = "identity") + coord_flip() +
  scale_y_continuous(breaks = seq(0, 50000, by = 10000)) +
  ggtitle("Top forty Flashpoint games by play count") +
  theme(legend.position = "none", axis.title.x = element_blank(),
        axis.title.y = element_blank(),
        axis.text.x = element_text(angle = 90, vjust = 0.5, hjust = 1),
        axis.text.y = element_text(face = "bold"))
```



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.