

# Freqüències

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## Freqüències

Volem estudiar les freqüències en un dataset de vídeojocs.

### Llegir dades

Primerament llegirem les dades des del fitxer. Per fer-ho emprarem la funció `read.csv`. Guardarem el resultat a la variable `df.vg`

```
df.vg = read.csv("vgsales.csv", header = TRUE, sep=",")
unique(df.vg$Platform)
```

```
## [1] "Wii" "NES" "GB" "DS" "X360" "PS3" "PS2" "SNES" "GBA" "3DS"
## [11] "PS4" "N64" "PS" "XB" "PC" "2600" "PSP" "XOne" "GC" "WiiU"
## [21] "GEN" "DC" "PSV" "SAT" "SCD" "WS" "NG" "TG16" "3DO" "GG"
## [31] "PCFX"
```

Volem saber com són les dades per aquest motiu emprarem la funció `summary`.

```
summary(df.vg)
```

```
##      Rank      Name      Platform      Year
## Min.   :    1  Length:16598  Length:16598  Length:16598
## 1st Qu.: 4151  Class :character  Class :character  Class :character
## Median : 8300  Mode  :character  Mode  :character  Mode  :character
## Mean   : 8301
## 3rd Qu.:12450
## Max.   :16600
##      Genre      Publisher      NA_Sales      EU_Sales
## Length:16598  Length:16598  Min.   : 0.0000  Min.   : 0.0000
## Class :character  Class :character  1st Qu.: 0.0000  1st Qu.: 0.0000
## Mode  :character  Mode  :character  Median : 0.0800  Median : 0.0200
##                                     Mean   : 0.2647  Mean   : 0.1467
##                                     3rd Qu.: 0.2400  3rd Qu.: 0.1100
##                                     Max.   :41.4900  Max.   :29.0200
##      JP_Sales      Other_Sales      Global_Sales
## Min.   : 0.00000  Min.   : 0.00000  Min.   : 0.0100
## 1st Qu.: 0.00000  1st Qu.: 0.00000  1st Qu.: 0.0600
## Median : 0.00000  Median : 0.01000  Median : 0.1700
## Mean   : 0.07778  Mean   : 0.04806  Mean   : 0.5374
## 3rd Qu.: 0.04000  3rd Qu.: 0.04000  3rd Qu.: 0.4700
## Max.   :10.22000  Max.   :10.57000  Max.   :82.7400
```

Observam que les característiques n'hi ha de numèriques i n'hi que no ho són. Les que no ho són s'anomenen factors, d'elles podem cercar les freqüències absolutes. En aquest exemple ho farem de les

plataformes.

```
freq_abs = table(df.vg$Platform)
freq_abs
```

```
##
## 2600  3DO  3DS   DC   DS   GB  GBA   GC  GEN   GG  N64  NES   NG   PC PCFX   PS
##  133    3  509   52 2163   98  822  556   27    1  319   98   12  960    1 1196
##  PS2  PS3  PS4  PSP  PSV  SAT  SCD SNES TG16  Wii WiiU   WS X360   XB XOne
## 2161 1329  336 1213  413  173    6  239    2 1325  143    6 1265  824  213
```

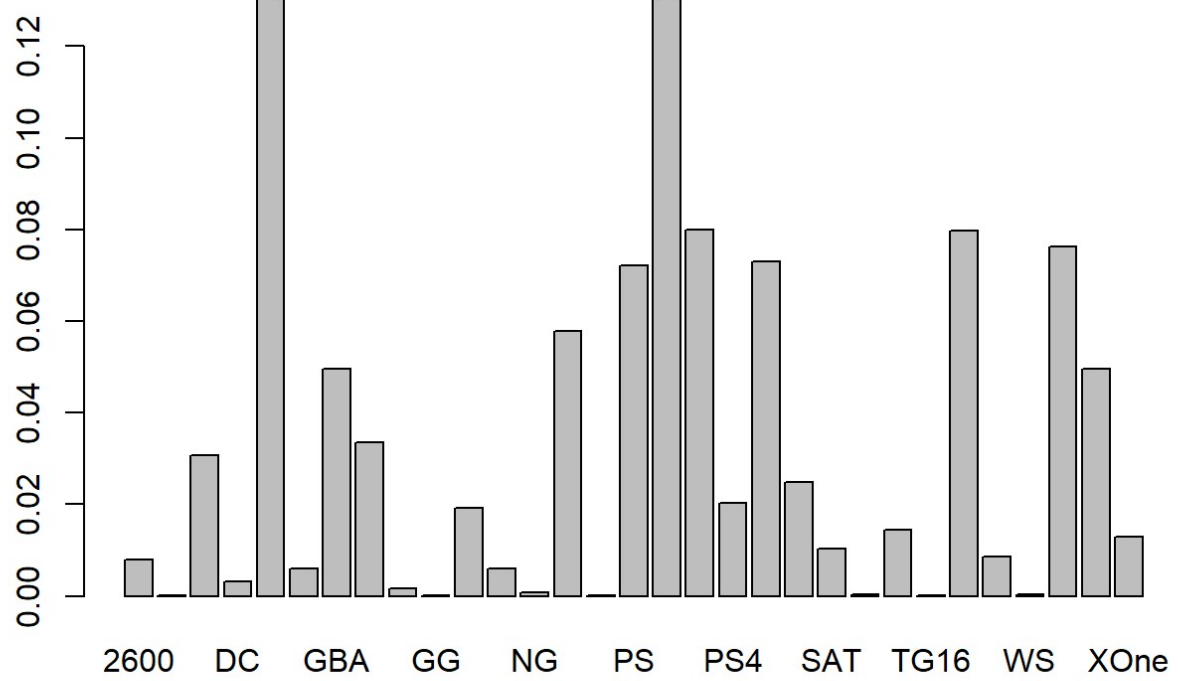
```
freq_rel = prop.table(freq_abs)
as.vector(freq_rel) * 100
```

```
## [1]  0.801301362  0.018074467  3.066634534  0.313290758 13.031690565
## [6]  0.590432582  4.952403904  3.349801181  0.162670201  0.006024822
## [11]  1.921918303  0.590432582  0.072297867  5.783829377  0.006024822
## [16]  7.205687432 13.019640921  8.006988794  2.024340282  7.308109411
## [21]  2.488251597  1.042294252  0.036148934  1.439932522  0.012049645
## [26]  7.982889505  0.861549584  0.036148934  7.621400169  4.964453549
## [31]  1.283287143
```

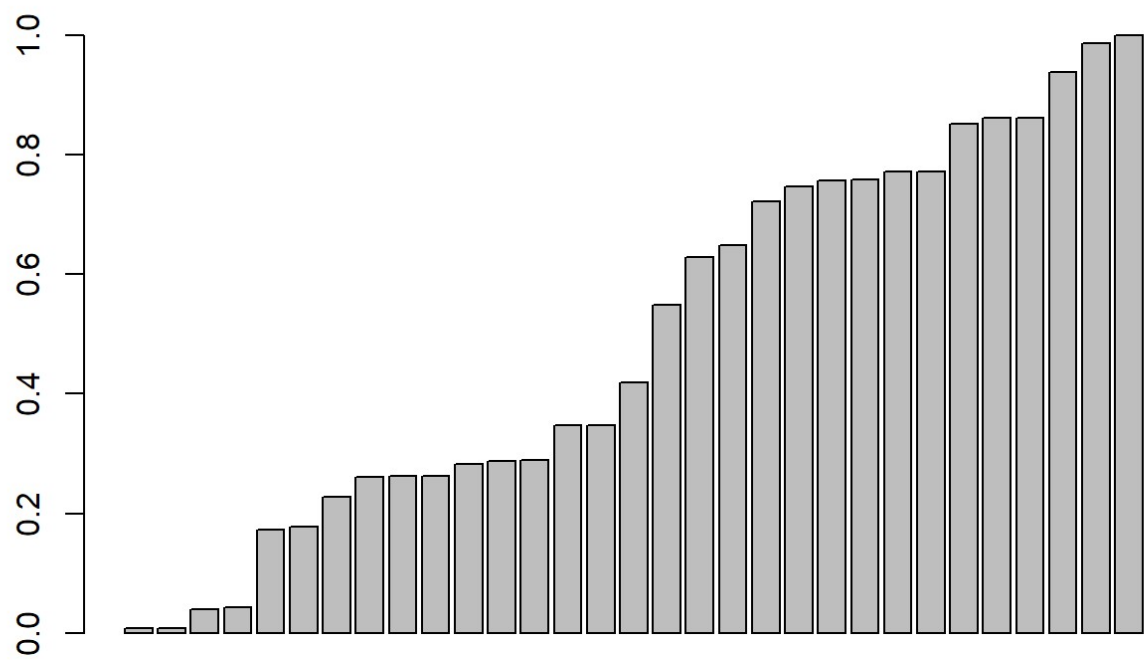
```
labels(freq_rel)
```

```
## [[1]]
## [1] "2600" "3DO"  "3DS"  "DC"   "DS"   "GB"   "GBA"  "GC"   "GEN"  "GG"
## [11] "N64"  "NES"  "NG"   "PC"   "PCFX" "PS"   "PS2"  "PS3"  "PS4"  "PSP"
## [21] "PSV"  "SAT"  "SCD"  "SNES" "TG16" "Wii"  "WiiU" "WS"   "X360" "XB"
## [31] "XOne"
```

```
barplot(freq_rel)
```



```
barplot(cumsum(as.vector(freq_rel)))
```



# Taules de probabilitat 2D

```
taula_abs_2d = table(df.vg$Platform, df.vg$Genre)
taula_abs_2d
```

| ## |      | Action  | Adventure  | Fighting | Misc     | Platform | Puzzle | Racing | Role-Playing |
|----|------|---------|------------|----------|----------|----------|--------|--------|--------------|
| ## | 2600 | 61      | 2          | 2        | 5        | 9        | 11     | 6      | 0            |
| ## | 3DO  | 0       | 1          | 0        | 0        | 0        | 1      | 0      | 0            |
| ## | 3DS  | 182     | 37         | 14       | 53       | 28       | 20     | 11     | 86           |
| ## | DC   | 3       | 11         | 12       | 0        | 2        | 0      | 6      | 4            |
| ## | DS   | 343     | 240        | 36       | 393      | 92       | 238    | 67     | 200          |
| ## | GB   | 6       | 5          | 0        | 8        | 19       | 15     | 2      | 21           |
| ## | GBA  | 167     | 38         | 23       | 110      | 142      | 41     | 64     | 73           |
| ## | GC   | 101     | 20         | 42       | 36       | 73       | 13     | 63     | 27           |
| ## | GEN  | 3       | 2          | 5        | 1        | 7        | 0      | 1      | 3            |
| ## | GG   | 0       | 0          | 0        | 0        | 1        | 0      | 0      | 0            |
| ## | N64  | 38      | 4          | 29       | 18       | 30       | 12     | 57     | 8            |
| ## | NES  | 13      | 1          | 4        | 2        | 28       | 14     | 4      | 11           |
| ## | NG   | 0       | 0          | 11       | 0        | 0        | 0      | 0      | 0            |
| ## | PC   | 165     | 65         | 6        | 24       | 11       | 25     | 60     | 104          |
| ## | PCFX | 0       | 0          | 0        | 0        | 0        | 0      | 0      | 1            |
| ## | PS   | 157     | 69         | 108      | 76       | 64       | 32     | 145    | 97           |
| ## | PS2  | 348     | 196        | 150      | 222      | 103      | 18     | 216    | 187          |
| ## | PS3  | 380     | 74         | 76       | 124      | 37       | 3      | 92     | 119          |
| ## | PS4  | 122     | 19         | 17       | 15       | 11       | 1      | 17     | 47           |
| ## | PSP  | 222     | 213        | 74       | 106      | 36       | 44     | 65     | 192          |
| ## | PSV  | 142     | 86         | 16       | 24       | 10       | 3      | 11     | 83           |
| ## | SAT  | 3       | 26         | 31       | 15       | 5        | 5      | 8      | 17           |
| ## | SCD  | 0       | 0          | 0        | 2        | 1        | 0      | 1      | 1            |
| ## | SNES | 12      | 4          | 25       | 17       | 26       | 13     | 9      | 50           |
| ## | TG16 | 0       | 1          | 0        | 0        | 0        | 0      | 0      | 0            |
| ## | Wii  | 238     | 84         | 42       | 280      | 58       | 55     | 94     | 35           |
| ## | WiiU | 63      | 3          | 5        | 21       | 16       | 4      | 3      | 6            |
| ## | WS   | 0       | 0          | 0        | 0        | 0        | 0      | 0      | 4            |
| ## | X360 | 324     | 47         | 65       | 126      | 24       | 7      | 105    | 76           |
| ## | XB   | 155     | 26         | 48       | 46       | 49       | 7      | 123    | 23           |
| ## | XOne | 68      | 12         | 7        | 15       | 4        | 0      | 19     | 13           |
| ## |      |         |            |          |          |          |        |        |              |
| ## |      | Shooter | Simulation | Sports   | Strategy |          |        |        |              |
| ## | 2600 | 24      | 1          | 12       | 0        |          |        |        |              |
| ## | 3DO  | 0       | 1          | 0        | 0        |          |        |        |              |
| ## | 3DS  | 7       | 30         | 26       | 15       |          |        |        |              |
| ## | DC   | 3       | 1          | 10       | 0        |          |        |        |              |
| ## | DS   | 42      | 285        | 148      | 79       |          |        |        |              |
| ## | GB   | 1       | 5          | 9        | 7        |          |        |        |              |
| ## | GBA  | 40      | 18         | 88       | 18       |          |        |        |              |
| ## | GC   | 48      | 12         | 110      | 11       |          |        |        |              |
| ## | GEN  | 1       | 0          | 3        | 1        |          |        |        |              |
| ## | GG   | 0       | 0          | 0        | 0        |          |        |        |              |
| ## | N64  | 24      | 10         | 80       | 9        |          |        |        |              |
| ## | NES  | 7       | 0          | 14       | 0        |          |        |        |              |
| ## | NG   | 0       | 0          | 1        | 0        |          |        |        |              |
| ## | PC   | 148     | 115        | 49       | 188      |          |        |        |              |
| ## | PCFX | 0       | 0          | 0        | 0        |          |        |        |              |
| ## | PS   | 96      | 60         | 222      | 70       |          |        |        |              |
| ## | PS2  | 160     | 90         | 400      | 71       |          |        |        |              |
| ## | PS3  | 156     | 31         | 213      | 24       |          |        |        |              |
| ## | PS4  | 34      | 5          | 43       | 5        |          |        |        |              |

|    |      |     |    |     |    |
|----|------|-----|----|-----|----|
| ## | PSP  | 37  | 29 | 135 | 60 |
| ## | PSV  | 5   | 3  | 23  | 7  |
| ## | SAT  | 22  | 7  | 16  | 18 |
| ## | SCD  | 0   | 0  | 0   | 1  |
| ## | SNES | 10  | 9  | 49  | 15 |
| ## | TG16 | 1   | 0  | 0   | 0  |
| ## | Wii  | 66  | 87 | 261 | 25 |
| ## | WiiU | 10  | 1  | 8   | 3  |
| ## | WS   | 0   | 0  | 0   | 2  |
| ## | X360 | 203 | 40 | 220 | 28 |
| ## | XB   | 132 | 24 | 170 | 21 |
| ## | XOne | 33  | 3  | 36  | 3  |

```
prop.table(taula_abs_2d) * 100
```

```

##
##           Action  Adventure  Fighting      Misc      Platform      Puzzle
## 2600 0.367514158 0.012049645 0.012049645 0.030124111 0.054223400 0.066273045
## 3DO  0.000000000 0.006024822 0.000000000 0.000000000 0.000000000 0.006024822
## 3DS  1.096517653 0.222918424 0.084347512 0.319315580 0.168695023 0.120496445
## DC   0.018074467 0.066273045 0.072297867 0.000000000 0.012049645 0.000000000
## DS   2.066514038 1.445957344 0.216893602 2.367755151 0.554283649 1.433907700
## GB   0.036148934 0.030124111 0.000000000 0.048198578 0.114471623 0.090372334
## GBA  1.006145319 0.228943246 0.138570912 0.662730449 0.855524762 0.247017713
## GC   0.608507049 0.120496445 0.253042535 0.216893602 0.439812026 0.078322689
## GEN  0.018074467 0.012049645 0.030124111 0.006024822 0.042173756 0.000000000
## GG   0.000000000 0.000000000 0.000000000 0.000000000 0.006024822 0.000000000
## N64  0.228943246 0.024099289 0.174719846 0.108446801 0.180744668 0.072297867
## NES  0.078322689 0.006024822 0.024099289 0.012049645 0.168695023 0.084347512
## NG   0.000000000 0.000000000 0.066273045 0.000000000 0.000000000 0.000000000
## PC   0.994095674 0.391613447 0.036148934 0.144595734 0.066273045 0.150620557
## PCFX 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000
## PS   0.945897096 0.415712736 0.650680805 0.457886492 0.385588625 0.192794313
## PS2  2.096638149 1.180865164 0.903723340 1.337510543 0.620556694 0.108446801
## PS3  2.289432462 0.445836848 0.457886492 0.747077961 0.222918424 0.018074467
## PS4  0.735028317 0.114471623 0.102421979 0.090372334 0.066273045 0.006024822
## PSP  1.337510543 1.283287143 0.445836848 0.638631160 0.216893602 0.265092180
## PSV  0.855524762 0.518134715 0.096397156 0.144595734 0.060248223 0.018074467
## SAT  0.018074467 0.156645379 0.186769490 0.090372334 0.030124111 0.030124111
## SCD  0.000000000 0.000000000 0.000000000 0.012049645 0.006024822 0.000000000
## SNES 0.072297867 0.024099289 0.150620557 0.102421979 0.156645379 0.078322689
## TG16 0.000000000 0.006024822 0.000000000 0.000000000 0.000000000 0.000000000
## Wii  1.433907700 0.506085070 0.253042535 1.686950235 0.349439692 0.331365225
## WiiU 0.379563803 0.018074467 0.030124111 0.126521268 0.096397156 0.024099289
## WS   0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000
## X360 1.952042415 0.283166647 0.391613447 0.759127606 0.144595734 0.042173756
## XB   0.933847452 0.156645379 0.289191469 0.277141824 0.295216291 0.042173756
## XOne 0.409687914 0.072297867 0.042173756 0.090372334 0.024099289 0.000000000
##
##           Racing  Role-Playing  Shooter  Simulation  Sports  Strategy
## 2600 0.036148934 0.000000000 0.144595734 0.006024822 0.072297867 0.000000000
## 3DO  0.000000000 0.000000000 0.000000000 0.006024822 0.000000000 0.000000000
## 3DS  0.066273045 0.518134715 0.042173756 0.180744668 0.156645379 0.090372334
## DC   0.036148934 0.024099289 0.018074467 0.006024822 0.060248223 0.000000000
## DS   0.403663092 1.204964454 0.253042535 1.717074346 0.891673696 0.475960959
## GB   0.012049645 0.126521268 0.006024822 0.030124111 0.054223400 0.042173756
## GBA  0.385588625 0.439812026 0.240992891 0.108446801 0.530184360 0.108446801
## GC   0.379563803 0.162670201 0.289191469 0.072297867 0.662730449 0.066273045
## GEN  0.006024822 0.018074467 0.006024822 0.000000000 0.018074467 0.006024822
## GG   0.000000000 0.000000000 0.000000000 0.000000000 0.000000000 0.000000000
## N64  0.343414869 0.048198578 0.144595734 0.060248223 0.481985781 0.054223400
## NES  0.024099289 0.066273045 0.042173756 0.000000000 0.084347512 0.000000000
## NG   0.000000000 0.000000000 0.000000000 0.000000000 0.006024822 0.000000000
## PC   0.361489336 0.626581516 0.891673696 0.692854561 0.295216291 1.132666586
## PCFX 0.000000000 0.006024822 0.000000000 0.000000000 0.000000000 0.000000000
## PS   0.873599229 0.584407760 0.578382938 0.361489336 1.337510543 0.421737559
## PS2  1.301361610 1.126641764 0.963971563 0.542234004 2.409928907 0.427762381
## PS3  0.554283649 0.716953850 0.939872274 0.186769490 1.283287143 0.144595734
## PS4  0.102421979 0.283166647 0.204843957 0.030124111 0.259067358 0.030124111

```

|    |      |             |             |             |             |             |             |
|----|------|-------------|-------------|-------------|-------------|-------------|-------------|
| ## | PSP  | 0.391613447 | 1.156765875 | 0.222918424 | 0.174719846 | 0.813351006 | 0.361489336 |
| ## | PSV  | 0.066273045 | 0.500060248 | 0.030124111 | 0.018074467 | 0.138570912 | 0.042173756 |
| ## | SAT  | 0.048198578 | 0.102421979 | 0.132546090 | 0.042173756 | 0.096397156 | 0.108446801 |
| ## | SCD  | 0.006024822 | 0.006024822 | 0.000000000 | 0.000000000 | 0.000000000 | 0.006024822 |
| ## | SNES | 0.054223400 | 0.301241113 | 0.060248223 | 0.054223400 | 0.295216291 | 0.090372334 |
| ## | TG16 | 0.000000000 | 0.000000000 | 0.006024822 | 0.000000000 | 0.000000000 | 0.000000000 |
| ## | Wii  | 0.566333293 | 0.210868779 | 0.397638270 | 0.524159537 | 1.572478612 | 0.150620557 |
| ## | WiiU | 0.018074467 | 0.036148934 | 0.060248223 | 0.006024822 | 0.048198578 | 0.018074467 |
| ## | WS   | 0.000000000 | 0.024099289 | 0.000000000 | 0.000000000 | 0.000000000 | 0.012049645 |
| ## | X360 | 0.632606338 | 0.457886492 | 1.223038920 | 0.240992891 | 1.325460899 | 0.168695023 |
| ## | XB   | 0.741053139 | 0.138570912 | 0.795276539 | 0.144595734 | 1.024219786 | 0.126521268 |
| ## | XOne | 0.114471623 | 0.078322689 | 0.198819135 | 0.018074467 | 0.216893602 | 0.018074467 |