Fortnite_Weapons_Type_Analysis

vaspilk

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#Import needed packages

```
## Le chargement a nécessité le package : dplyr

##
## Attachement du package : 'dplyr'

## Les objets suivants sont masqués depuis 'package:stats':
##
##     filter, lag

## Les objets suivants sont masqués depuis 'package:base':
##
##     intersect, setdiff, setequal, union

## Le chargement a nécessité le package : ggplot2

## Warning: le package 'ggplot2' a été compilé avec la version R 4.2.2

## Le chargement a nécessité le package : viridis

## Le chargement a nécessité le package : viridisLite

## Le chargement a nécessité le package : ggcorrplot

## Warning: le package 'ggcorrplot' a été compilé avec la version R 4.2.3

## Le chargement a nécessité le package : FactoMineR
```

#Preparing Data ## Import Dataset and Cleaning it

```
weapons <- read.csv("data/Fortnite_BR_Weapon_Attributes.csv",sep=";")
weapons$Name <- as.factor(weapons$Name)
weapons$Rarity <- as.factor(weapons$Rarity)
weapons$Type <- as.factor(weapons$Type)
```

Dataset overview

```
summary(weapons)
```

```
##                   Name         DPS            Damage         Critical..
##  Bolt-Action Sniper: 3   Min.   : 34.7   Min.   : 14.00   Min.   :0
##  Burst Rifle       : 3   1st Qu.: 81.5   1st Qu.: 23.50   1st Qu.:0
##  Grenade Launcher  : 3   Median :111.0   Median : 33.00   Median :0
##  M4                : 3   Mean   :125.2   Mean   : 52.63   Mean   :0
##  Pistol            : 3   3rd Qu.:170.2   3rd Qu.: 82.00   3rd Qu.:0
##  Revolver          : 3   Max.   :240.0   Max.   :121.00   Max.   :0
##  (Other)           :25
##   Crit..Damage   Fire.Rate        Mag..Size         Range
##  Min.   :0     Min.   : 0.330   Min.   : 1.00   Min.   :1.000
##  1st Qu.:0     1st Qu.: 0.950   1st Qu.: 6.00   1st Qu.:1.000
##  Median :0     Median : 4.060   Median :16.00   Median :1.000
##  Mean   :0     Mean   : 4.643   Mean   :17.23   Mean   :1.241
##  3rd Qu.:0     3rd Qu.: 6.750   3rd Qu.:30.00   3rd Qu.:1.000
##  Max.   :0     Max.   :15.000   Max.   :35.00   Max.   :3.072
##
##   Durability         Reload.Time      Ammo.Cost     Impact             Rarity
##  Length:43          Min.   :1.300   Min.   :1   Min.   :  25.0   Common   : 7
##  Class :character   1st Qu.:2.100   1st Qu.:1   1st Qu.:  28.0   Epic     : 9
##  Mode  :character   Median :2.300   Median :1   Median :  45.0   Legendary: 6
##                     Mean   :2.623   Mean   :1   Mean   : 304.3   Rare     :12
##                     3rd Qu.:2.700   3rd Qu.:1   3rd Qu.: 348.0   Uncommon : 9
##                     Max.   :6.300   Max.   :1   Max.   :2200.0
##
##               Type
##  Assault Rifles :10
##  Explosives     : 6
##  Pistols        : 8
##  Shotguns       : 5
##  Sniper Rifles  : 5
##  Submachine Guns: 9
##
```

Critical.. and Crit..Damage are corrupted columns, its values are always equal to 0. Durability is also a corrupted column as its value is always "?". We'll be removing these columns for the following analysis.

```
weapons <- select(weapons, -c("Critical..","Crit..Damage","Durability"))
```

```
cat("Distinct Weapons :",length(levels(weapons$Name)),"\n",
"Distinct Rarity Levels :",length(levels(weapons$Rarity)),"\n",
"Distinct Weapon Types :",length(levels(weapons$Type)))
```

```
## Distinct Weapons : 16
##  Distinct Rarity Levels : 5
##  Distinct Weapon Types : 6
```

This dataset contains 16 different weapons overall. Weapons are from 6 different Types, and 5 disitinct levels of Rarity are are presented.

Exploring Weapons Types & Rarity

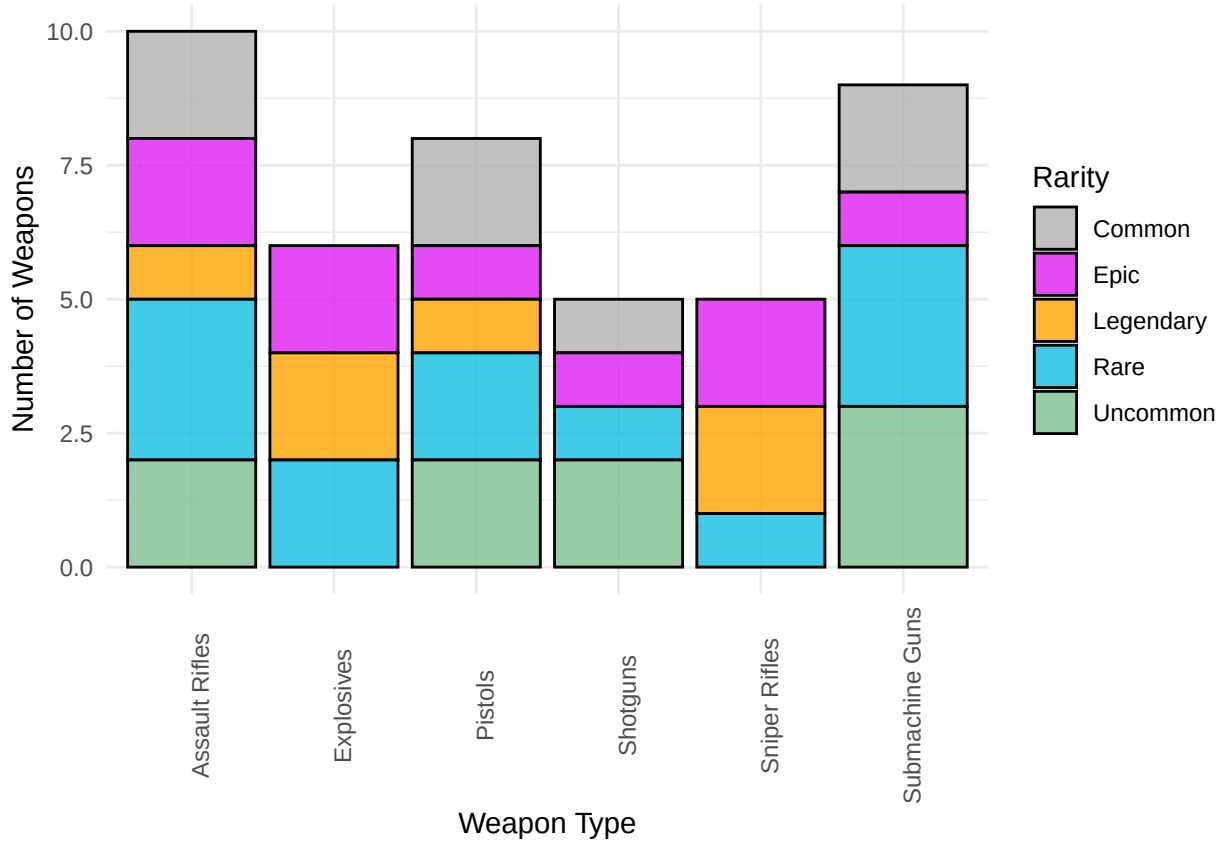
Barchart per Type

```
weapons_type_barchart <- ggplot(data = weapons,aes(x=Type,fill = Rarity)) + geom_bar(stats="identity",a
  ylab("Number of Weapons")
```

```
## Warning in geom_bar(stats = "identity", alpha = 0.8, color = "black"): Ignoring
## unknown parameters: ‘stats‘
```

```
weapons_type_barchart <- weapons_type_barchart + scale_fill_manual(values=c('#B2B2B2','#DE1FF6','#FFA50

weapons_type_barchart
```



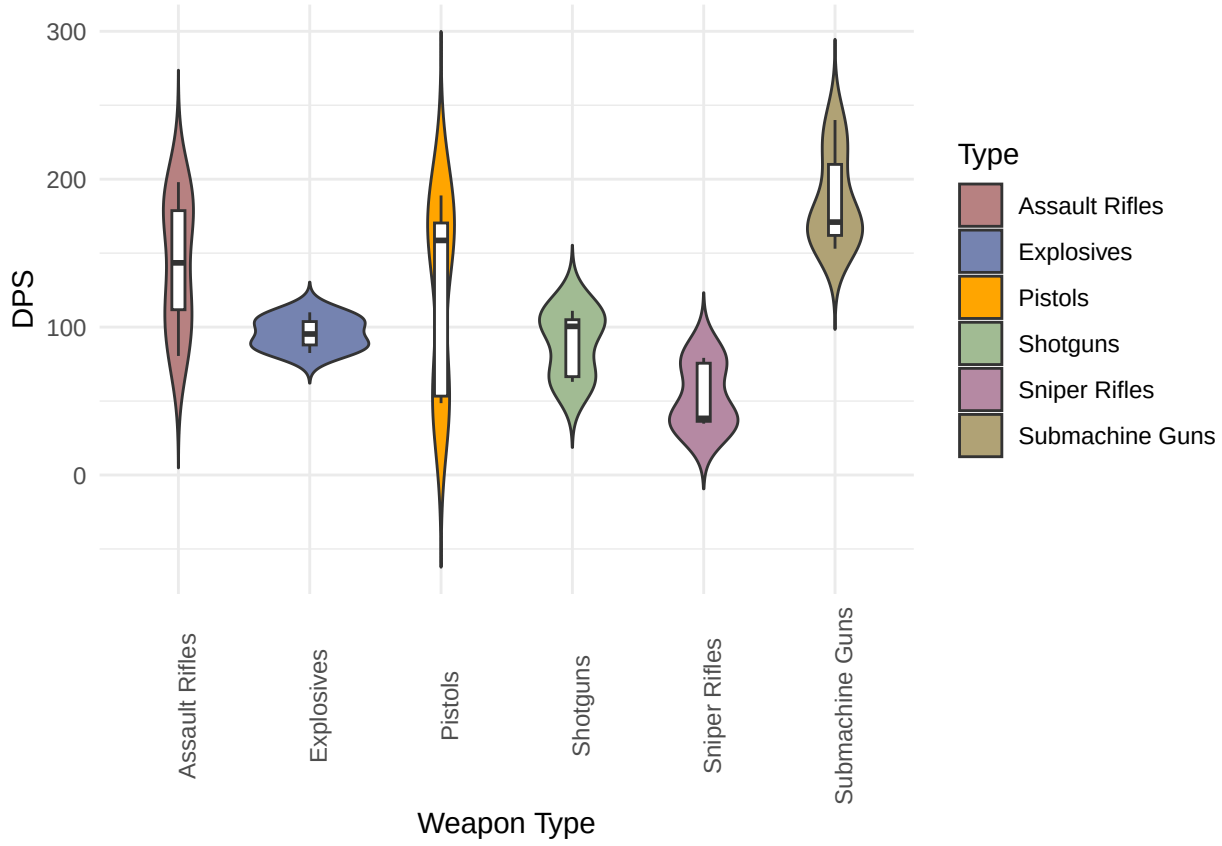
Damages per Weapon Type

Looking at DPS repartition among different weapon types.

```
dps_type_violin <- ggplot(weapons, aes(x = Type, y = DPS))+   geom_violin(aes(fill = Type), trim = FALS

dps_type_violin <- dps_type_violin + scale_fill_manual(values=c('#B78181','#7583b0','#FFA500','#a1bb93'

dps_type_violin
```



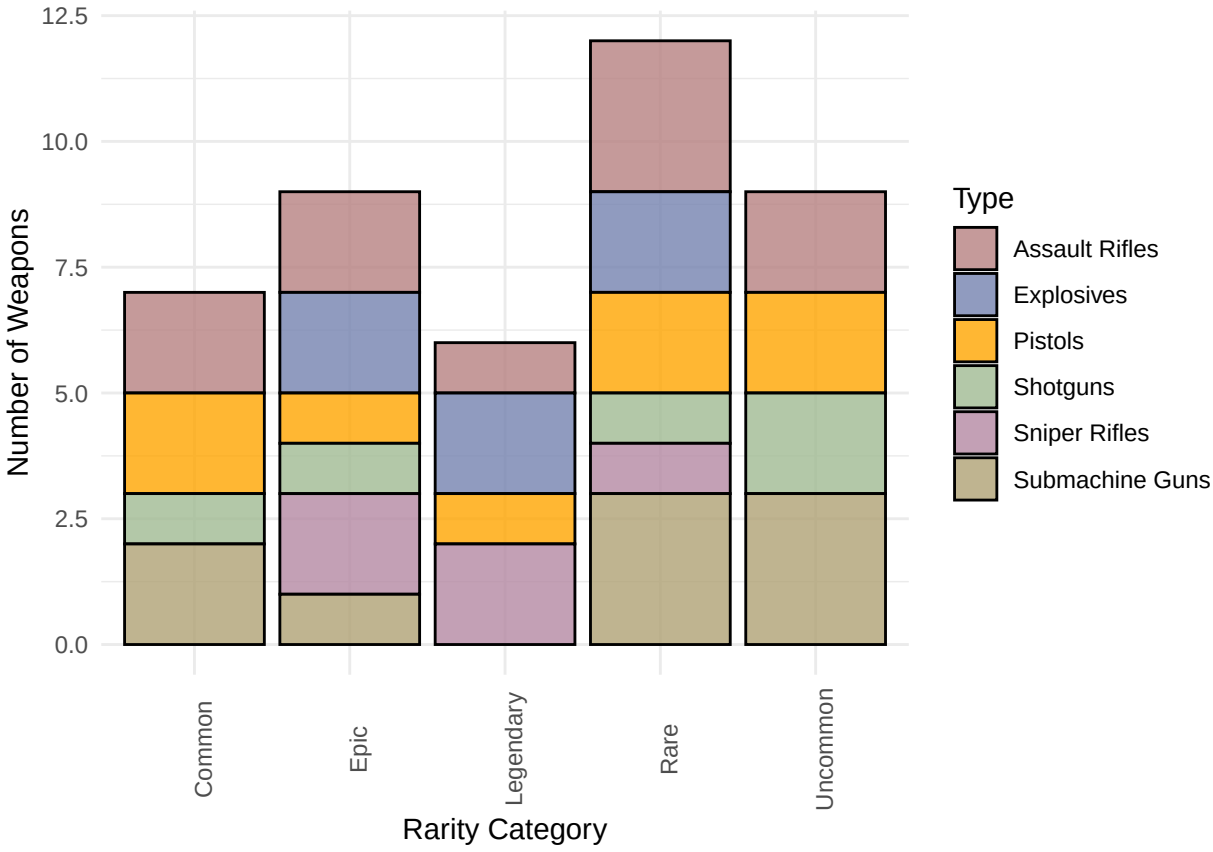
It seems like Pistols is the weapon type with the wider range of DPS. Weapon types with the most different DPS distributions are Sniper Riffles and Submachine Guns.

Barchart per Rarity

```
weapons_rarity_barchart <- ggplot(data = weapons,aes(x=Rarity,fill = Type )) + geom_bar(alpha = 0.8,col

weapons_rarity_barchart <- weapons_rarity_barchart + scale_fill_manual(values=c('#B78181','#7583b0','#F

weapons_rarity_barchart
```

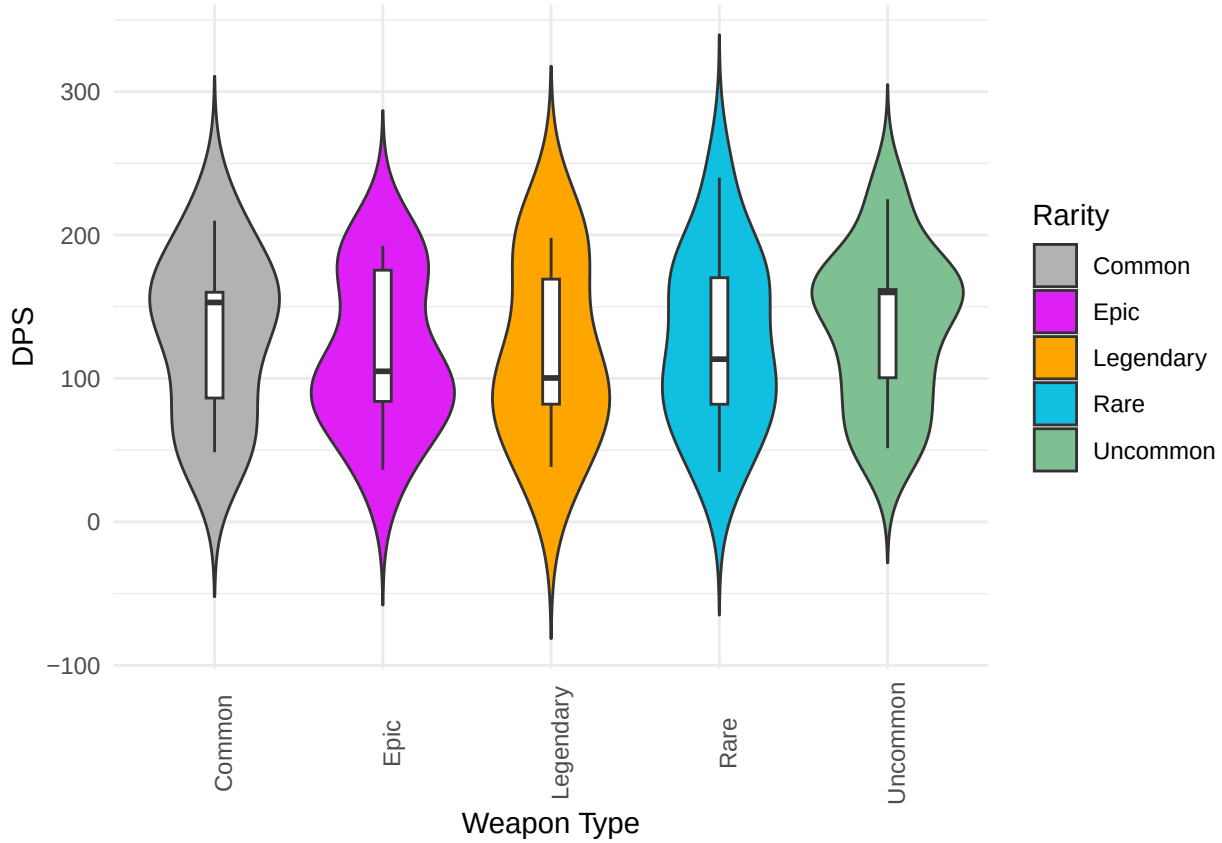


Damages per Rarity

```
dps_rarity_violin <- ggplot(weapons, aes(x = Rarity , y = DPS))+  geom_violin(aes(fill = Rarity), trim =

dps_rarity_violin <- dps_rarity_violin + scale_fill_manual(values=c('#B2B2B2','#DE1FF6','#FFA500','#11B

dps_rarity_violin
```



It seems more difficult to differentiate Rarity Levels of weapons studying the distributions of DPS among weapons.

Characterizing Weapons with PCA

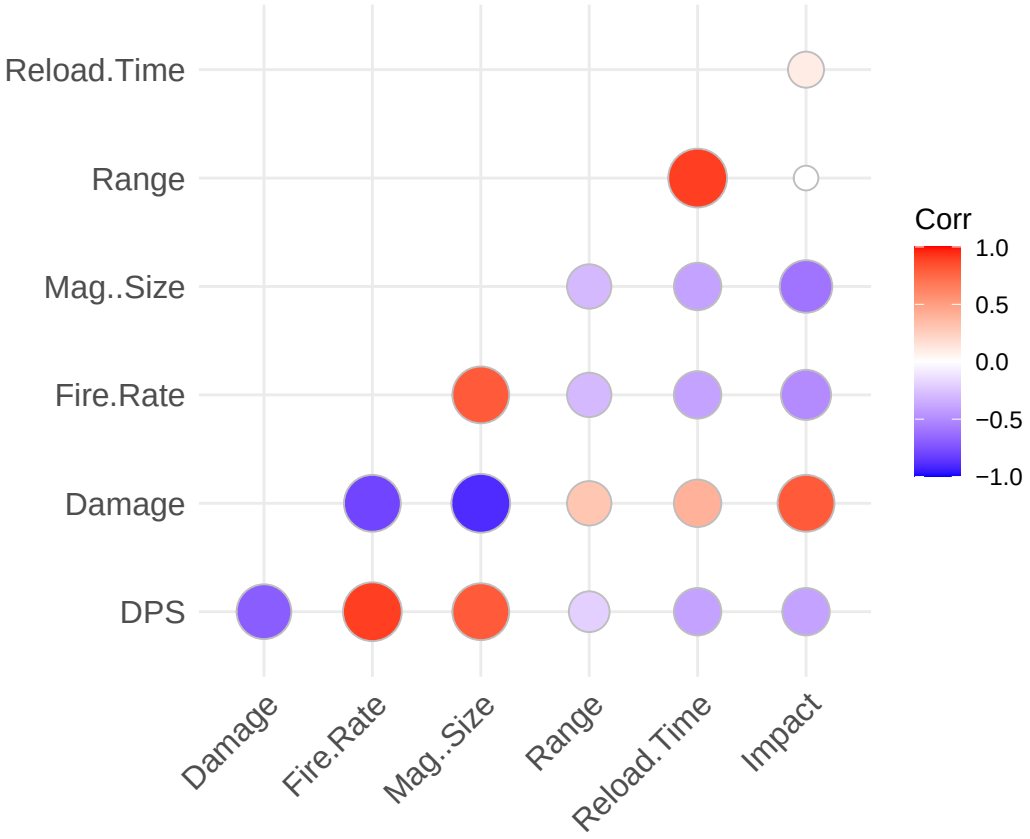
Correlations Matrix

First we'll temporarely keep only numeric variables

```
temp.weapons <- select(weapons, -c(1,10,11))
corr <- round(cor(temp.weapons), 1)
```

```
## Warning in cor(temp.weapons): l'écart type est nul
```

```
ggcorrplot(corr, method = "circle" , type = "lower")
```



PCA

Applying PCA

```
weapons_PCA <- select(weapons,-c(1))

res.PCA <- PCA(X = weapons_PCA,quali.sup = c(9,10),graph = F)

cat("First Dimension explains",res.PCA$eig[1,2],"% of the dataset's Variance","\n","Second Dimension ex
```

```
## First Dimension explains 53.02475 % of the dataset's Variance
##  Second Dimension explains 20.10492 % of the dataset's Variance
##
##  Meaning 73.12967 % is explained in the first two dimensions
```

Studying Dimensions

```
dimdesc(res.PCA,axes = c(1,2))
```

```
## $Dim.1
##
```

```
## Link between the variable and the continuous variables (R-square)
## ================================================================================
##             correlation      p.value
## <NA>                 NA           NA
## Mag..Size     0.9241393 9.832143e-19
## Fire.Rate     0.9046457 8.848579e-17
## DPS           0.8598281 1.533675e-13
## Range        -0.4859266 9.551479e-04
## Reload.Time  -0.5849972 3.790470e-05
## Impact       -0.6379304 4.195025e-06
## Damage       -0.9192151 3.403741e-18
##
## Link between the variable and the categorical variable (1-way anova)
## ============================================
##             R2      p.value
## Type 0.8728318 1.468525e-15
##
## Link between variable abd the categories of the categorical variables
## ============================================================
##                       Estimate      p.value
## Type=Submachine Guns  2.983405 7.725930e-06
## Type=Sniper Rifles   -1.338531 3.576838e-02
## Type=Explosives      -1.901932 1.609272e-03
## Type=Shotguns        -2.274367 9.551479e-04
##
## $Dim.2
##
## Link between the variable and the continuous variables (R-square)
## ================================================================================
##             correlation      p.value
## <NA>                 NA           NA
## Range         0.8373744 2.577490e-12
## Reload.Time   0.7798872 7.109769e-10
## Impact       -0.4304787 3.958286e-03
##
## Link between the variable and the categorical variable (1-way anova)
## ============================================
##             R2      p.value
## Type 0.9317543 1.608501e-20
##
## Link between variable abd the categories of the categorical variables
## ============================================================
##                  Estimate      p.value
## Type=Shotguns    2.867585 2.577490e-12
## Type=Explosives -1.660643 5.027061e-04
```

- Dimension 1

Is positively correlated to Mag..Size, Fire.Rate and DPS. Is negatively correlated to Impact and Damage

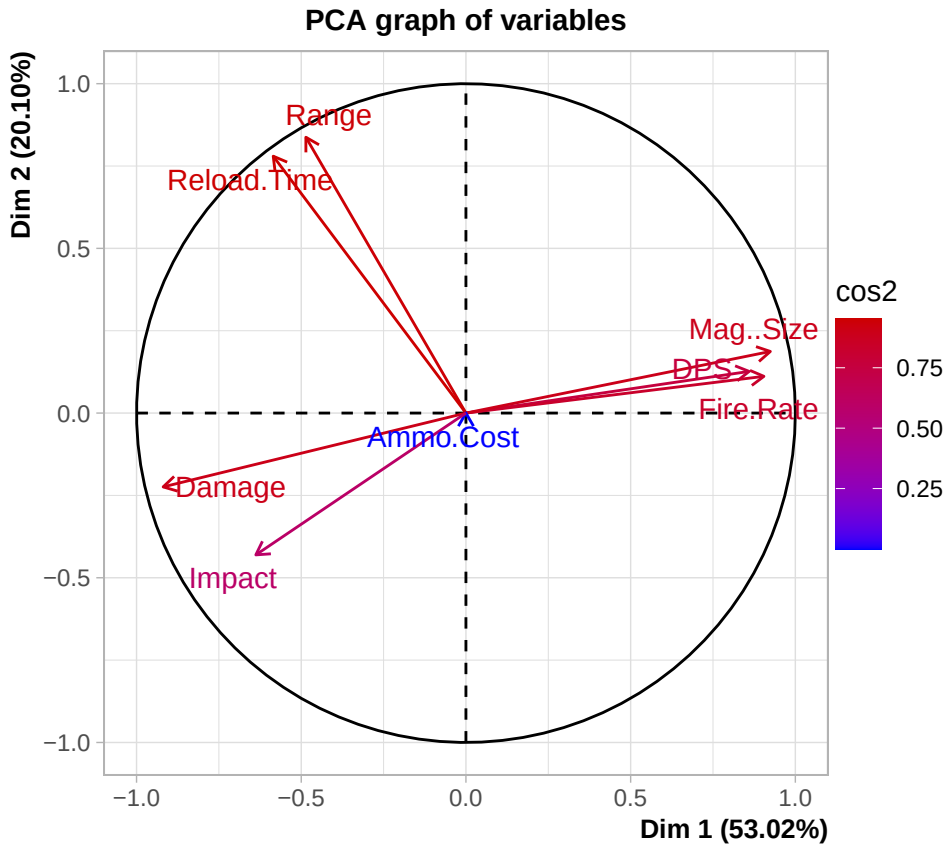
- Dimension 2

Is positively correlated to Reload.Time and Range

Both dimensions describe most part of information we found with the correlation Matrix.

Variables

```
plot.PCA(res.PCA, axes=c(1, 2), choix="var", habillage="cos2")
```



Following the dimensions' description, the graph of variables offers a better representation of variables' correlations with dimensions.

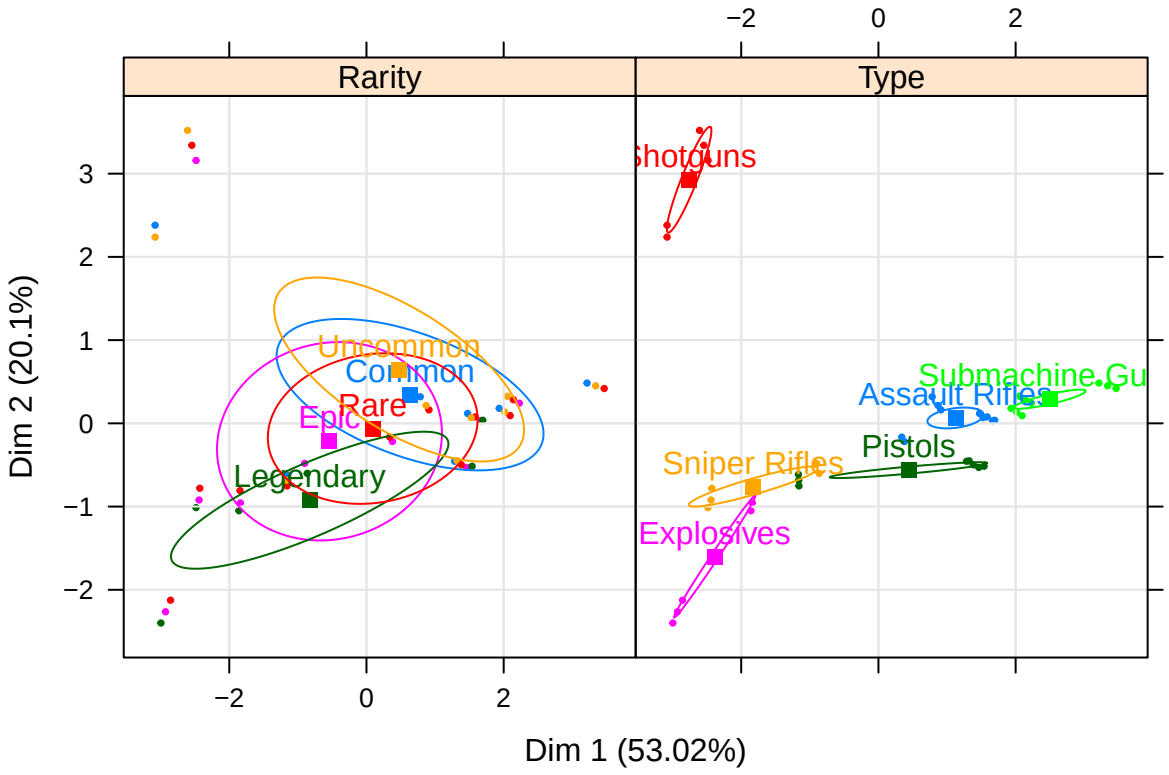
Moreover,by observing the $\cos^2$ of each variables, we notice that the Ammo.Cost variable is not properly projected on the factorial plan. Therefore we will not make any conclusion regarding this variable.

Also, it is reassuring that the 1st Dimension presents opposite correlations for Fire.Rate and Damage variables, as this is a well known trade-off in game design for weapons.

Individuals

We're now going to analyze weapons Rarity Levels and Types representations in the factorial plan.

```
plotellipses(res.PCA)
```



- Weapon Rarity Levels

As confidence ellipses of each Rarity level overlaps with each of them, it is not possible to differentiate weapons of each category on the factorial plan.

This is in fact a great thing as it means each Rarity level doesn't differentiate from another in a significant way regarding for example Damages,DPS and Impact which could possibly impact the balance between weapons.

- Weapon Types

The first thing we can notice is that the 2nd Dimension differentiates Shotguns from all other weapon types, while the 1st Dimension presents a more homogeneous distribution of weapon types. Here is some conclusions we can find for all weapon types :

- Shotguns are mostly defined by higher hit Range and Reload Time values than other types, but also by high values of Damage and Impact.
- Shotguns are mostly defined by higher hit Range and Reload Time values than other types.
- Submachine Guns and Assault Rifles are defined by higher DPS,Fire Rate and MagSize, and lower values in Impact and Damage.
- Sniper Riffles and Explosives are defined by higher values in Damages and Imapct, and lower values in DPS, Fire Rate and MagSize.