VISUALIZAÇÃO DE DADOS APLICADA

Prof. Dr. Anderson Ara

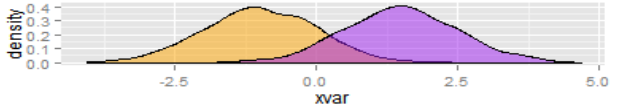
Slide 07

GGPLOT2

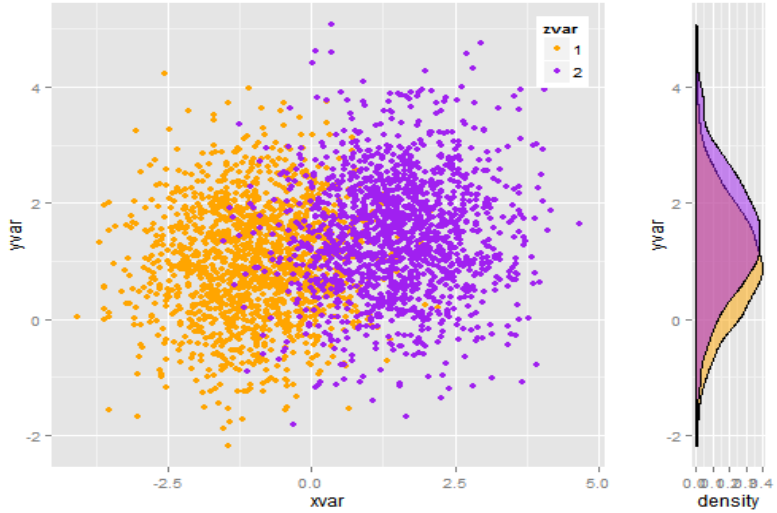
PACOTE GGPLOT2

http://ggplot2.org/

O pacote ggplot2, criado por Hadley Wickham, oferece uma poderosa linguagem gráfica para criar gráficos elegantes e complexos. Sua popularidade na comunidade R explodiu nos últimos anos e é – **hoje** - a principal implementação da gramática de gráficos para o R. Geralmente baseado na Gramática de Gráficos de Leland Wilkinson.



O ggplot2 permite criar gráficos que representam dados numéricos e categóricos univariados e multivariados de forma direta. O agrupamento pode ser representado por cor, símbolo, tamanho e transparência. A criação de parcelas de trellis (isto é, condicionamento) é também é relativamente simples.



GGPLOT2

Fornece uma estrutura unificadora (uma gramática) para descrever e especificar gráficos

Cria gráficos de dados de forma incremental a partir de pequenos pedaços de código.

NA GRAMÁTICA GGPLOT2:

Uma **aesthetic** (estética) é um mapeamento explícito entre uma variável e os elementos visuais que representam seus valores.

Um **glyph** (glifo) é o elemento gráfico básico que representa um caso (outros termos utilizados incluem "**mark**" e " **symbol**").

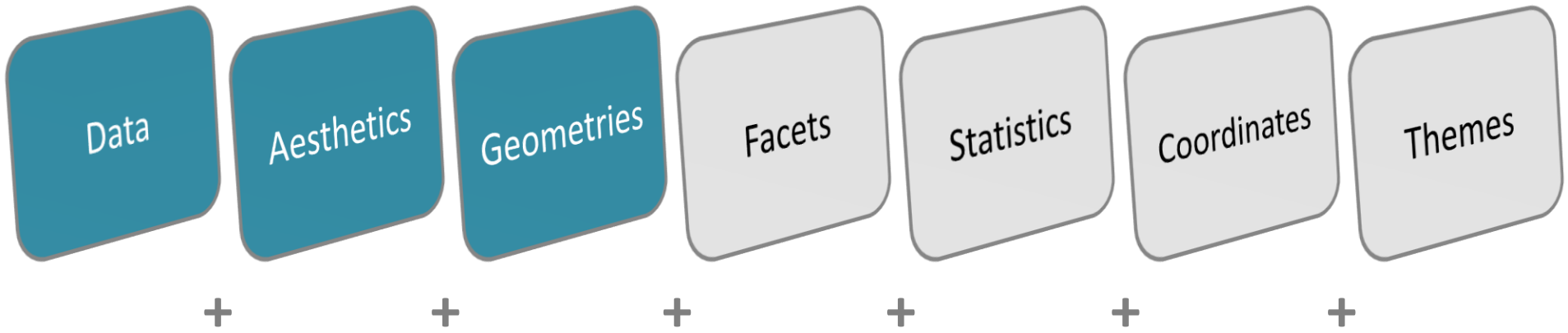
GGPLOT2

Em um gráfico de dispersão, as posições de um glifo na janela gráfica (nos sentidos horizontais e verticais) são as elementos visuais que ajudam o usuário a entender quão grandes são as quantidades correspondentes.

A estética é o mapeamento que descreve essas correspondências. Quando mais de duas variáveis estão presentes, a estética adicional pode gerar sugestões visuais adicionais. Observe também que algumas elementos visuais (como a direção em uma série temporal) estão implícitos e não possuem uma estética correspondente.

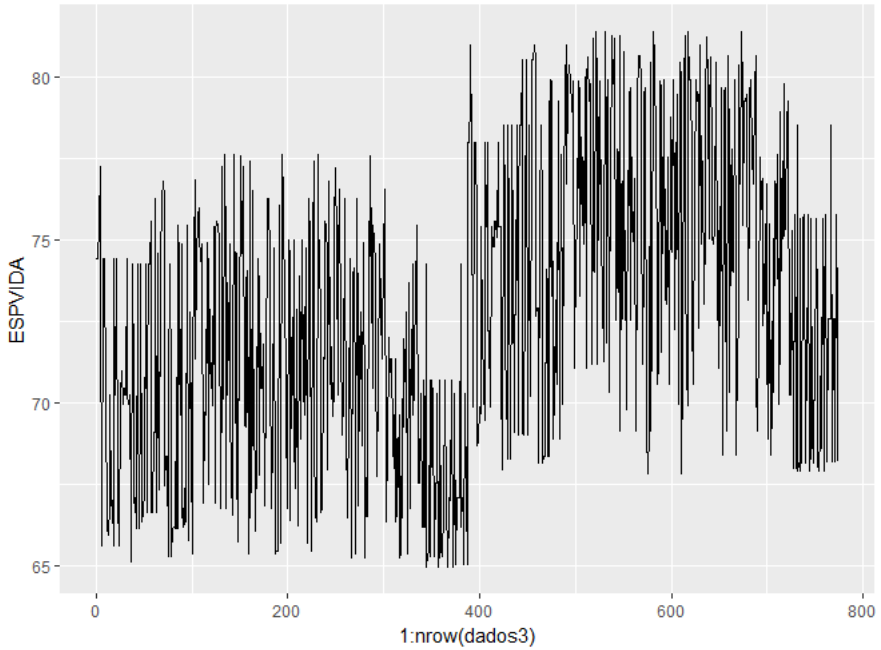
GRAMÁTICA GGPLOT2

INSTRUÇÃO EM CAMADAS:



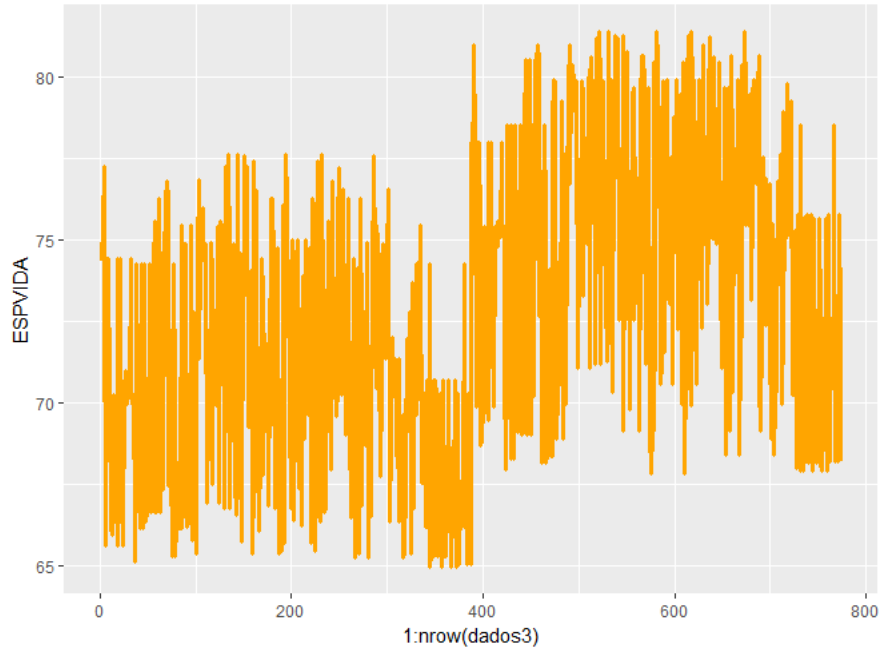
GGPLOT2

```
#PRIMEIROS PASSOS
require(ggplot2)

head(dados3)

ggplot(data = dados3, aes(y = ESPVIDA, x = 1:nrow(dados3))) +
geom_line()
```



GGPLOT2

```
g1 <-ggplot(data = dados3, aes(y = ESPVIDA, x =
1:nrow(dados3))) + geom_line()
g1 <- g1 + geom_line(size=1.1,color="orange")
g1
```

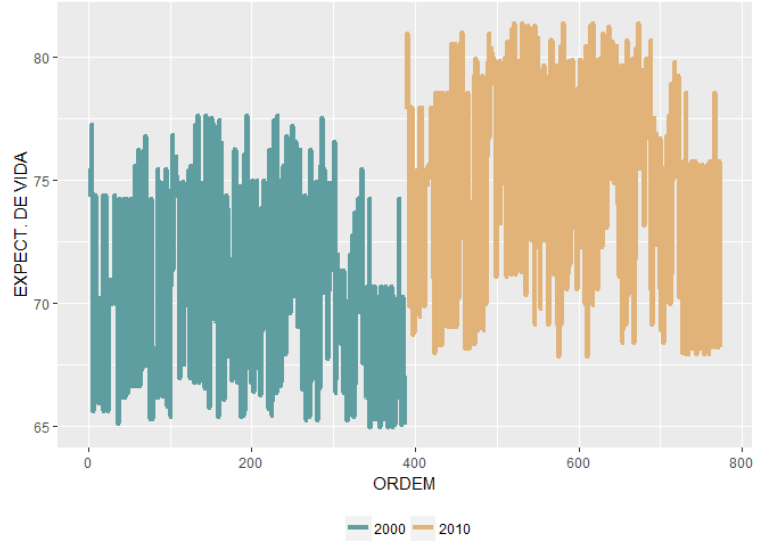


GGPLOT2

```
g2 <-ggplot(data = dados3,
            aes(y = ESPVIDA, x = 1:nrow(dados3),
                colour = factor(ANO)))
g2<-g2 + geom_line(size=1.5)
g2<-g2 + scale_x_continuous(name = "ORDEM")
g2<-g2 + scale_y_continuous(name = "EXPECT. DE VIDA")
g2<-g2 + scale_colour_discrete(name="ANO")
g2
```

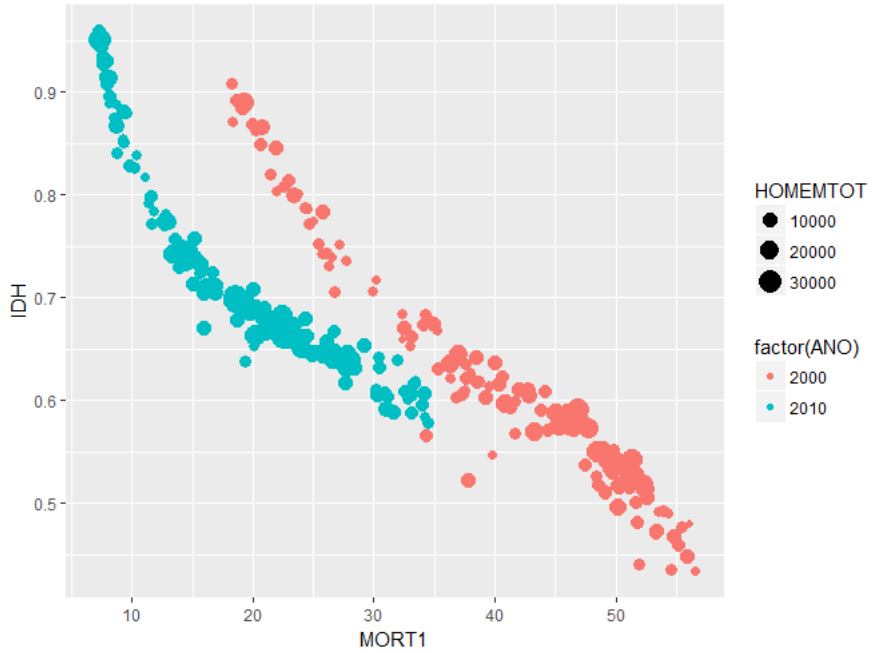
GGPLOT2

```
cores <- c("#5F9EA0", "#E1B378")
g3 <-ggplot(data = dados3,
            aes(y = ESPVIDA, x = 1:nrow(dados3),
                colour = factor(ANO)))
g3 <-g3 + geom_line(size=1.5)
g3 <-g3 + scale_x_continuous(name = "ORDEM")
g3 <-g3 + scale_y_continuous(name = "EXPECT. DE VIDA")
g3 <-g3 +theme(legend.position="bottom",
               legend.direction="horizontal",
               legend.title = element_blank())
g3 <- g3 + scale_colour_manual(values=cores)
g3
```



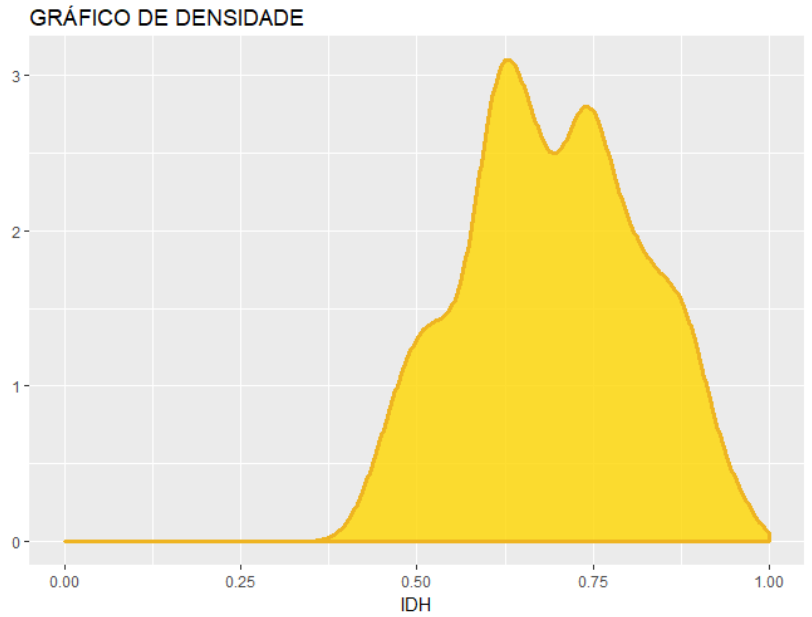
GGPLOT2

```
#SCATTERPLOT
g4 <- ggplot(data = dados3, aes(y = IDH, x = MORT1))
g4 + geom_point(size = 5)
g4 + geom_point(aes(color = factor(ANO)), size = 5)
g4 + geom_point(aes(color = factor(ANO), size =HOMEMTOT))
```



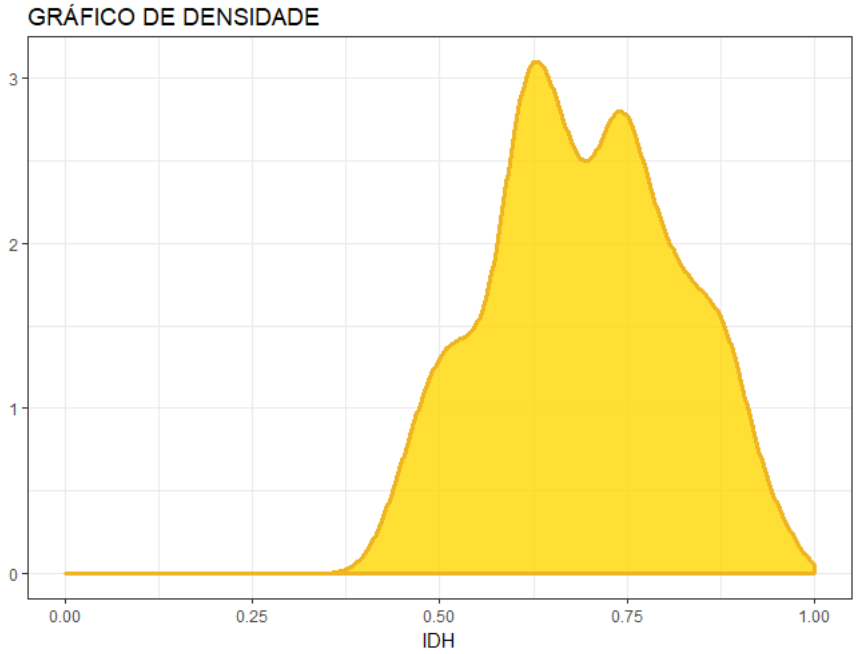
GGPLOT2

```
##DENSIDADE
cor.preen <- "gold1"
cor.linha <- "goldenrod2"

g2<- ggplot(dados3,aes(x = IDH)) + geom_density()
g2<-g2 + scale_x_continuous(name = "IDH", limits=c(0,1))
g2<-g2 + scale_y_continuous(name = "")
g2<-g2 + ggtitle("GRÁFICO DE DENSIDADE")
g2<-g2 + geom_density(fill = cor.preen,
          colour = cor.linha,alpha = 0.8,
          size=1.2)
g2
```

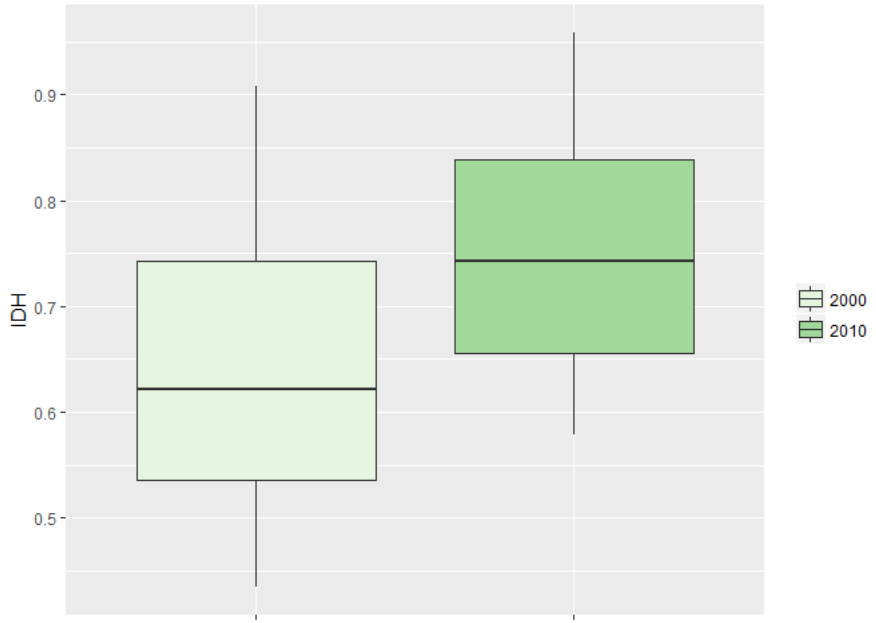


GGPLOT2

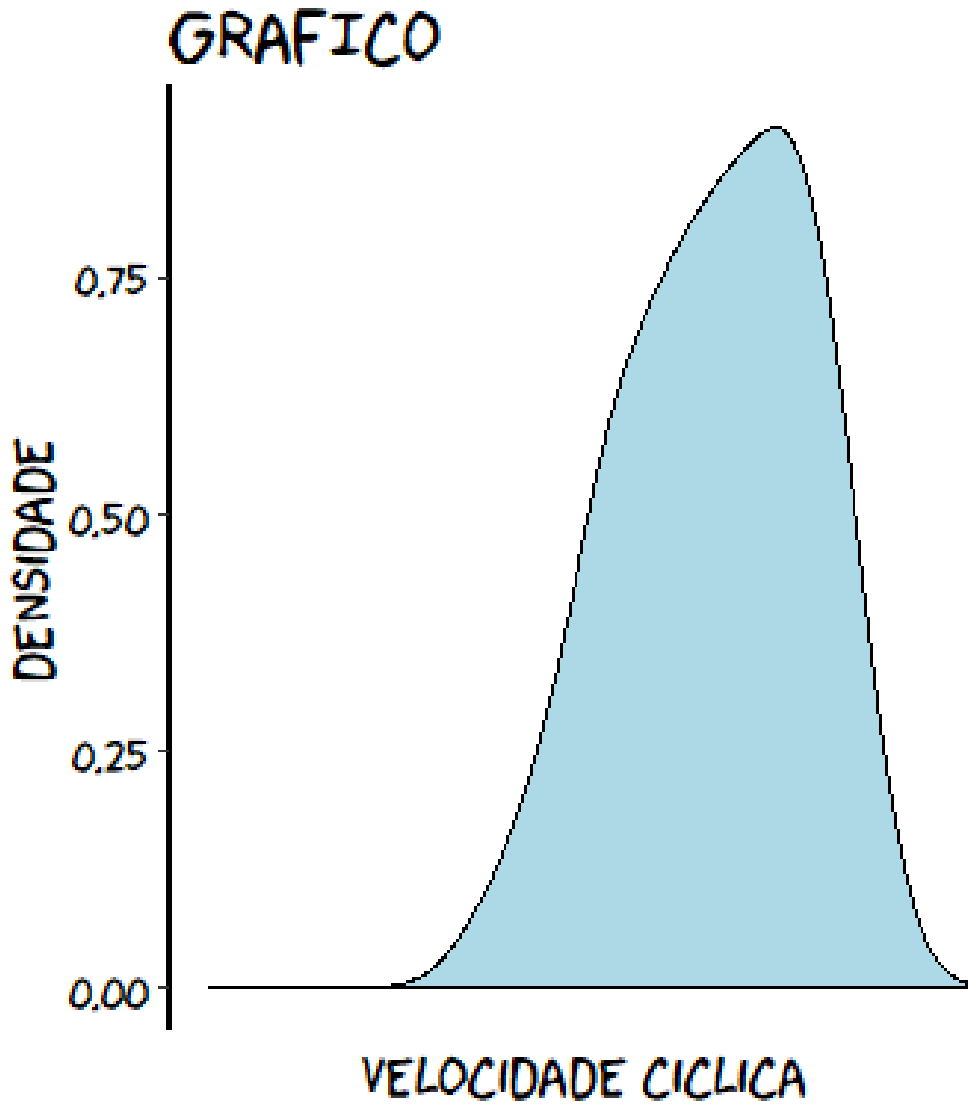
```
#TEMA BÁSICO

g2 <- g2+ theme_bw()
g2
```



```
##BOXPLOT
gg<-
ggplot(dados3,aes(x=factor(ANO),y=IDH,fill=factor(ANO)))+geom
_boxplot()
gg<- gg + scale_x_discrete(name = "")
gg<- gg + theme(axis.text.x = element_blank())
gg<- gg + scale_fill_brewer(palette="Greens")
gg<- gg + theme(legend.title = element_blank())
gg
```



DENSIDADE



```
library(extrafont)

##DOWNLOAD DA FONTE
download.file("http://simonsoftware.se/other/xkcd.
ttf", dest="xkcd.ttf", mode="wb")

system("cmd.exe", input = "mkdir C:\\fonts")
system("cmd.exe", input = "copy xkcd.ttf
C:\\fonts")

font_import(paths = "C:\\fonts",
pattern="[X/x]kcd")
fonts()
loadfonts()
```

```
##CRIANDO NOVO GRÁFICO COM A FONTE
gg2 <- ggplot(dados3, aes(x = ESPVIDA)) +
  geom_density(colour = "black", fill = "lightblue",size=1) +
  scale_x_continuous(name = "EXPECTATIVA DE VIDA",
                     limits=c(50, 90)) +
  scale_y_continuous(name = "Densidade") +
  ggtitle("GRAFICO") +
  theme(axis.line = element_line(size=1, colour = "black"),
        panel.grid.major = element_blank(),
        panel.grid.minor = element_blank(),
        panel.border = element_blank(),
        panel.background = element_blank(),
        plot.title=element_text(size = 20, family="xkcd", hjust
= 0.5),
        text=element_text(size = 16, family="xkcd"),
        axis.text.x=element_text(colour="black", size = 12),
        axis.text.y=element_text(colour="black", size = 12))
gg2
```

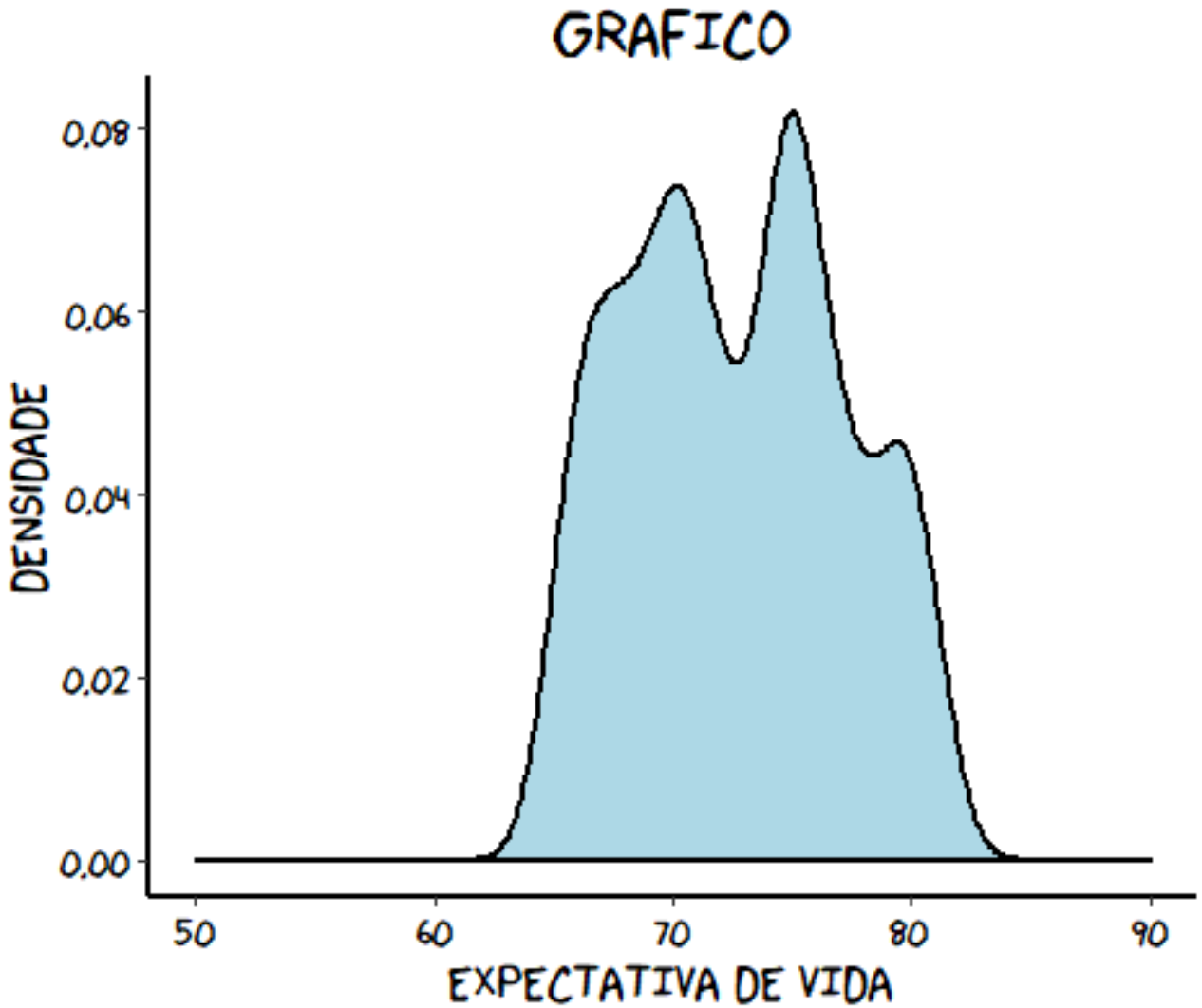
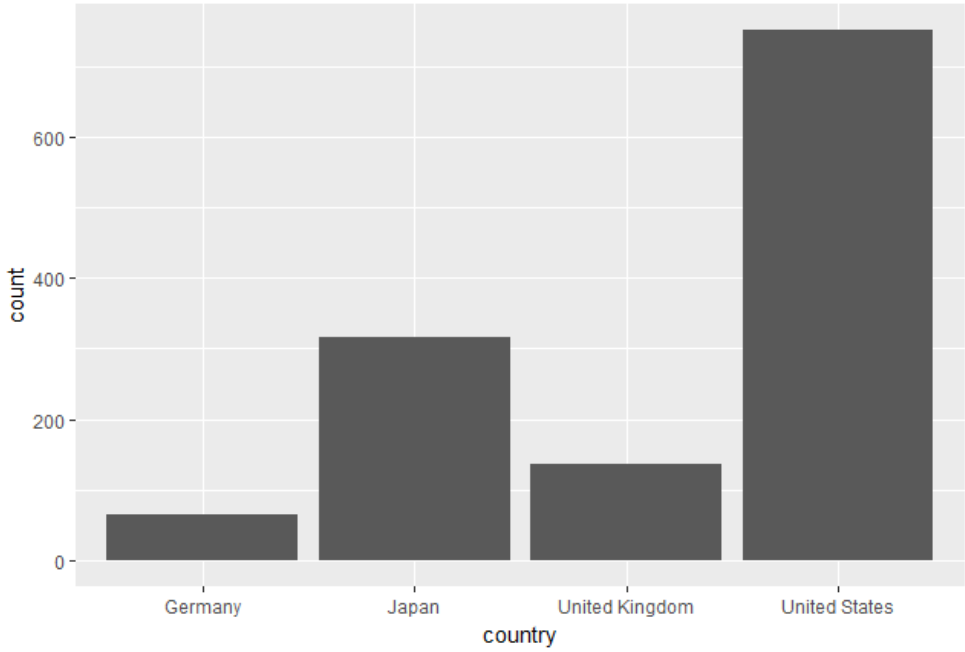


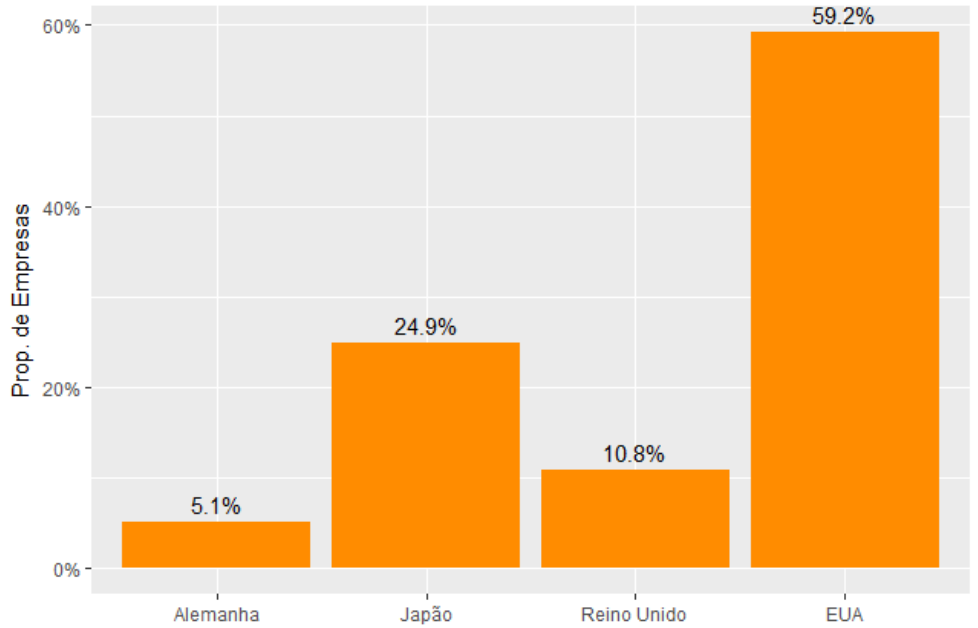
GRAFICO
0.08
0.06
0.04
0.02
0.00
DENSIDADE
50
60
70
80
90
EXPECTATIVA DE VIDA

```
#PREPARANDO OS DADOS

require(ggplot2)
require(HSAUR)

data(Forbes2000)

sel=Forbes2000[,"country"]=="Germany" |
  Forbes2000[,"country"]=="United Kingdom" |
  Forbes2000[,"country"]=="United States" |
  Forbes2000[,"country"]=="Japan"

pontos=c(min(Forbes2000$marketvalue)-
0.01,median(Forbes2000$marketvalue),max(Forbes2000$marketvalue))
Forbes2000$mk=cut(Forbes2000$marketvalue,pontos)


dados=Forbes2000[sel,]
```

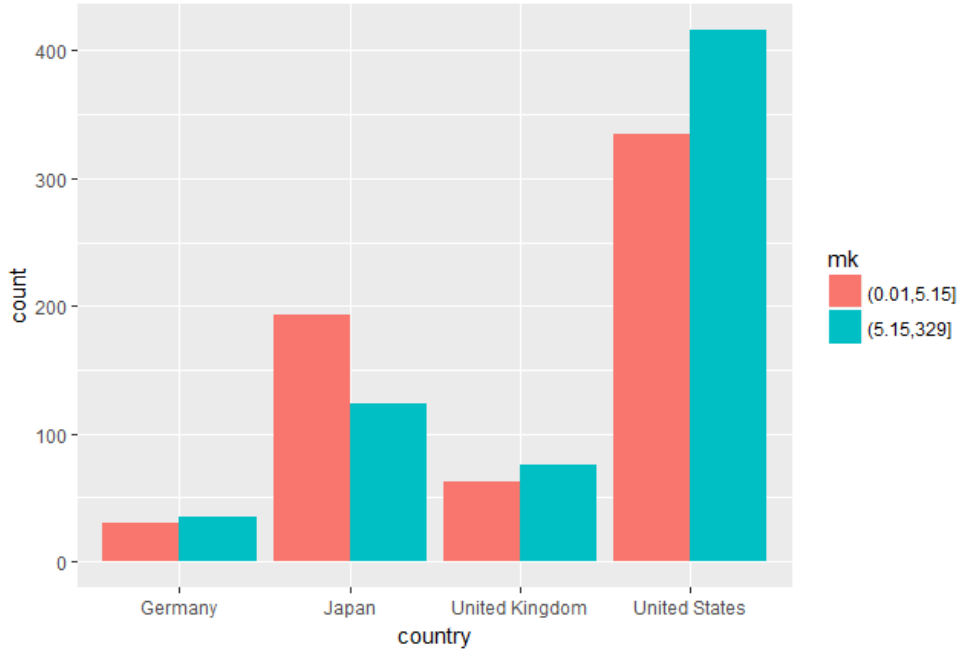
GRÁFICO DE BARRAS



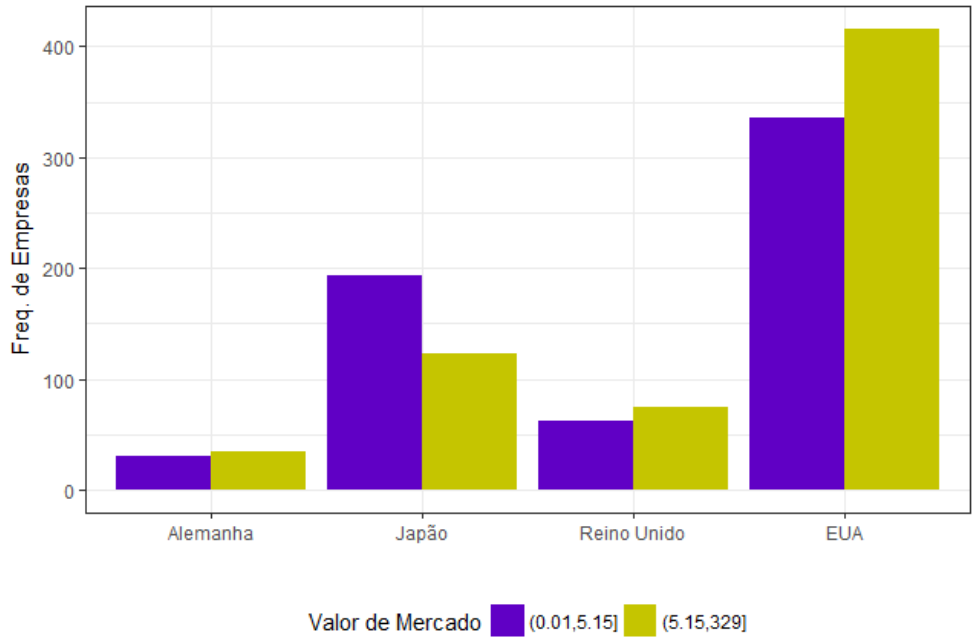

```
#GRÁFICO DE BARRAS
ggplot(dados)+
  aes(x=country)+
  geom_bar()
```




```
#GRÁFICO FINAL
ggplot(dados)+
  aes(x=country,y=(..count..)/sum(..count..))+
  geom_bar(fill="darkorange")+
  geom_text(aes(label = scales::percent((..count..)/sum(..count..)),
                y= (..count..)/sum(..count..)), stat= "count", vjust = -.5) +
  scale_y_continuous(labels =  scales::percent)+
  xlab(" ") +
  ylab("Prop. de Empresas")+
  scale_x_discrete(labels=c("Alemanha","Japão","Reino Unido","EUA"))
```

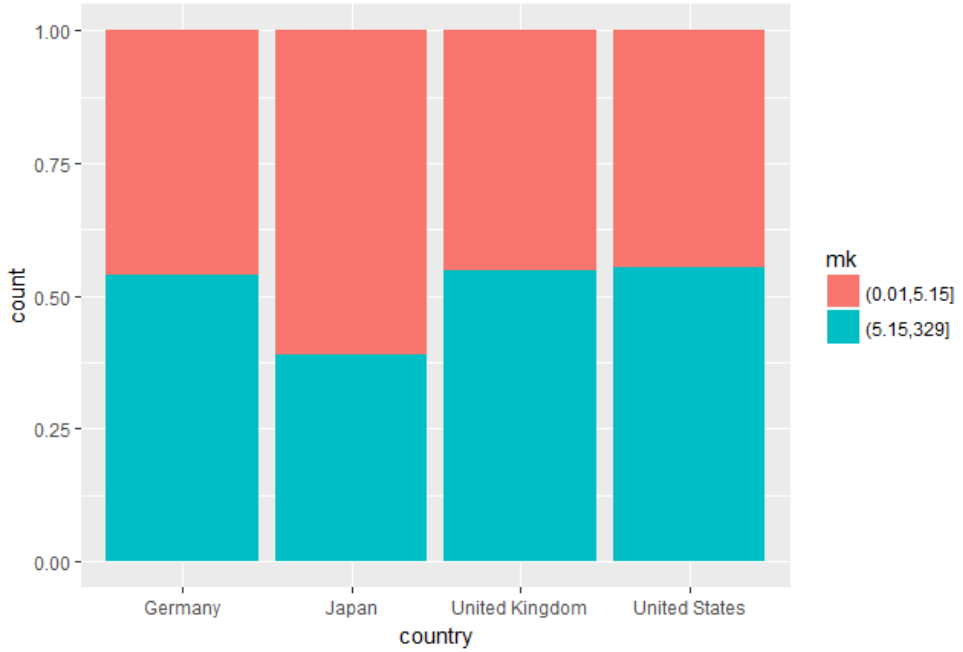


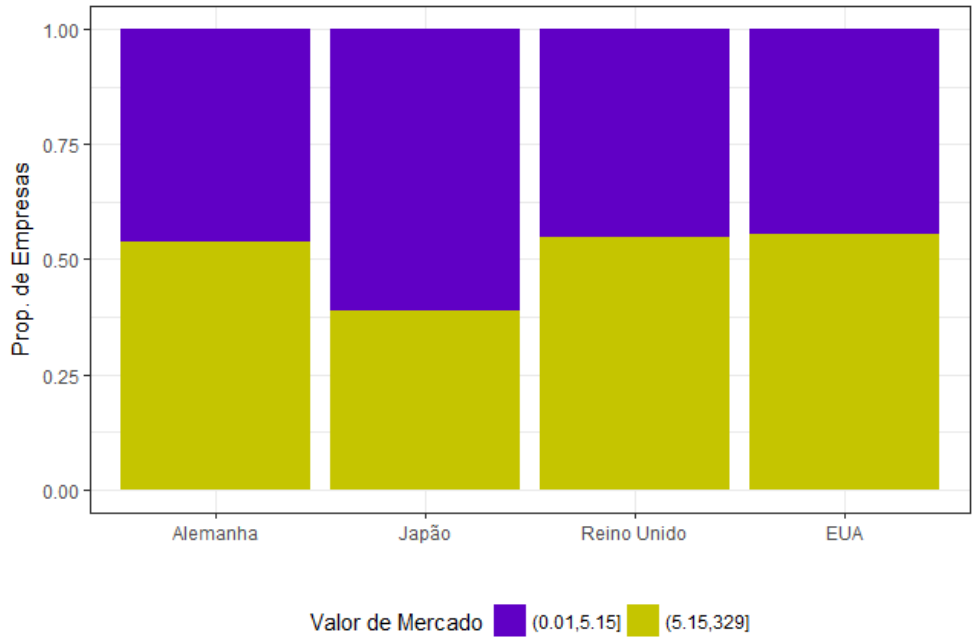

```
#GRÁFICO DE BARRAS CONJUNTAS
ggplot(dados)+
  aes(x=country,fill=mk) +
   geom_bar(position="dodge")
```




```
#GRÁFICO EDITADO
cores <- c("#6000C5", "#C5C500")
ggplot(dados)+
  aes(x=country,fill=mk) +
   geom_bar(position="dodge") +
   xlab(" ") +
   ylab("Freq. de Empresas")+
   scale_x_discrete(labels=c("Alemanha","Japão","Reino Unido","EUA")) +
   scale_fill_manual("Valor de Mercado", values = cores)+
   theme_bw()+
   theme(legend.position="bottom", legend.direction="horizontal")
```

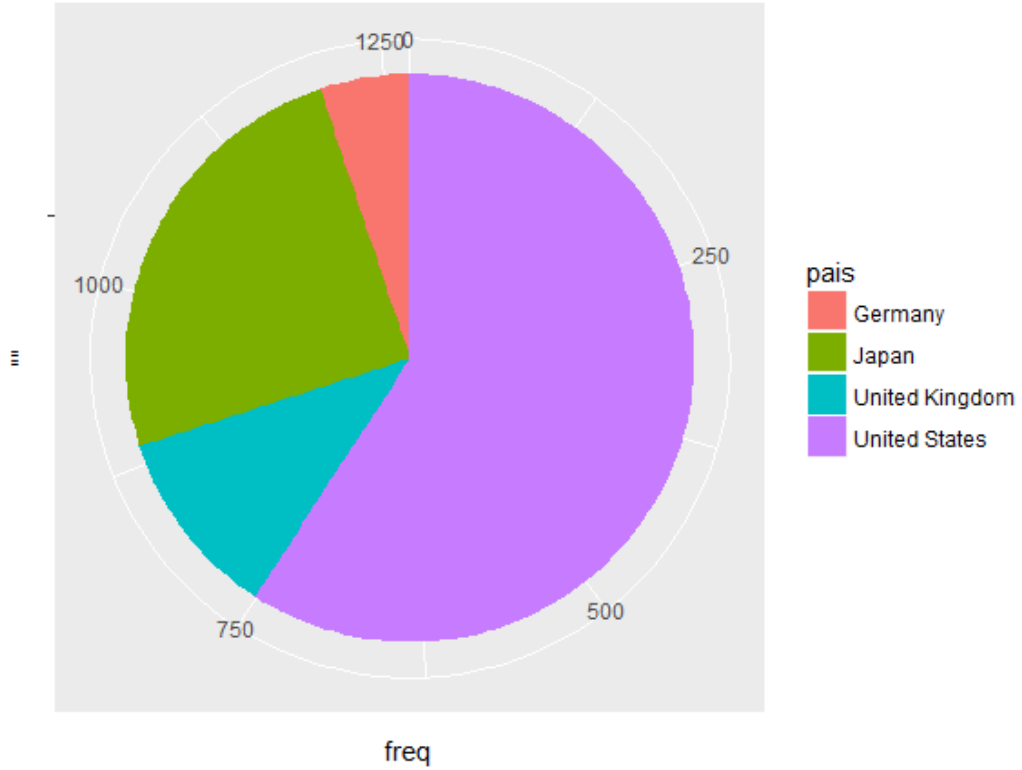
```
#GRÁFICO DE BARRAS ACUMULADAS
cores <- c("#6000C5", "#C5C500")
ggplot(dados)+
  aes(x=country,fill=mk) +
   geom_bar(position="fill")
```



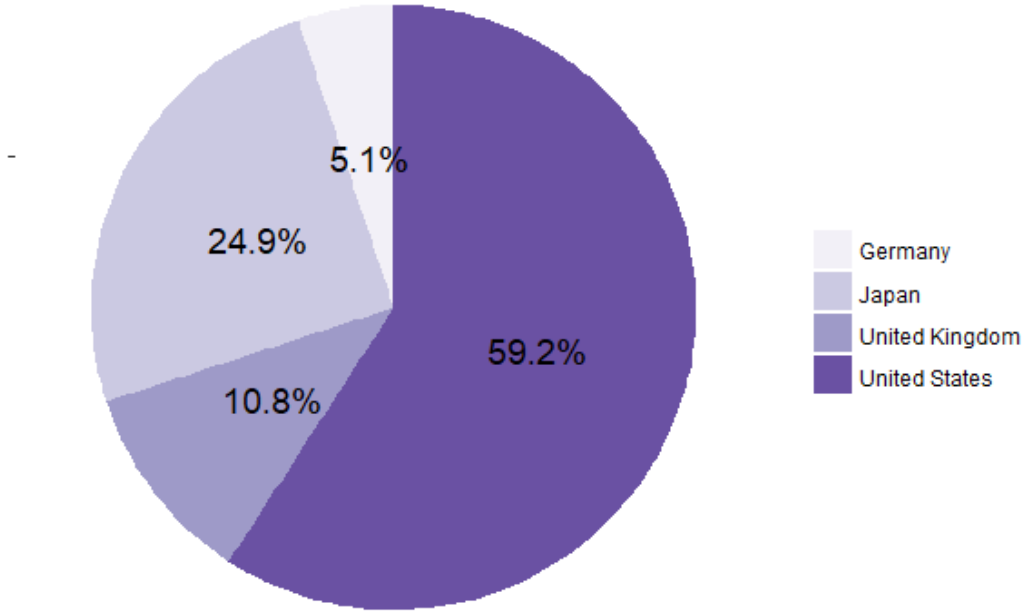



```
#GRÁFICO EDITADO
cores <- c("#6000C5", "#C5C500")
ggplot(dados)+
  aes(x=country,fill=mk) +
   geom_bar(position="fill") +
   xlab(" ") +
   ylab("Prop. de Empresas")+
   scale_x_discrete(labels=c("Alemanha","Japão","Reino Unido","EUA")) +
   scale_fill_manual("Valor de Mercado", values = cores)+
   theme_bw()+
   theme(legend.position="bottom", legend.direction="horizontal")
```

GRÁFICO DE SETORES

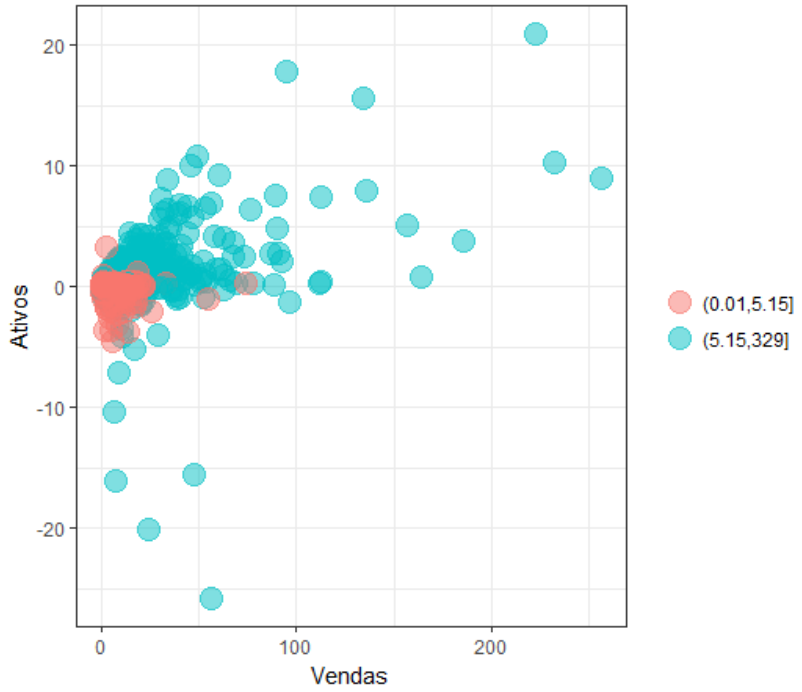



```
#PREPARANDO O CONJUNTO DE DADOS
dados.porc=data.frame(table(dados$country),
      as.numeric(table(dados$country)/sum(table(dados$country))))
names(dados.porc)=c("pais","freq","porc")

head(dados.porc)

#GRÁFICO BÁSICO
ggplot(dados.porc[dados.porc$freq>0,]) +
  aes(x="", y = freq,fill=pais)+
  geom_bar(stat="identity", width=1)+
  coord_polar(theta="y")
```

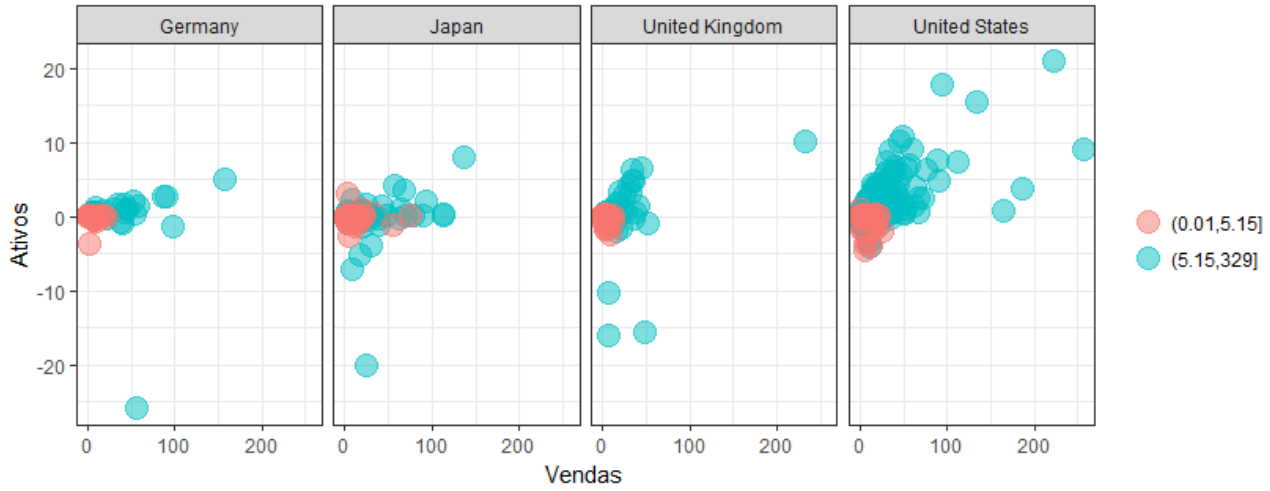



```
#GRÁFICO EDITADO
ggplot(dados.porc[dados.porc$freq>0,]) +
  aes(x="", y = freq,fill=pais)+
  geom_bar(stat="identity", width=1)+
  coord_polar(theta="y")+
  geom_text(aes(label = paste0(round(porc*100,1), "%")),
            position = position_stack(vjust = 0.5),size=5)+
  scale_fill_brewer(palette="Purples")+
  labs(x = NULL, y = NULL, fill = NULL)+
  theme_classic()+
  theme(axis.text = element_blank(),axis.line = element_blank())
```

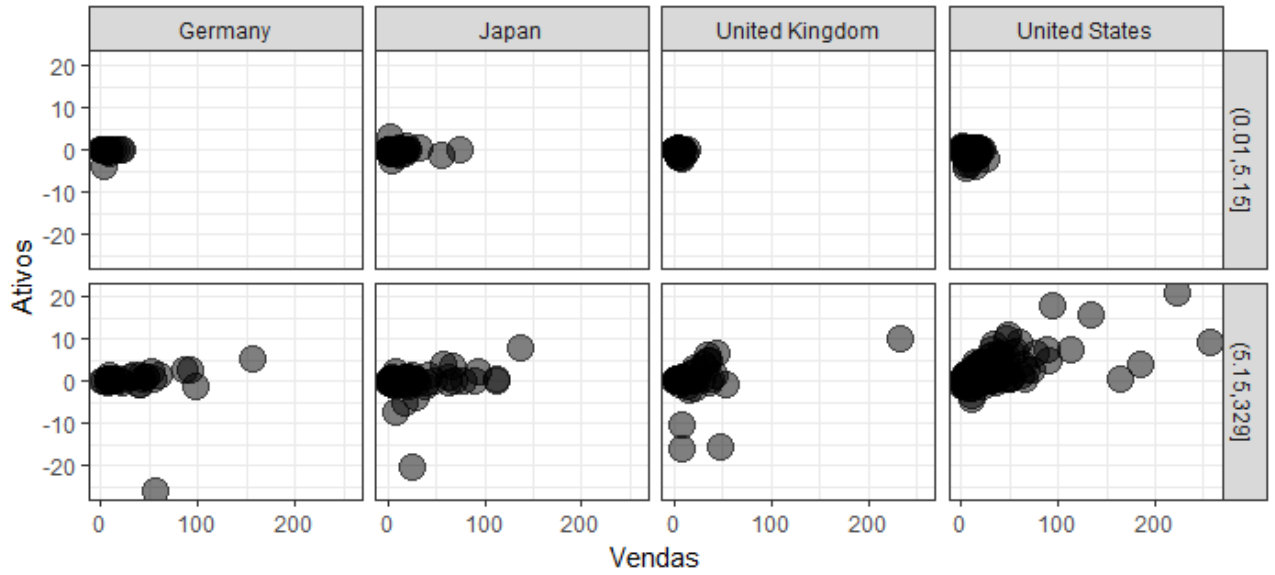
TRELIÇAS



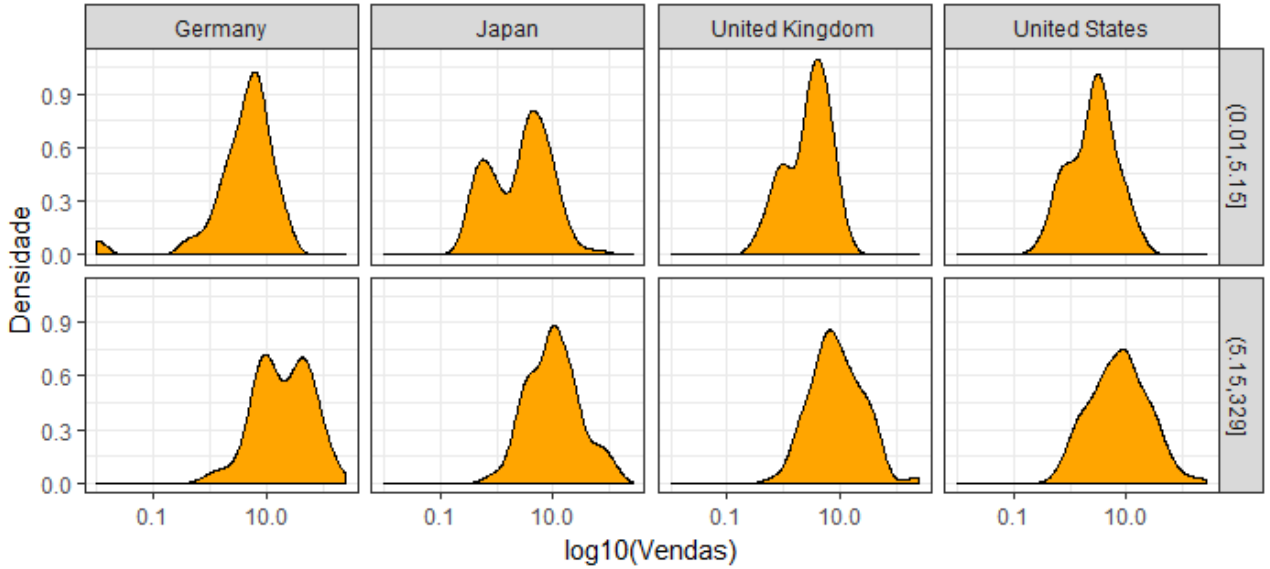

```
#SCATTERPLOT SIMPLES
ggplot(data = dados)+
  aes(x = sales, y = profits,colour=mk) +
  xlab("Vendas")+
  ylab("Ativos")+
  geom_point(size = 5,alpha=0.5)+
  theme_bw()+
  theme(legend.title = element_blank())
```




```
#TRELIÇA SIMPLES PARA SCATTERPLOT
ggplot(data = dados)+
  aes(x = sales, y = profits,colour=mk) +
  xlab("Vendas")+
  ylab("Ativos")+
  geom_point(size = 5,alpha=0.5)+
  facet_grid(facets=. ~ country)+
  theme_bw()+
  theme(legend.title = element_blank())
```



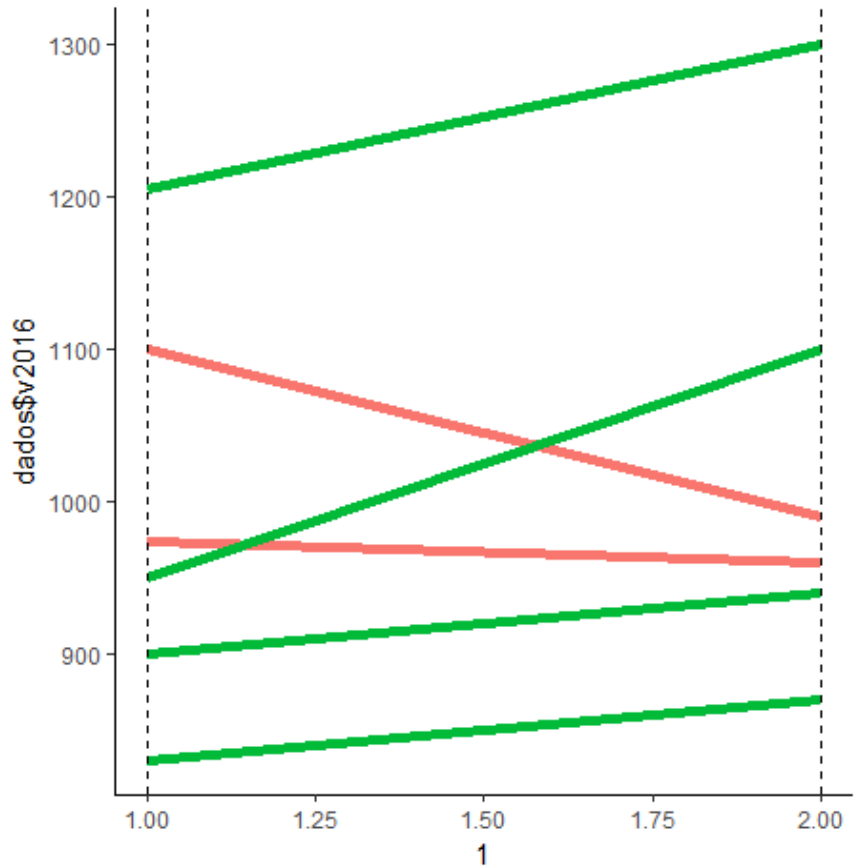

```
#TRELIÇA DUPLA PARA SCATTERPLOT
ggplot(data = dados)+
  aes(x = sales, y = profits) +
  xlab("Vendas")+
  ylab("Ativos")+
  geom_point(size = 5,alpha=0.5)+
  facet_grid(facets=mk~ country)+
  theme_bw()
```



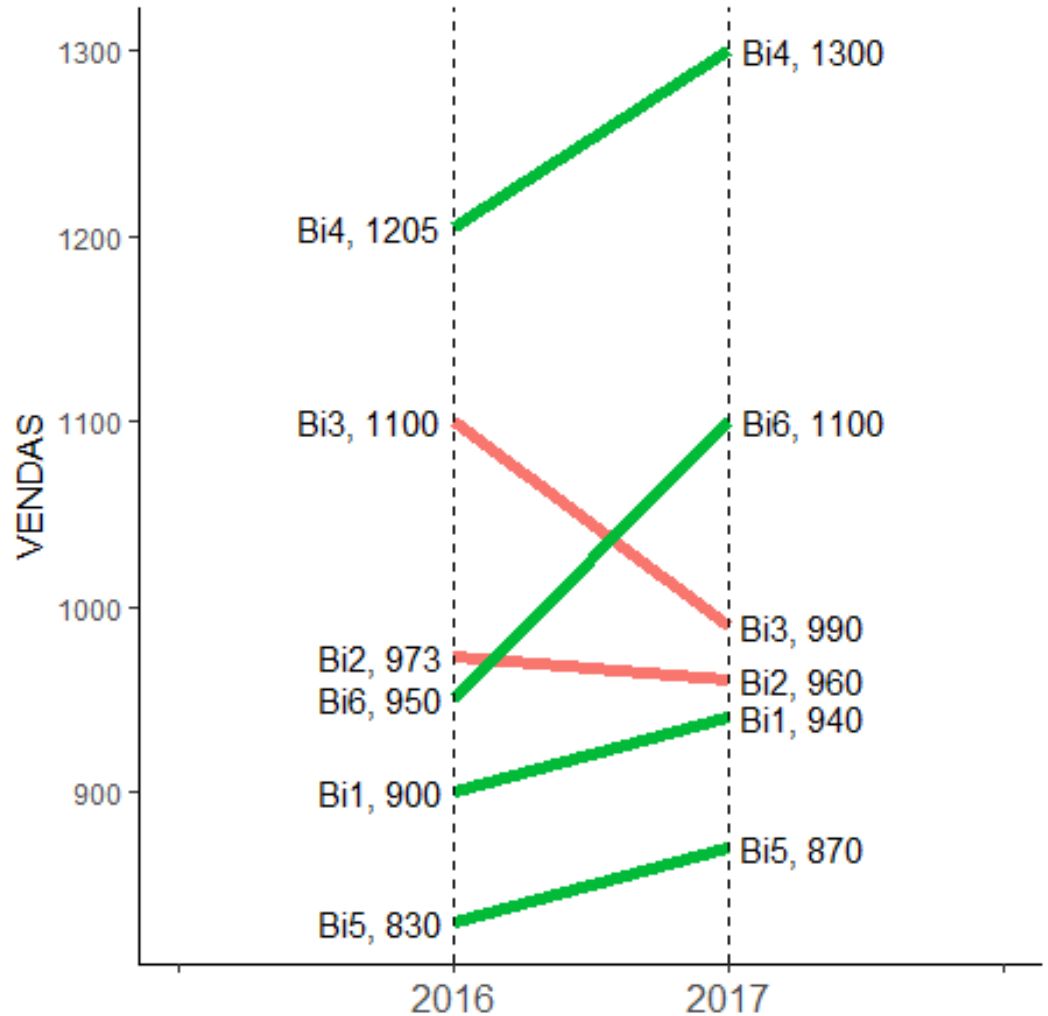

```
#TRELIÇA DUPLA PARA DENSIDADE
ggplot(data = dados)+
  aes(x = sales) +
  geom_density(fill="orange")+
  xlab("log10(Vendas)")+
  ylab("Densidade")+
  scale_x_log10()+
  facet_grid(facets=mk~ country)+
  theme_bw()
```

SLOPE CHART

```
#CONJUNTO DE DADOS
v2016=c(900,973,1100,1205,830,950)
v2017=c(940,960,990,1300,870,1100)
m <- c('Bi1','Bi2','Bi3','Bi4','Bi5','Bi6')
dados=data.frame(m,v2016,v2017)
dados$cores <- ifelse((dados$v2017 - dados$v2016) < 0, "red", "green")

theme_set(theme_classic())

#GRÁFICO INICIAL
p<-ggplot(dados) +
  geom_segment(aes(x=1, xend=2, y=dados$v2016, yend=v2017, col=cores),
size=2, show.legend=F) +
  geom_vline(xintercept=1, linetype="dashed", size=0.5) +
  geom_vline(xintercept=2, linetype="dashed", size=0.5) +
  scale_color_manual(values = c("#00ba38", "#f8766d"))


p
```


1300
1200
1100
1000
900
dados$v2016
1.00
1.25
1.50
1.75
2.00
1

```r
# Adicionando Texto
texto_2016 <- paste(dados$m, round(dados$v2016,2),sep=", ")
texto_2017 <- paste(dados$m, round(dados$v2017,2),sep=", ")

p <- p + geom_text(label=texto_2016, y=dados$v2016,
                   x=rep(1, nrow(dados)), hjust=1.1, size=4)+
         geom_text(label=texto_2017, y=dados$v2017,
                   x=rep(2, nrow(dados)), hjust=-0.1, size=4)+
         scale_x_continuous(limits=c(0,3),breaks = seq(0, 3, 1),
                   labels = c("",2016,2017,""))+
  ylab("VENDAS") +
  xlab("") +
  theme(axis.text.x=element_text(size=12))

p
```


1300
1200
1100
1000
900
VENDAS
Bi4, 1300
Bi4, 1205
Bi3, 1100
Bi6, 1100
Bi3, 990
Bi2, 973
Bi2, 960
Bi6, 950
Bi1, 940
Bi1, 900
Bi5, 870
Bi5, 830
2016
2017

DOTPLOT

```
data(Forbes2000)

#PREPARANDO OS DADOS
valor.medio=aggregate(Forbes2000$marketvalue,
by=list(Forbes2000$country), FUN=mean)
colnames(valor.medio)=c("pais", "valor")
valor.medio=valor.medio[order(valor.medio$valor), ]
valor.medio$pais=factor(valor.medio$pais, levels = valor.medio$pais)

#GRÁFICO
ggplot(valor.medio, aes(x=pais, y=valor)) +
  geom_point(col="tomato2", size=3) +
  geom_segment(aes(x=pais, xend=pais, y=min(valor),
     yend=max(valor)),linetype="dashed", size=0.1) +
  scale_y_log10() +
  labs(title="Dot Plot",
       subtitle="País Vs Valor de Mercado Médio",
       caption="source: UFBA") +
  coord_flip()
```

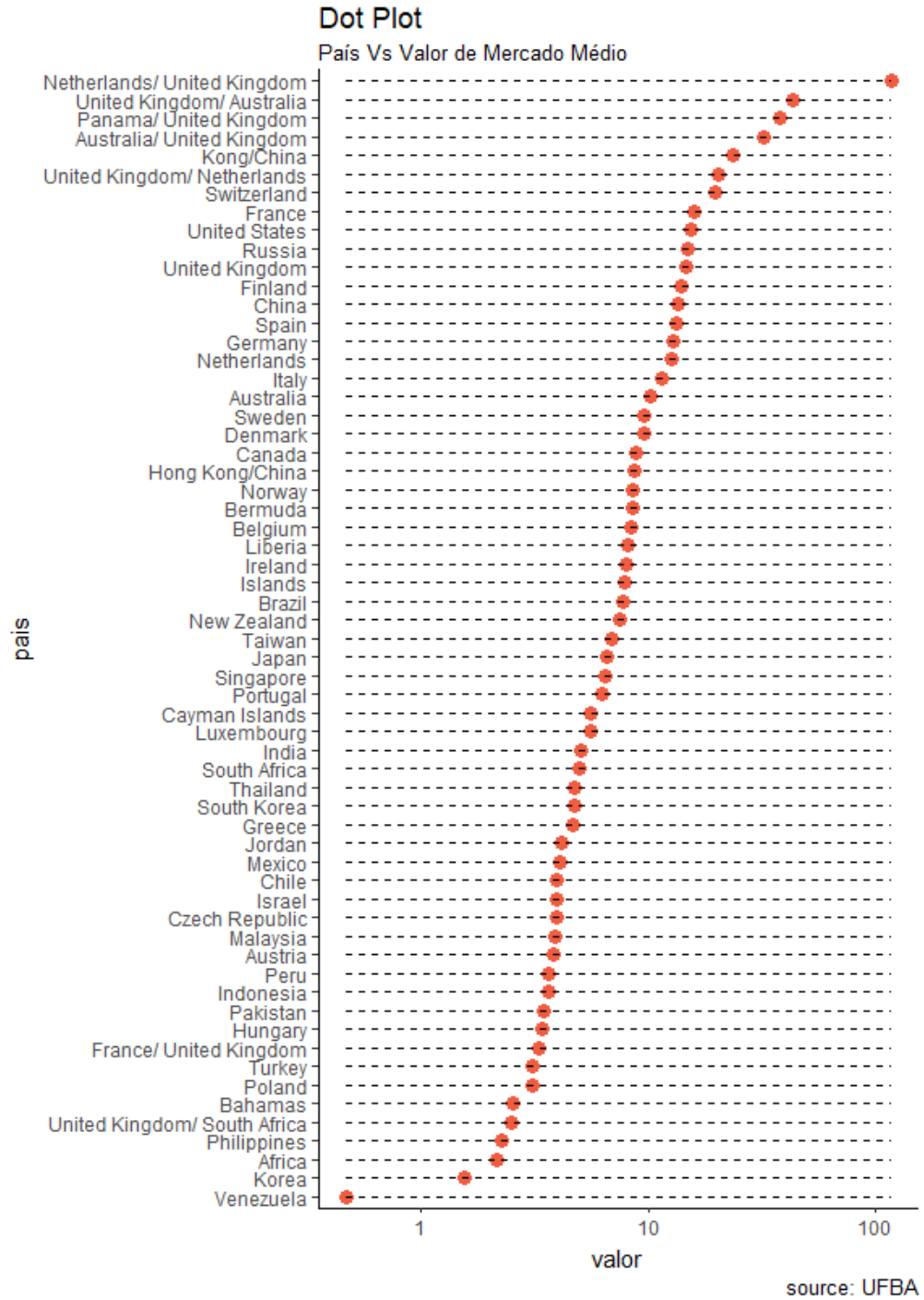
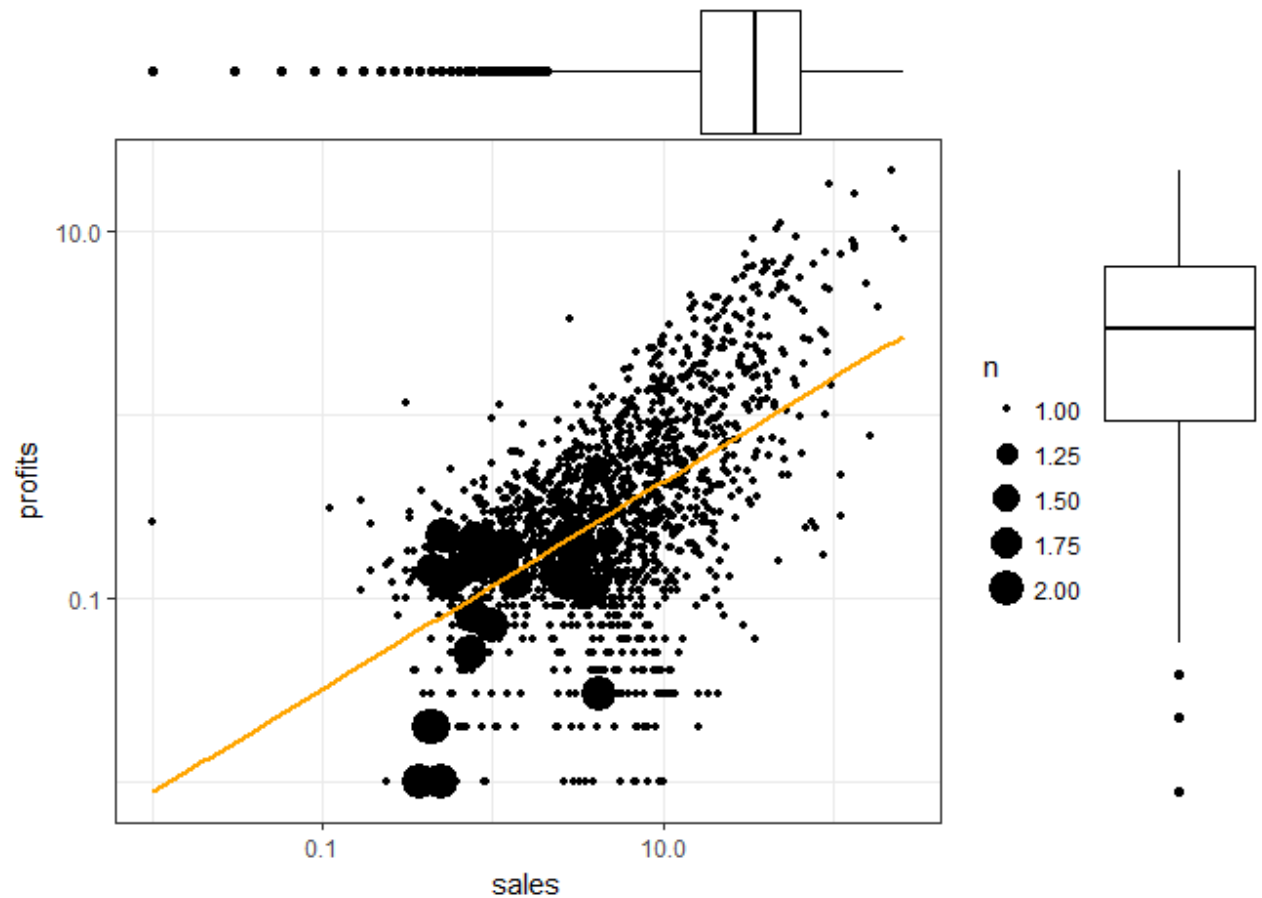
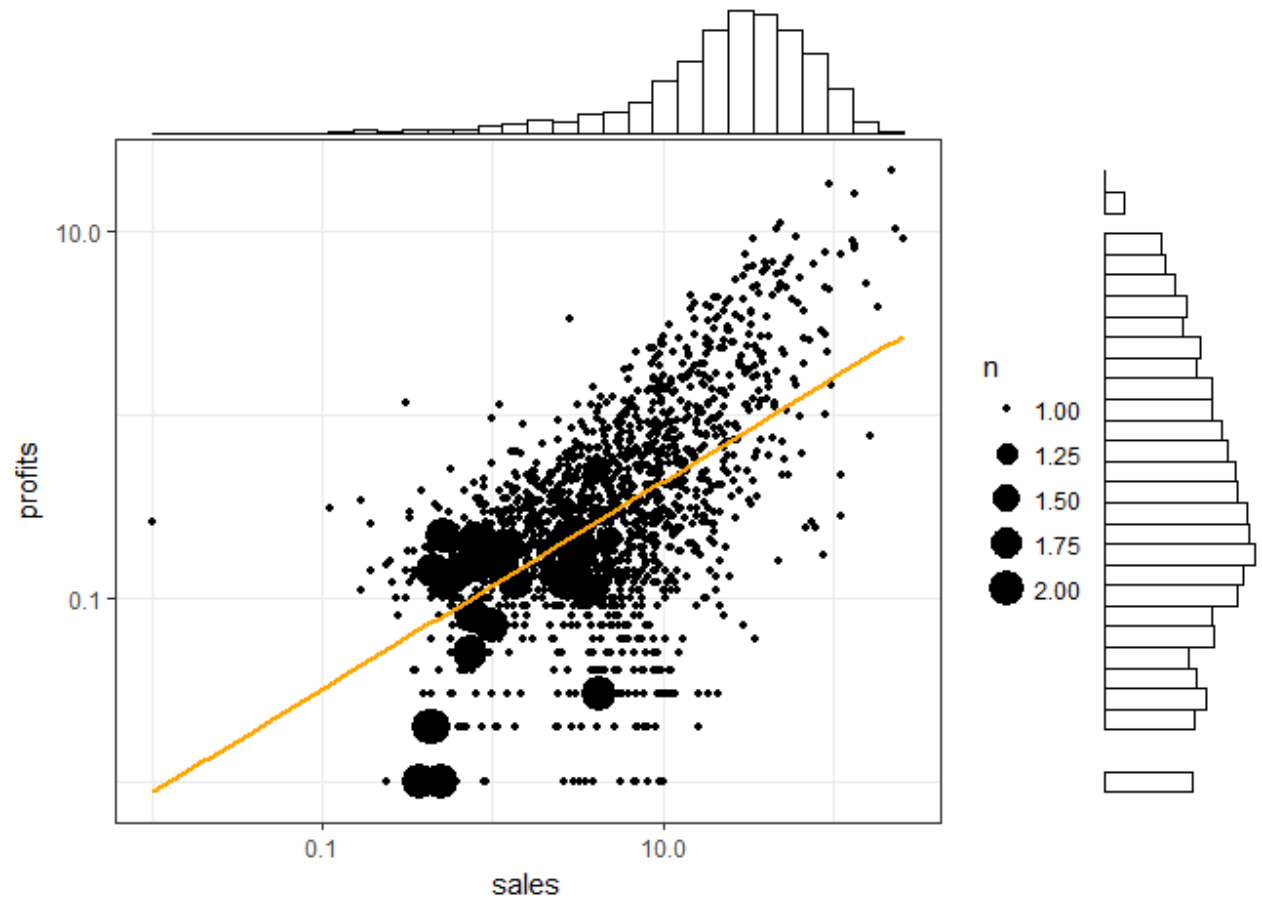

Dot Plot
País Vs Valor de Mercado Médio
Netherlands/ United Kingdom
United Kingdom/ Australia
Panama/ United Kingdom
Australia/ United Kingdom
Kong/China
United Kingdom/ Netherlands
Switzerland
France
United States
Russia
United Kingdom
Finland
China
Spain
Germany
Netherlands
Italy
Australia
Sweden
Denmark
Canada
Hong Kong/China
Norway
Bermuda
Belgium
Liberia
Ireland
Islands
Brazil
New Zealand
Taiwan
Japan
Singapore
Portugal
Cayman Islands
Luxembourg
India
South Africa
Thailand
South Korea
Greece
Jordan
Mexico
Chile
Israel
Czech Republic
Malaysia
Austria
Peru
Indonesia
Pakistan
Hungary
France/ United Kingdom
Turkey
Poland
Bahamas
United Kingdom/ South Africa
Philippines
Africa
Korea
Venezuela
pais
1
10
100
valor
source: UFBA

GRÁFICO MARGINAIS

```
theme_set(theme_bw())

#PACOTE ggExtra
library(ggExtra)

#GRÁFICO
g<-ggplot(Forbes2000, aes(sales,profits)) +
  geom_count() +
  scale_x_log10()+
  scale_y_log10()+
  geom_smooth(method="lm", se=F,col="orange")

#PLOT DAS MARGINAIS
ggMarginal(g, type = "histogram", fill="transparent")
ggMarginal(g, type = "boxplot", fill="transparent")
```


10.0
0.1
profits
0.1
10.0
sales
n
1.00
1.25
1.50
1.75
2.00


10.0
0.1
profits
0.1
10.0
sales
n
1.00
1.25
1.50
1.75
2.00

BARRAS DIVERGENTES

```
theme_set(theme_bw())

#PREPARAÇÃO DOS DADOS
data(Forbes2000)
valor.medio=aggregate(Forbes2000$marketvalue,
by=list(Forbes2000$country), FUN=mean)
colnames(valor.medio)=c("pais", "valor")
valor.medio$valor_z=(valor.medio$valor-
mean(valor.medio$valor))/sd(valor.medio$valor)
valor.medio$tipo=ifelse(valor.medio$valor_z < 0, "abaixo", "acima")
valor.medio=valor.medio[order(valor.medio$valor_z), ]
valor.medio$pais=factor(valor.medio$pais, levels = valor.medio$pais)

#GRÁFICO
ggplot(valor.medio) +
  aes(x=pais, y=valor_z, label=valor_z,fill=tipo) +
  geom_bar(stat='identity', width=.5)+
  scale_fill_manual(name="Valor Médio",
                    labels = c("Acima da média", "Abaixo da Média"),
                    values = c("#32CD32", "#B22222"))+
  coord_flip()
```

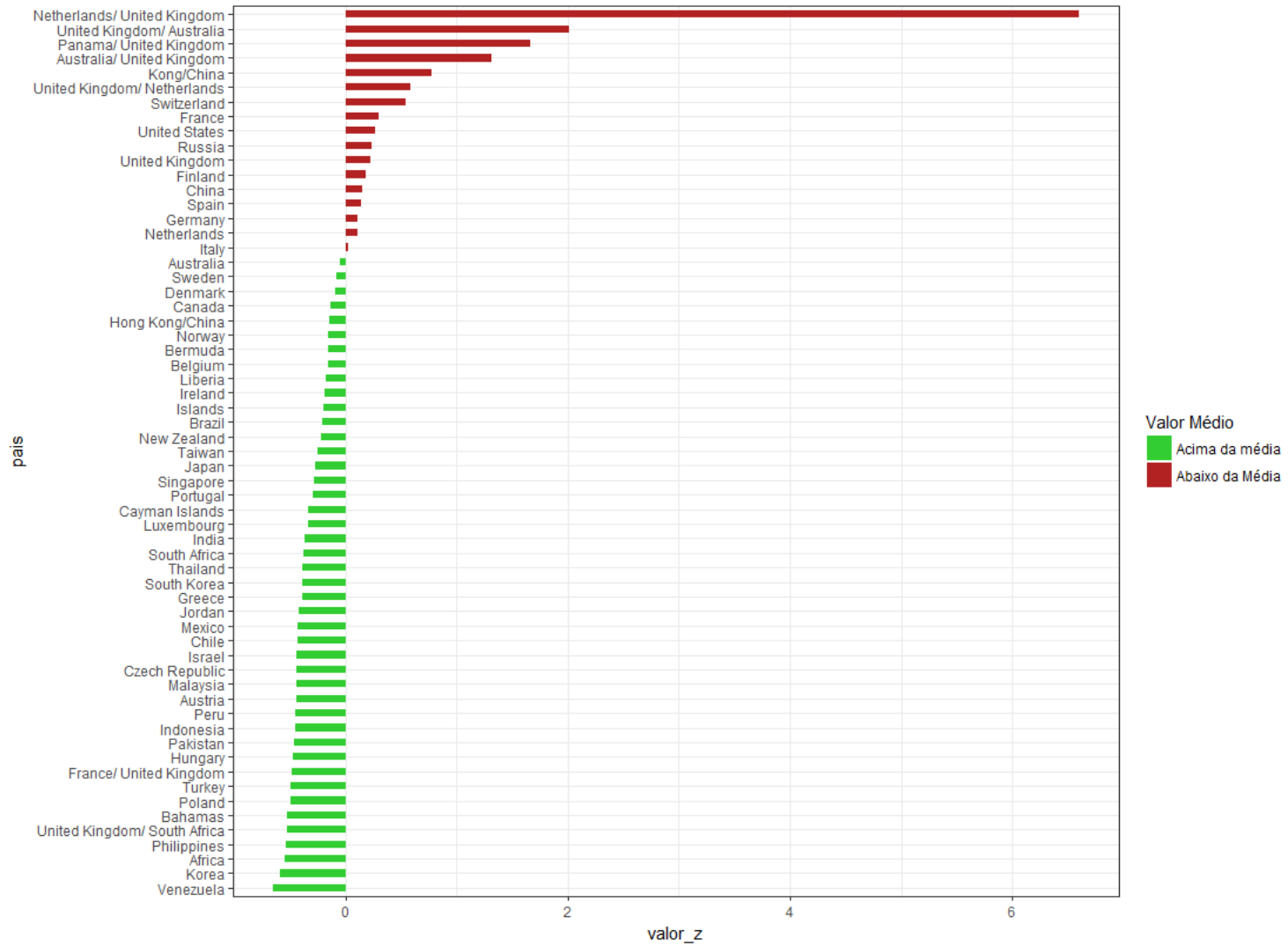

Netherlands/ United Kingdom
United Kingdom/ Australia
Panama/ United Kingdom
Australia/ United Kingdom
Kong/China
United Kingdom/ Netherlands
Switzerland
France
United States
Russia
United Kingdom
Finland
China
Spain
Germany
Netherlands
Italy
Australia
Sweden
Denmark
Canada
Hong Kong/China
Norway
Bermuda
Belgium
Liberia
Ireland
Islands
Brazil
New Zealand
Taiwan
Japan
Singapore
Portugal
Cayman Islands
Luxembourg
India
South Africa
Thailand
South Korea
Greece
Jordan
Mexico
Chile
Israel
Czech Republic
Malaysia
Austria
Peru
Indonesia
Pakistan
Hungary
France/ United Kingdom
Turkey
Poland
Bahamas
United Kingdom/ South Africa
Philippines
Africa
Korea
Venezuela
pais
0
2
4
6
valor_z
Valor Médio
Acima da média
Abaixo da Média

GRÁFICO DE VIOLINO

```
#PREPARANDO OS DADOS
data(Forbes2000)

sel=Forbes2000[,"country"]=="Germany" |
  Forbes2000[,"country"]=="United Kingdom" |
  Forbes2000[,"country"]=="United States" |
  Forbes2000[,"country"]=="Japan"

dados=Forbes2000[sel,]

theme_set(theme_bw())

#GRÁFICO
ggplot(dados, aes(x=country,y=marketvalue)) +
  geom_violin(fill="darkorange2") +
  scale_y_log10() +
  labs(title="Gráfico Violino",
       subtitle="Valor de Mercado x País",
       caption="Source: UFBA",
       x="Valor de Mercado",
       y="País")
```

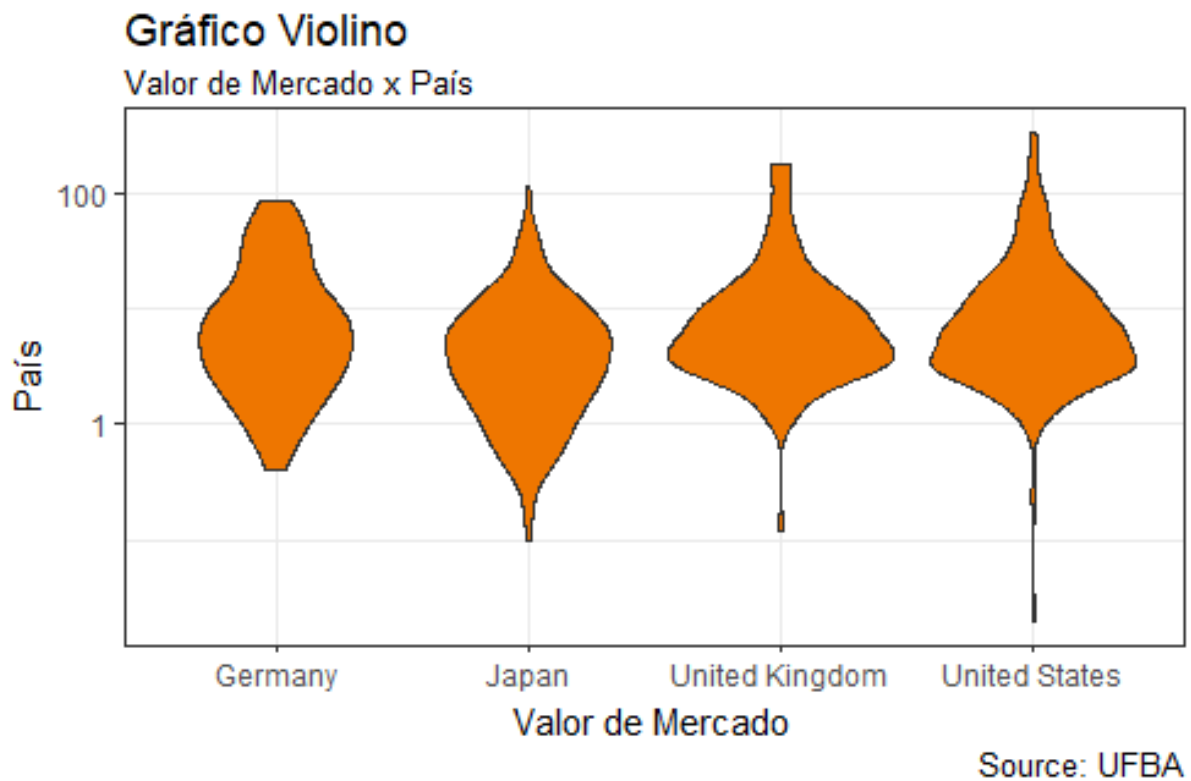
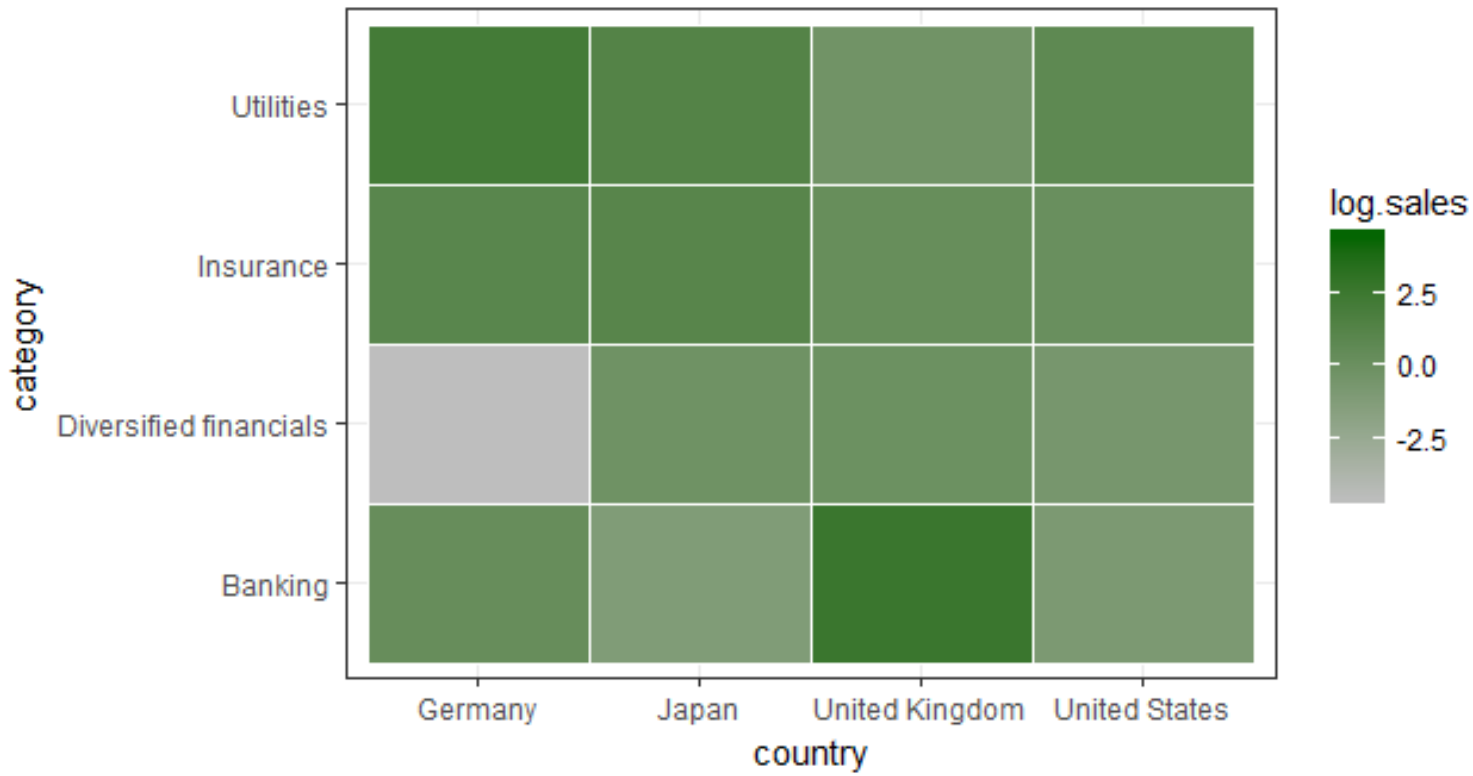


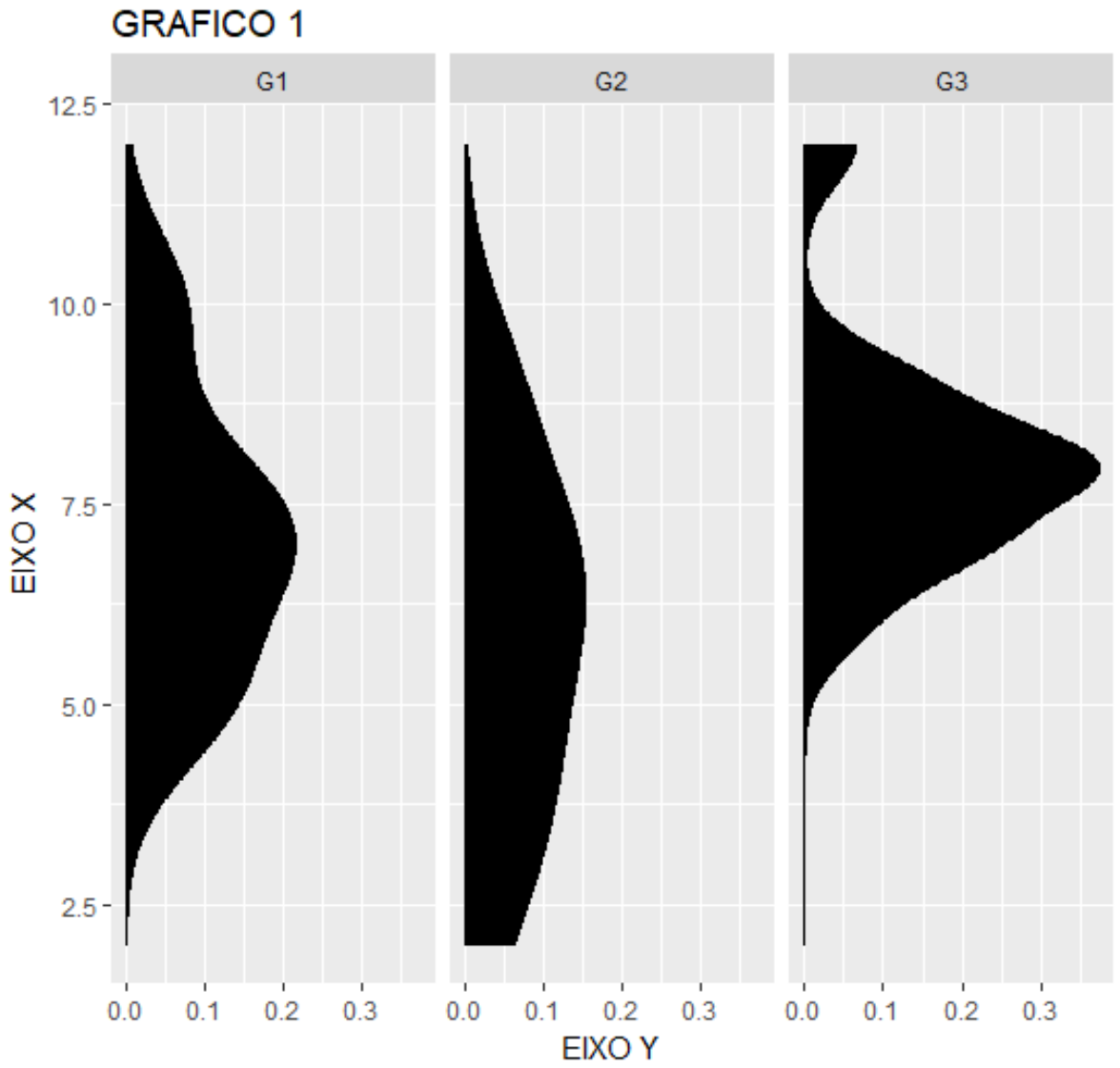
Gráfico Violino
Valor de Mercado x País
100
1
País
Germany
Japan
United Kingdom
United States
Valor de Mercado
Source: UFBA

MAPA DE CALOR

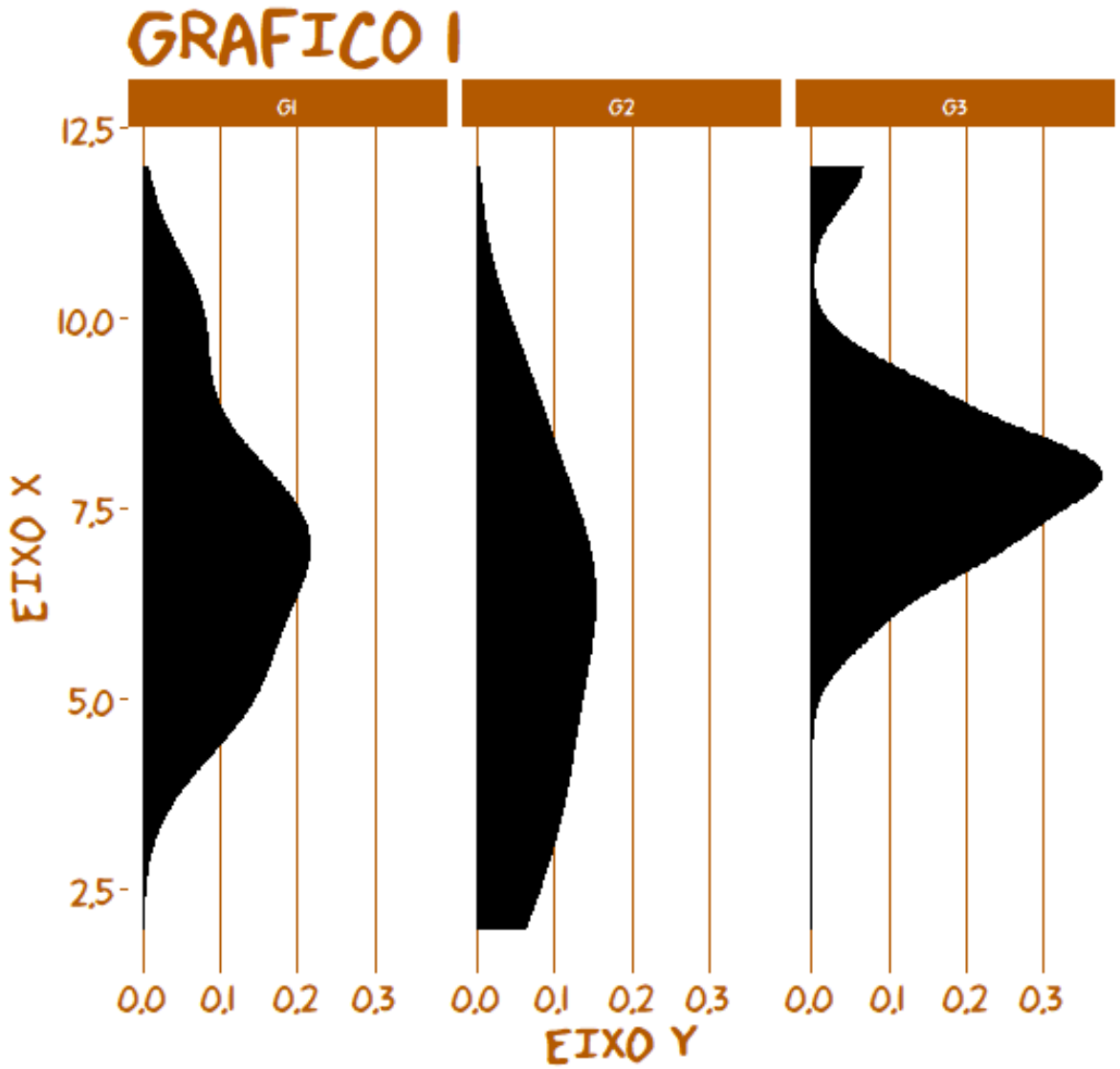
```
#PREPARANDO OS DADOS
data(Forbes2000)

sel=Forbes2000[,"country"]=="Germany" |
  Forbes2000[,"country"]=="United Kingdom" |
  Forbes2000[,"country"]=="United States" |
  Forbes2000[,"country"]=="Japan"

sel2=Forbes2000[,"category"]=="Utilities" |
  Forbes2000[,"category"]=="Diversified financials" |
  Forbes2000[,"category"]=="Insurance" |
  Forbes2000[,"category"]=="Banking"

dados=Forbes2000[sel & sel2,]
dados$log.sales=log(dados$sales)

#GRÁFICO
ggplot(dados) +
  aes(x=country, y=category) +
  geom_tile(aes(fill = log.sales), colour = "white")+
  scale_fill_gradient(low = "gray", high = "darkgreen")
```


Utilities
Insurance
Diversified financials
Banking
category
Germany
Japan
United Kingdom
United States
country
log.sales
2.5
0.0
-2.5

TEMAS



TEMAS



```
ggplot(data = dat)+
  aes(x = y1) +
  geom_density(fill=cor.3)+
  xlab("EIXO X")+
  ylab("EIXO Y")+
  ggtitle("GRAFICO 1")+
  facet_grid(facets=.~ grp)+
  coord_flip()
```

```
#LISTAGEM DE FONTES
library(extrafont)
font_import()
fonts()

cor.1=NA
cor.2="#b35900"
cor.3="black“
```

```
tema <- function() {
  theme(
    plot.background = element_rect(fill = cor.1, colour = cor.1),
    panel.background = element_rect(fill = cor.1),
    axis.text = element_text(colour = cor.2, family = "xkcd",size=15),
    plot.title = element_text(colour = cor.2, face = "bold", size = 30,
                              vjust = 0.5, family = "xkcd"),
    axis.title = element_text(colour = cor.2,
                              face = "bold", size = 20, family = "xkcd"),
    panel.grid.major.x = element_line(colour = cor.2),
    panel.grid.minor.x = element_blank(),
    panel.grid.major.y = element_blank(),
    panel.grid.minor.y = element_blank(),
    strip.text = element_text(family = "xkcd", colour = "white"),
    strip.background = element_rect(fill = cor.2),
    axis.ticks = element_line(colour = cor.2),
    legend.title = element_text(family =  "xkcd", colour = cor.2,
                              size = 20),
    legend.background = element_rect(fill = cor.1),
    legend.key = element_rect(fill = cor.1, colour = cor.1),
    legend.text = element_text(family = "xkcd", colour = cor.2, size =
20))
}
```

```
g1=ggplot(data = dat)+
  aes(x = y1) +
  geom_density(fill=cor.3)+
  xlab("EIXO X")+
  ylab("EIXO Y")+
  ggtitle("GRAFICO 1")+
  facet_grid(facets=.~ grp)+
  coord_flip()+
  tema()
g1
```

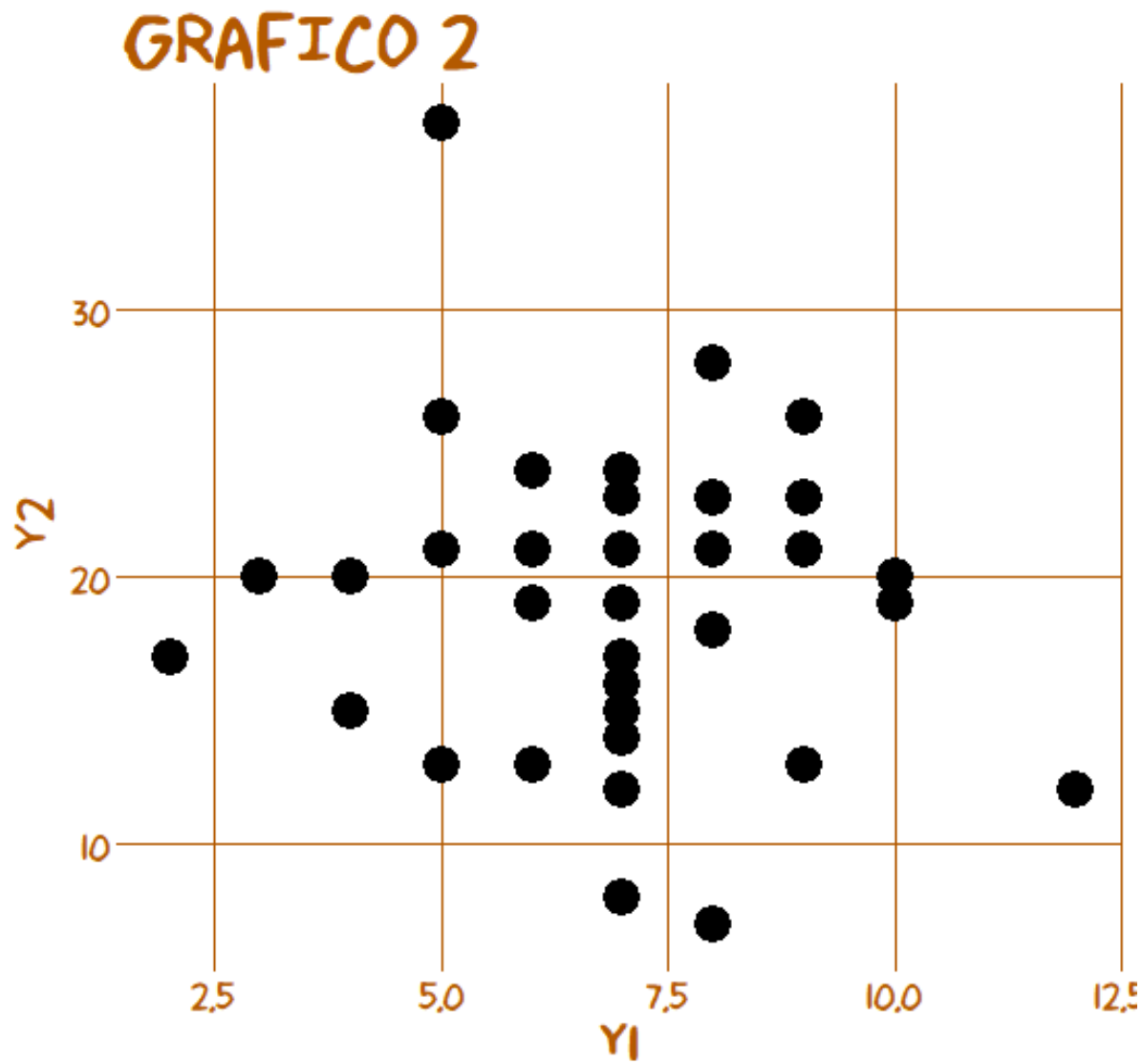


GRAFICO 2
30
20
10
Y2
2,5
5,0
7,5
10,0
12,5
Y1

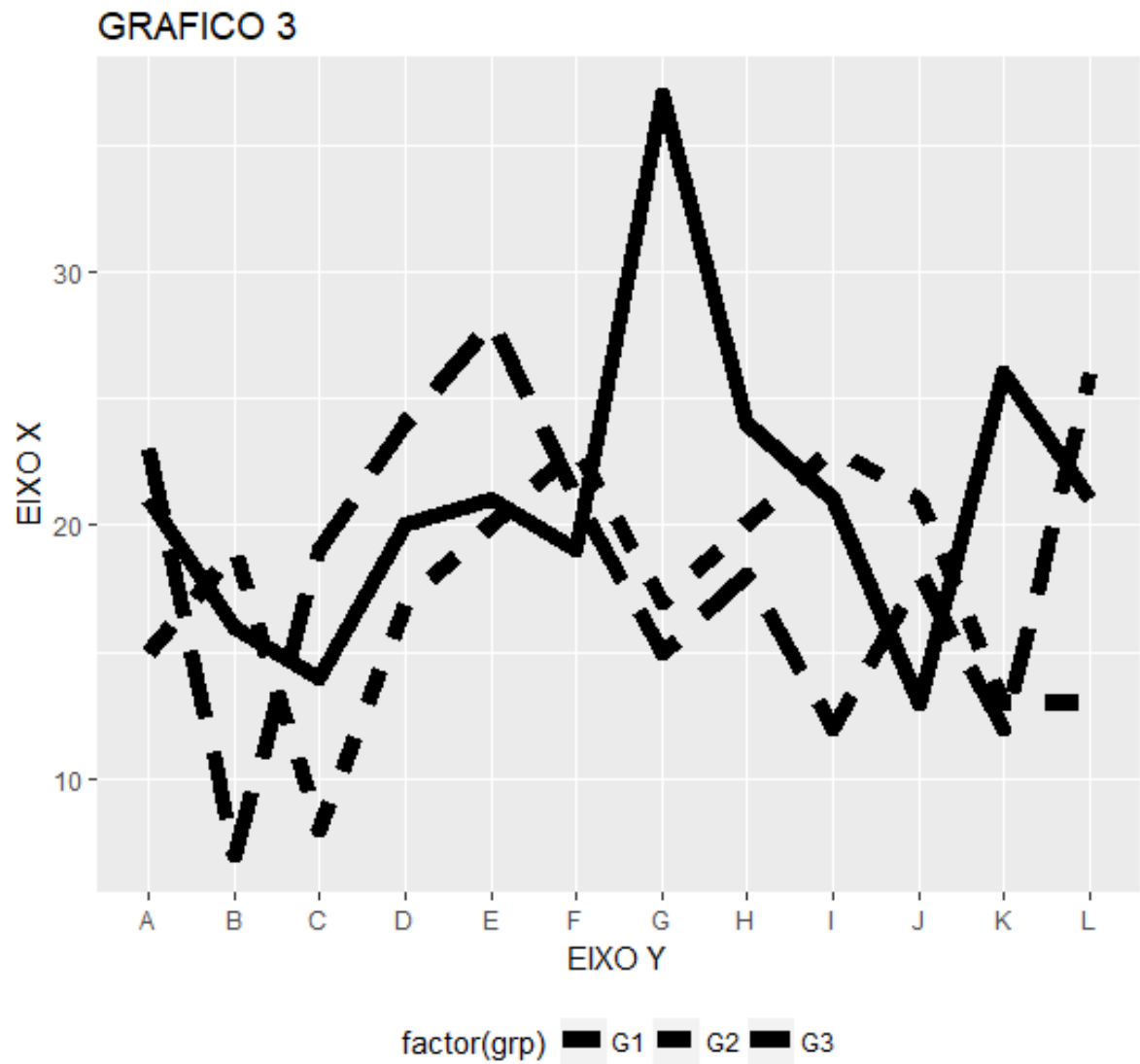


GRAFICO 3
EIXO X
30
20
10
A
B
C
D
E
F
G
H
I
J
K
L
EIXO Y
factor(grp)
G1
G2
G3

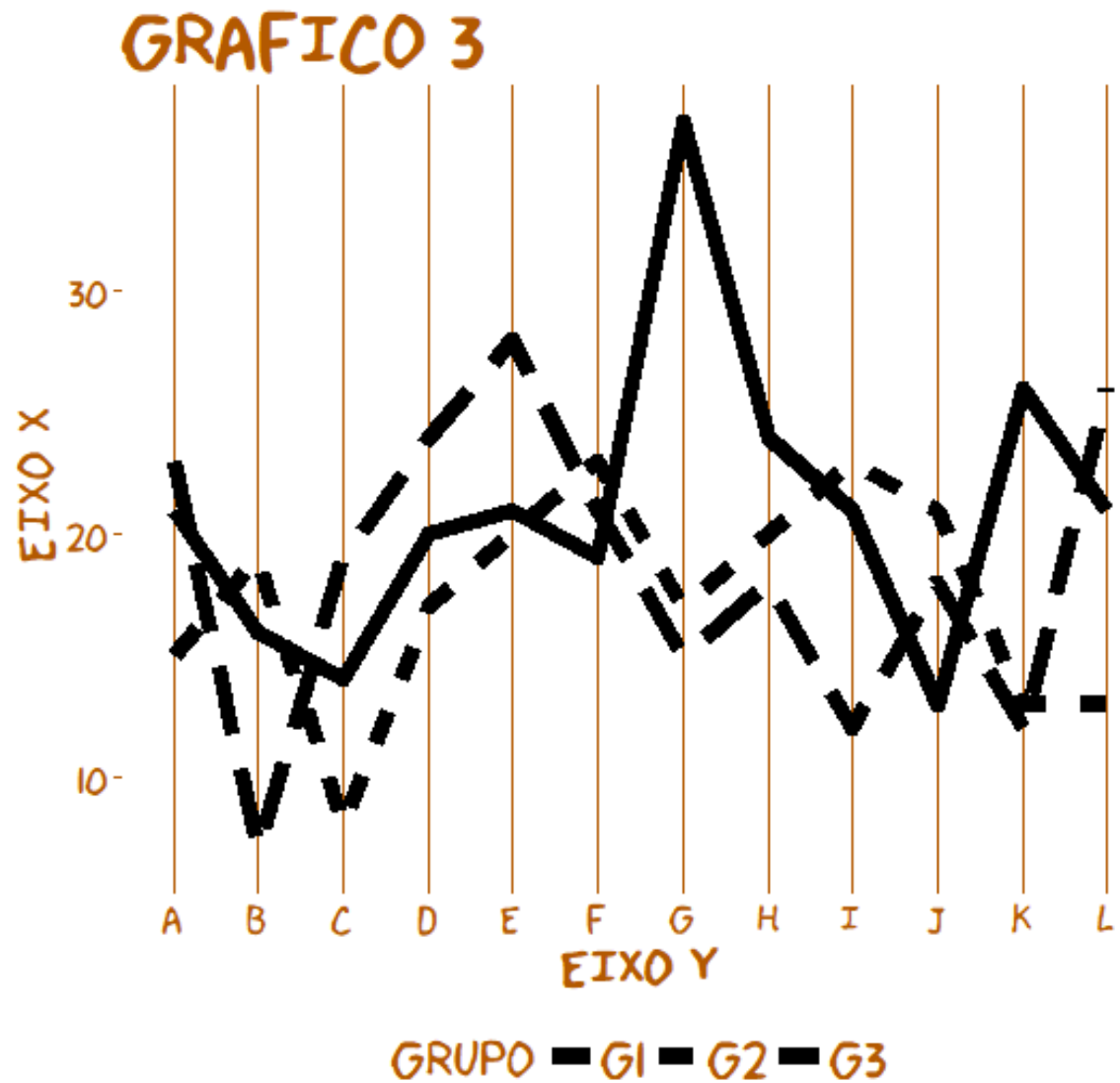
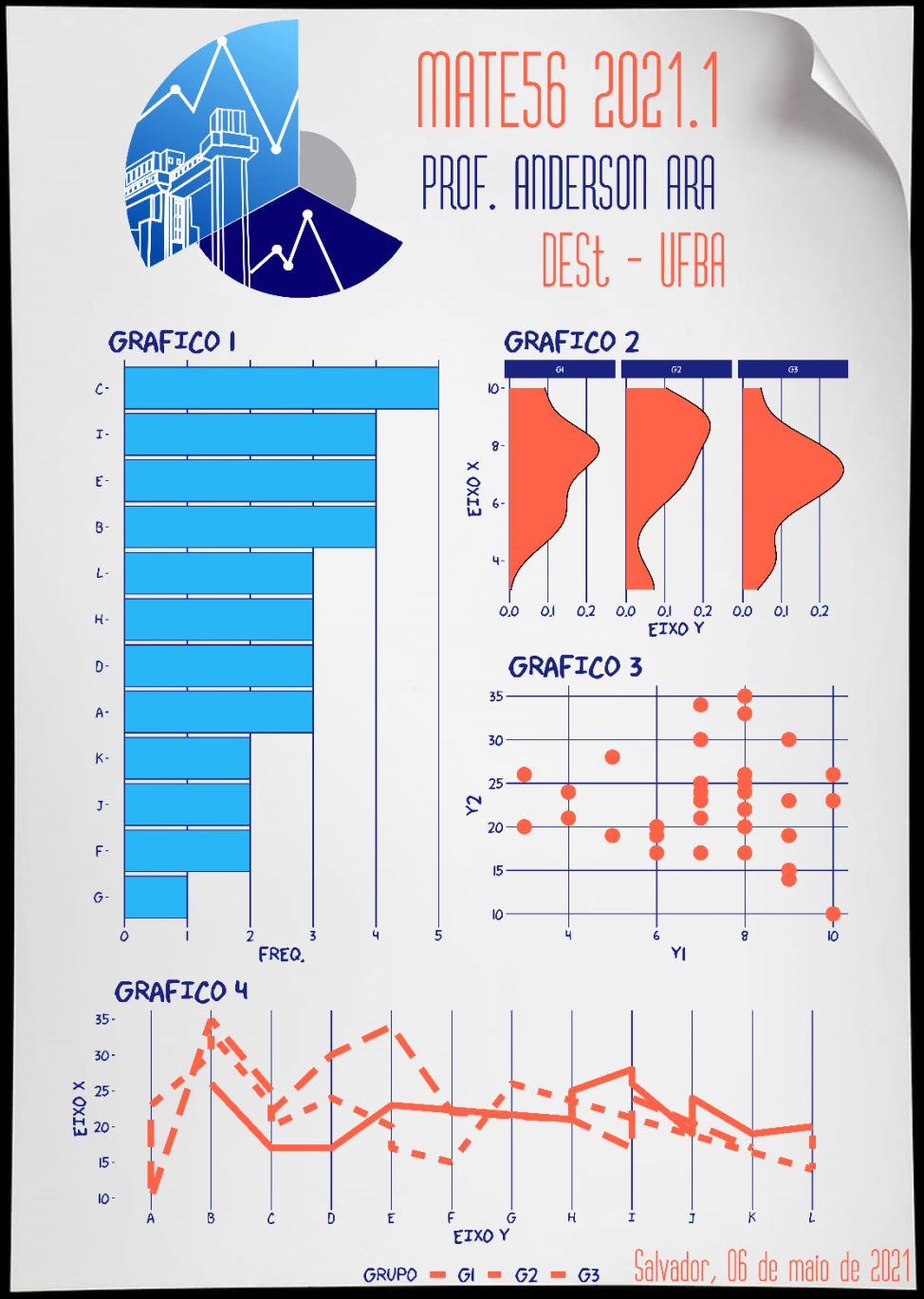


GRAFICO 3
30
20
10
EIXO X
A B C D E F G H I J K L
EIXO Y
GRUPO G1 G2 G3

```
g2=ggplot(dat, aes(y1,y2)) +
  geom_point(size=6)+
  ggtitle("GRAFICO 2")+
  tema()+
  theme(panel.grid.major.y = element_line(colour = cor.2))

g2
```

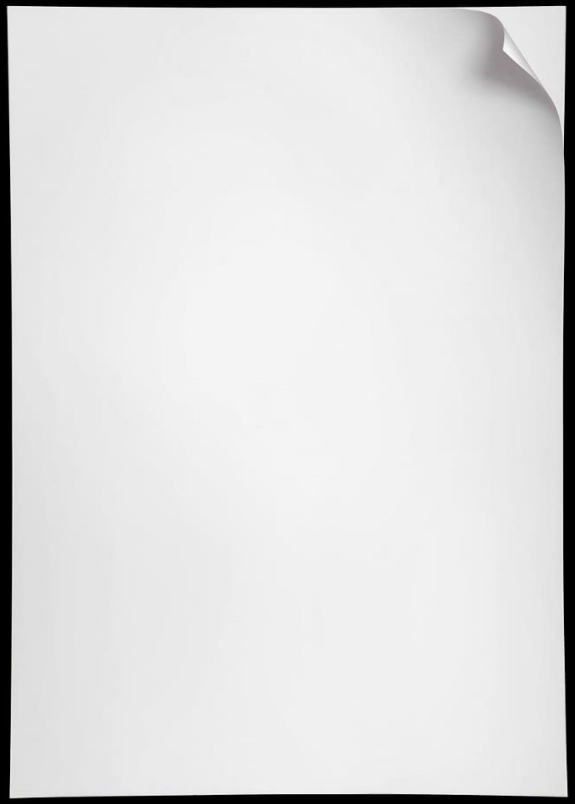
```
g3 <- ggplot(data = dat, aes(x = x, y = y2, group = factor(grp)))
+
       geom_line(aes(linetype = factor(grp)),
              size = 3,
              colour = cor.3) +
       ylab("EIXO X") + xlab("EIXO Y") + ggtitle("GRAFICO 3")+
       theme(legend.position="bottom",
       legend.direction="horizontal")+
        tema()+
       scale_linetype_discrete("GRUPO")

g3
```

GGPLOT2:
GRID E LAYOUT



GGPLOT2: GRID E LAYOUT

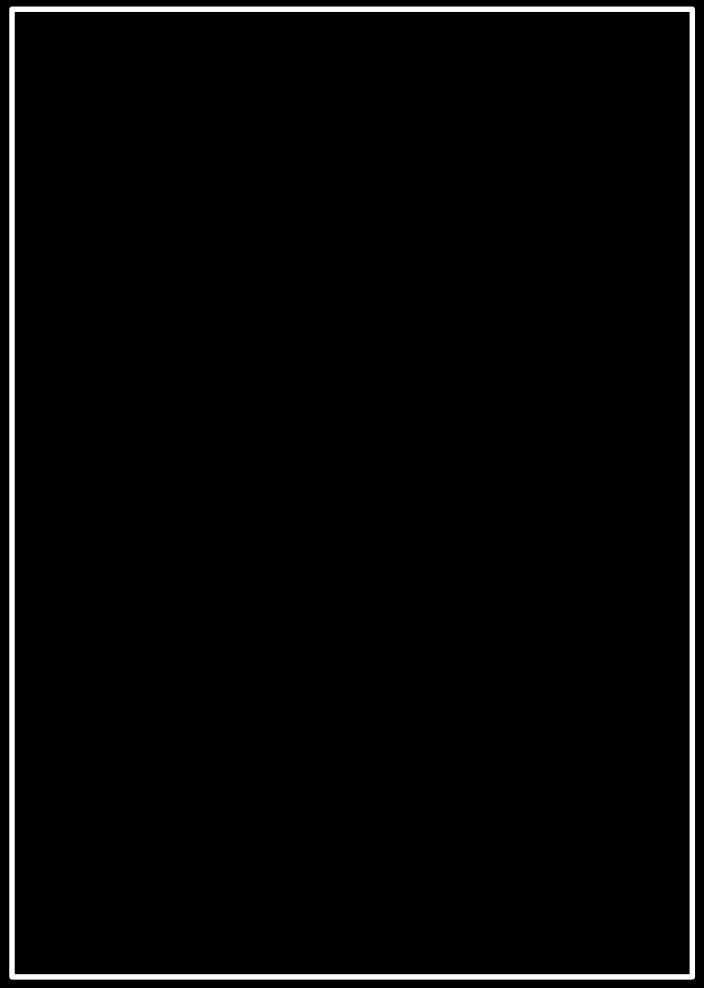
lg_estatistca.png



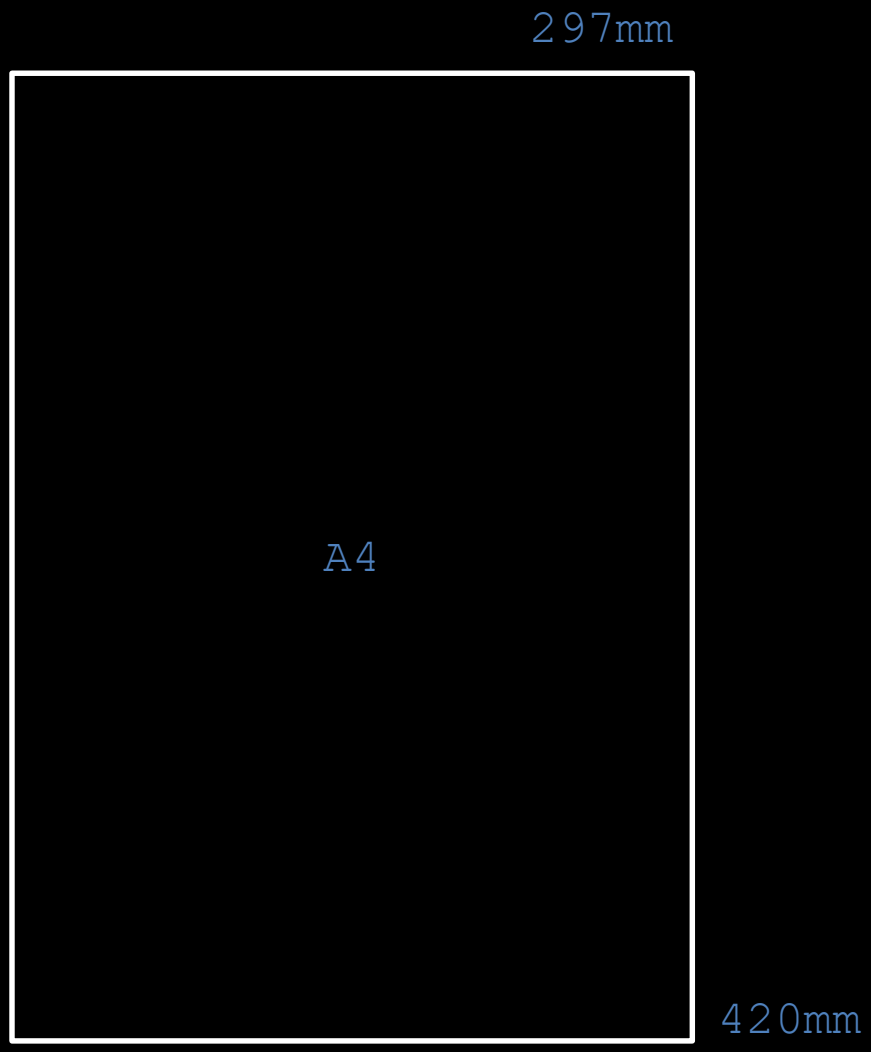
bk.png

RStudioLogo.png

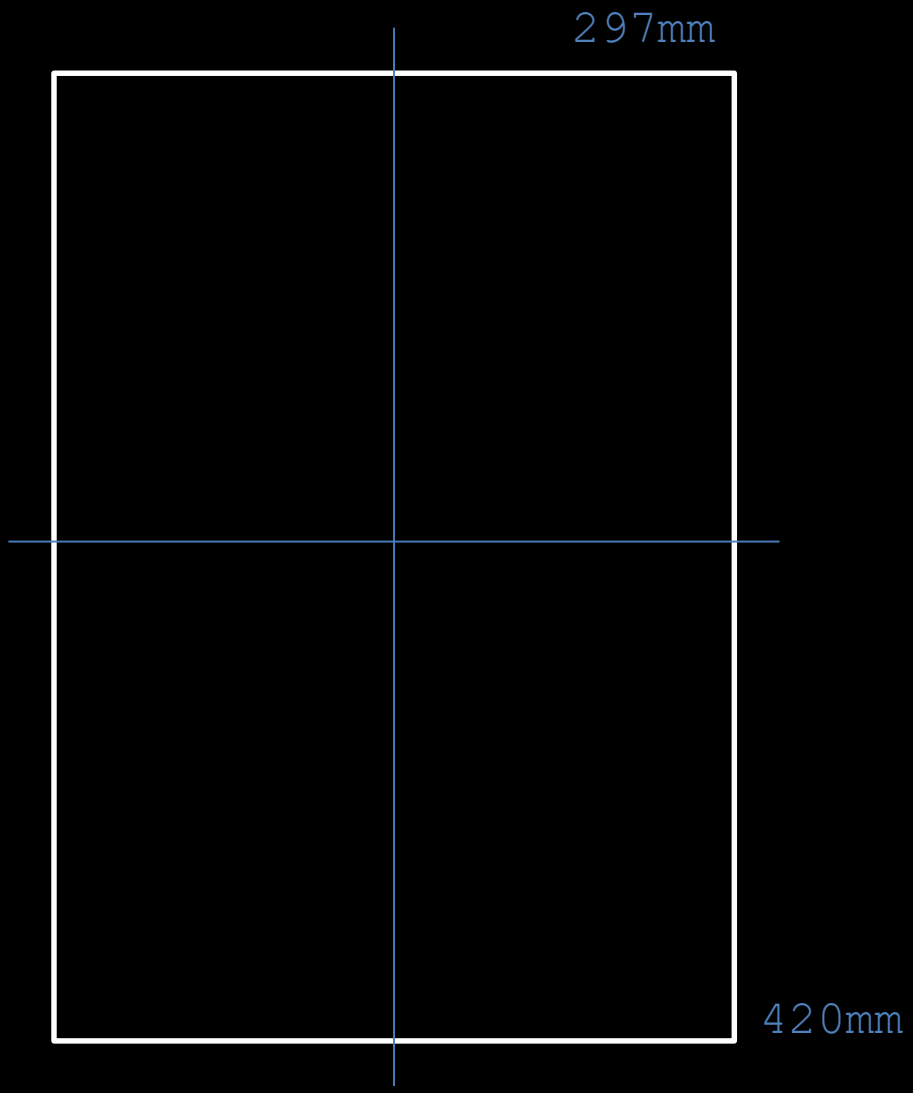
GGPLOT2: GRID E LAYOUT



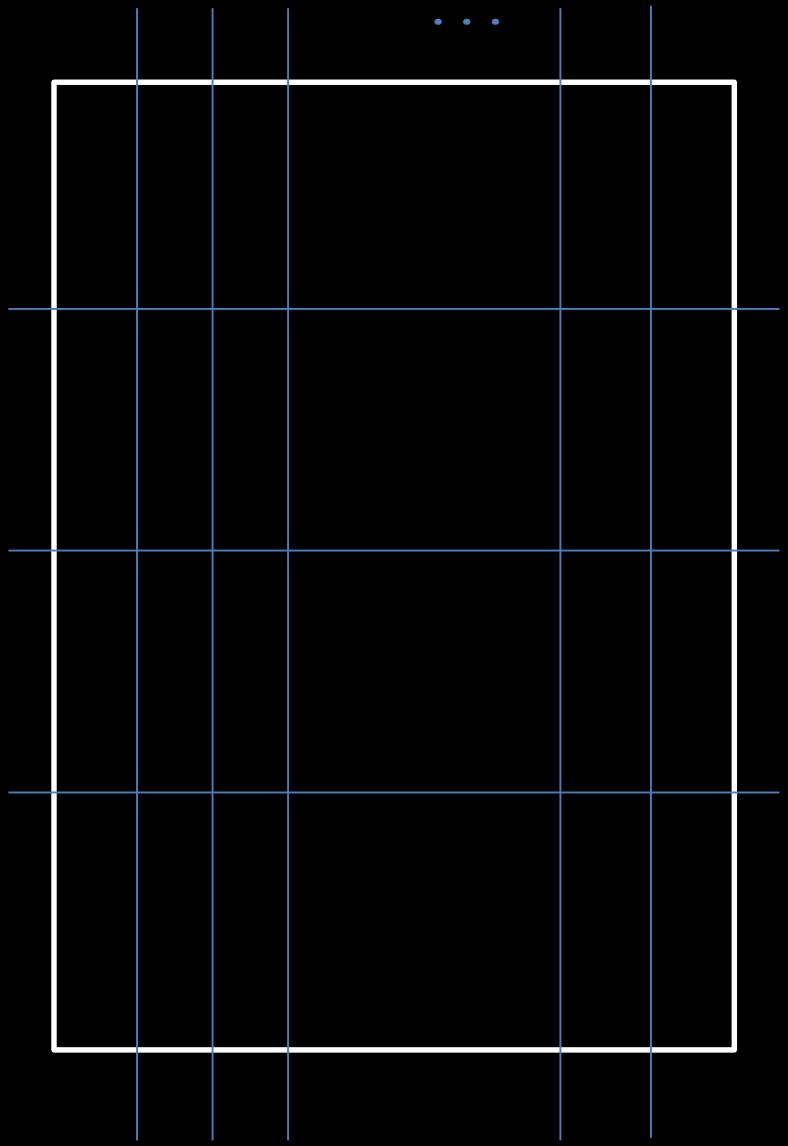
GGPLOT2: GRID E LAYOUT



GGPLOT2: GRID E LAYOUT



GGPLOT2: GRID E LAYOUT



GGPLOT2: GRID E LAYOUT

```
#ENTRADA DE DADOS
y1 <- round(rnorm(n = 36, mean = 7, sd = 2))
y2 <- round(rnorm(n = 36, mean = 21, sd = 6))
y3 <- round(rnorm(n = 36, mean = 50, sd = 8))
x <- sample(c(LETTERS[1:12],LETTERS[1:3]), 36,rep=T)
grp <- rep(c("G1", "G2", "G3"), each = 12)
dat <- data.frame(grp, x, y1, y2, y3)
tab <- data.frame(Freq=sort(table(x)))

#INICIANDO DIRETÓRIO DE TRABALHO
setwd("...")

#IMPORTANDO IMAGENS
require(png)
require(jpeg)
imag1 <- readPNG("bk.png")
im1<- rasterGrob(imag1,width = unit(297,"mm"), height = unit(420,"mm"))

imag2 <- readPNG("RStudioLogo.png")
im2 <- rasterGrob(imag2,width = unit(90,"mm"), height =unit(90,"mm"))

#CRIANDO IMAGEM
png("painel.png", width = 297 , height = 420, units = "

#CONSTRUIR UM NOVO GRID
grid.newpage()
```

GGPLOT2: GRID E LAYOUT

```
#CABEÇALHO E TEXTOS
pushViewport(viewport(layout = grid.layout(1, 1)))
print(grid.draw(im1))



grid.text("MATE56 2021.1", x = unit(297/2+35, "mm"),  y = unit(390, "mm"),
          gp = gpar(fontfamily = "VertigoFLF", col = cor.3, cex = 7))

grid.text("PROF. ANDERSON ARA", x = unit(297/2+35, "mm"),  y = unit(360, "mm"),
          gp = gpar(fontfamily = "VertigoFLF", col = cor.2, cex = 5))

grid.text("DESt - UFBA", x = unit(297/2+20, "mm"),  y = unit(335, "mm"), hjust=-0.1,
          gp = gpar(fontfamily = "VertigoFLF", col = cor.3, cex = 5))

grid.text("Salvador, 06 de maio de 2021", x = unit(297/2+65, "mm"),  y = unit(10,
"mm"), hjust=0.1,
          gp = gpar(fontfamily = "VertigoFLF", col = cor.3, cex = 3))
```

GGPLOT2:
GRID E LAYOUT

```
#INCLUINDO GRÁFICOS
pushViewport(viewport(layout = grid.layout(4, 14)))
print(g1, vp = viewport(layout.pos.row=2:3, layout.pos.col = 2:7))
print(g2, vp = viewport(layout.pos.row=2, layout.pos.col = 8:13))
print(g3, vp = viewport(layout.pos.row=3, layout.pos.col = 8:13))
print(g4, vp = viewport(layout.pos.row=4, layout.pos.col = 2:13))


#INCLUINDO RLOGO
pushViewport(viewport(layout.pos.row=1, layout.pos.col = 2:7))
print(grid.draw(im2))

dev.off()
```

MATE56 2021.1

PROF. ANDERSON ARA

DEST - UFBA

GRAFICO 1

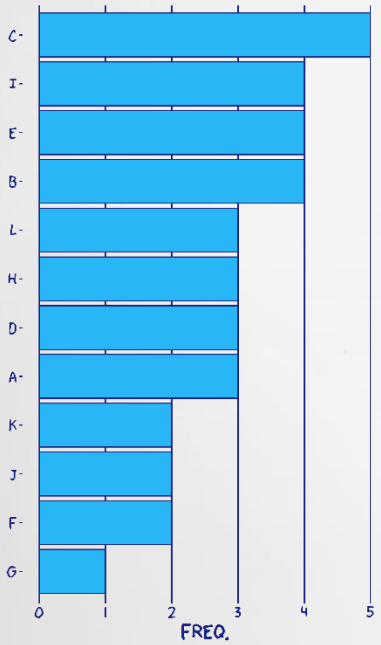


GRAFICO 2

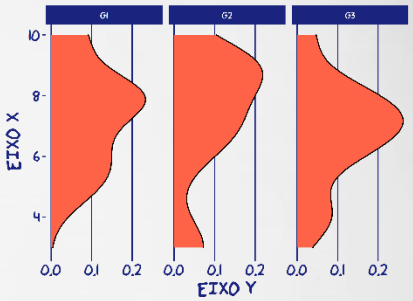


GRAFICO 3

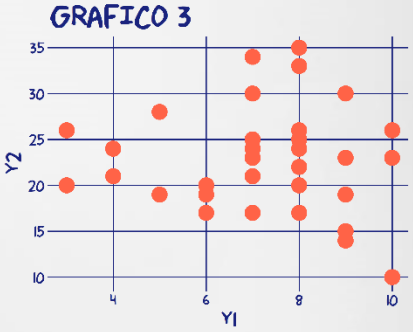
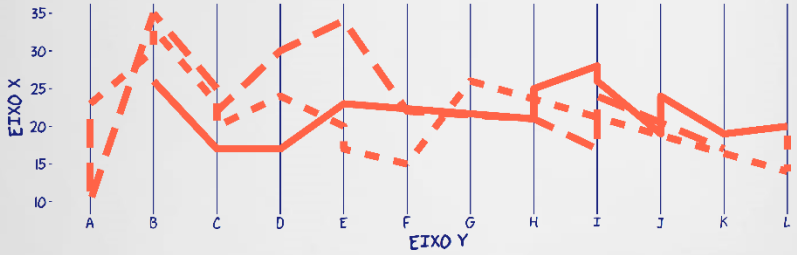


GRAFICO 4



Salvador, 06 de maio de 2021