Estística Descritiva

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O objetivo é sintetizar os dados de maneira direta, preocupando-se menos com variações e intervalos de confiança dos dados.

Análise Exploratória

Conjunto de Dados (Dataset Iris)

```
dados <- iris
head(dados)
```

```
##   Sepal.Length Sepal.Width Petal.Length Petal.Width Species
## 1          5.1         3.5          1.4         0.2  setosa
## 2          4.9         3.0          1.4         0.2  setosa
## 3          4.7         3.2          1.3         0.2  setosa
## 4          4.6         3.1          1.5         0.2  setosa
## 5          5.0         3.6          1.4         0.2  setosa
## 6          5.4         3.9          1.7         0.4  setosa
```

Funções para efetuar estatística descritiva

- média: mean()
- desvio padrão: sd()
- variância: var()
- valor mínimo: min()
- valor máximo: max()
- mediana: median()
- amplitude de valores (min e máximo): range()
- quartis: quantile()
- função genérica: summary()

Medidas de tendência central

```
mean(dados$Sepal.Length)
```

```
## [1] 5.843333
```

```
median(dados$Sepal.Length)
```

```
## [1] 5.8
```

Medidas de variabilidade

```
min(dados$Sepal.Length)
```

```
## [1] 4.3
```

```
max(dados$Sepal.Length)
```

```
## [1] 7.9
```

```
range(dados$Sepal.Length)
```

```
## [1] 4.3 7.9
```

```
quantile(dados$Sepal.Length)
```

```
##   0%  25%  50%  75% 100%
##  4.3  5.1  5.8  6.4  7.9
```

```
var(dados$Sepal.Length)
```

```
## [1] 0.6856935
```

```
sd(dados$Sepal.Length)
```

```
## [1] 0.8280661
```

Resumo estatístico

```
summary(dados)
```

```
##   Sepal.Length    Sepal.Width     Petal.Length    Petal.Width
##  Min.   :4.300   Min.   :2.000   Min.   :1.000   Min.   :0.100
##  1st Qu.:5.100   1st Qu.:2.800   1st Qu.:1.600   1st Qu.:0.300
##  Median :5.800   Median :3.000   Median :4.350   Median :1.300
##  Mean   :5.843   Mean   :3.057   Mean   :3.758   Mean   :1.199
##  3rd Qu.:6.400   3rd Qu.:3.300   3rd Qu.:5.100   3rd Qu.:1.800
##  Max.   :7.900   Max.   :4.400   Max.   :6.900   Max.   :2.500
##        Species
##  setosa    :50
##  versicolor:50
##  virginica :50
##
##
##
```

Gráficos de distribuições

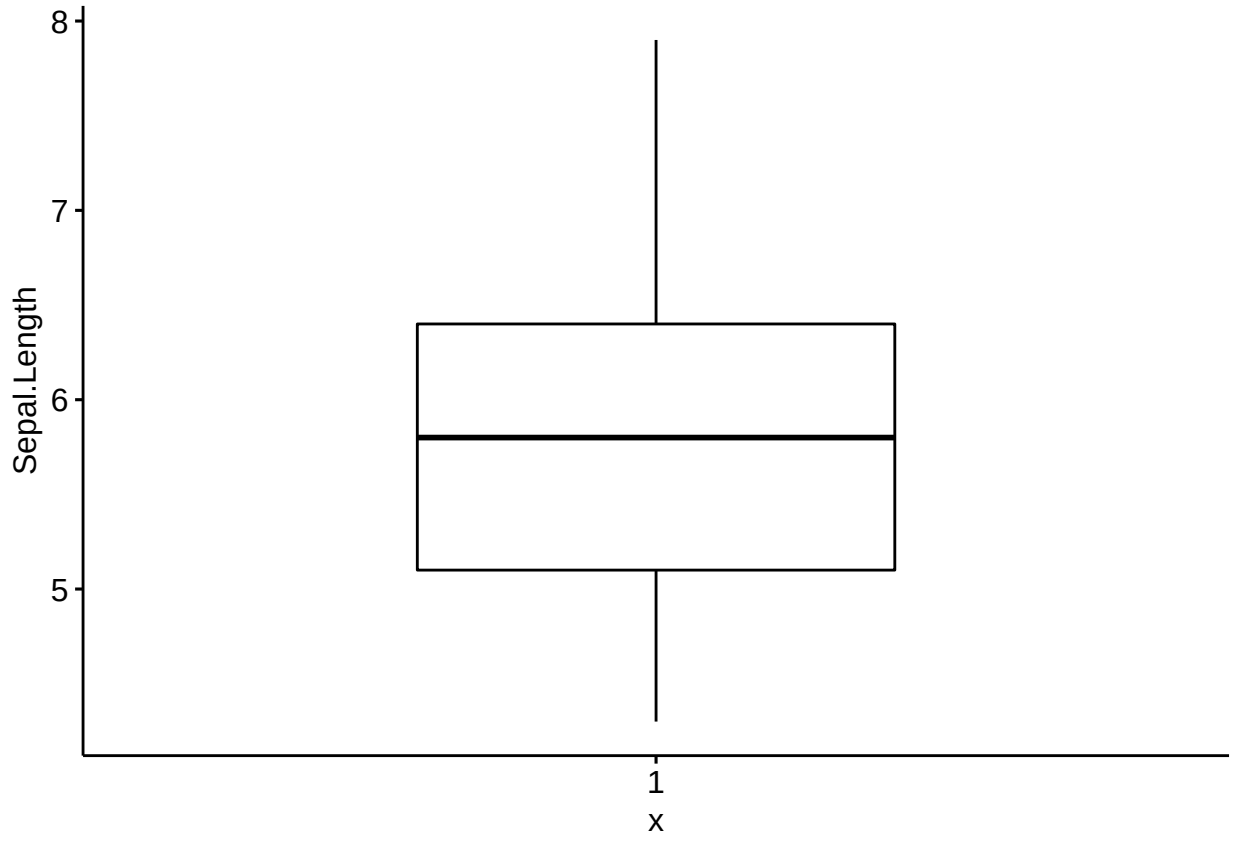
```
library(ggpubr)
```

```
## Loading required package: ggplot2
```

```
## Loading required package: magrittr
```

Box plot

```
ggboxplot(dados, y="Sepal.Length", width = 0.5)
```



Analisando o boxplot (outliers)

```
v = c(10.2, 14.1, 14.4, 14.4, 14.4, 14.5, 14.5, 14.6, 14.7, 14.7, 14.7, 14.9, 15.1, 15.9, 16.4)
v
```

```
##  [1] 10.2 14.1 14.4 14.4 14.4 14.5 14.5 14.6 14.7 14.7 14.7 14.9 15.1 15.9
## [15] 16.4
```

```
summary(v)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    10.2    14.4    14.6    14.5    14.8    16.4
```

```r
IQR(v) # Interquartile range
```

```
## [1] 0.4
```

Se um valor estiver abaixo de Q1-1.5xIQR ou acima de Q3+1.5xIQR é considerado um outlier

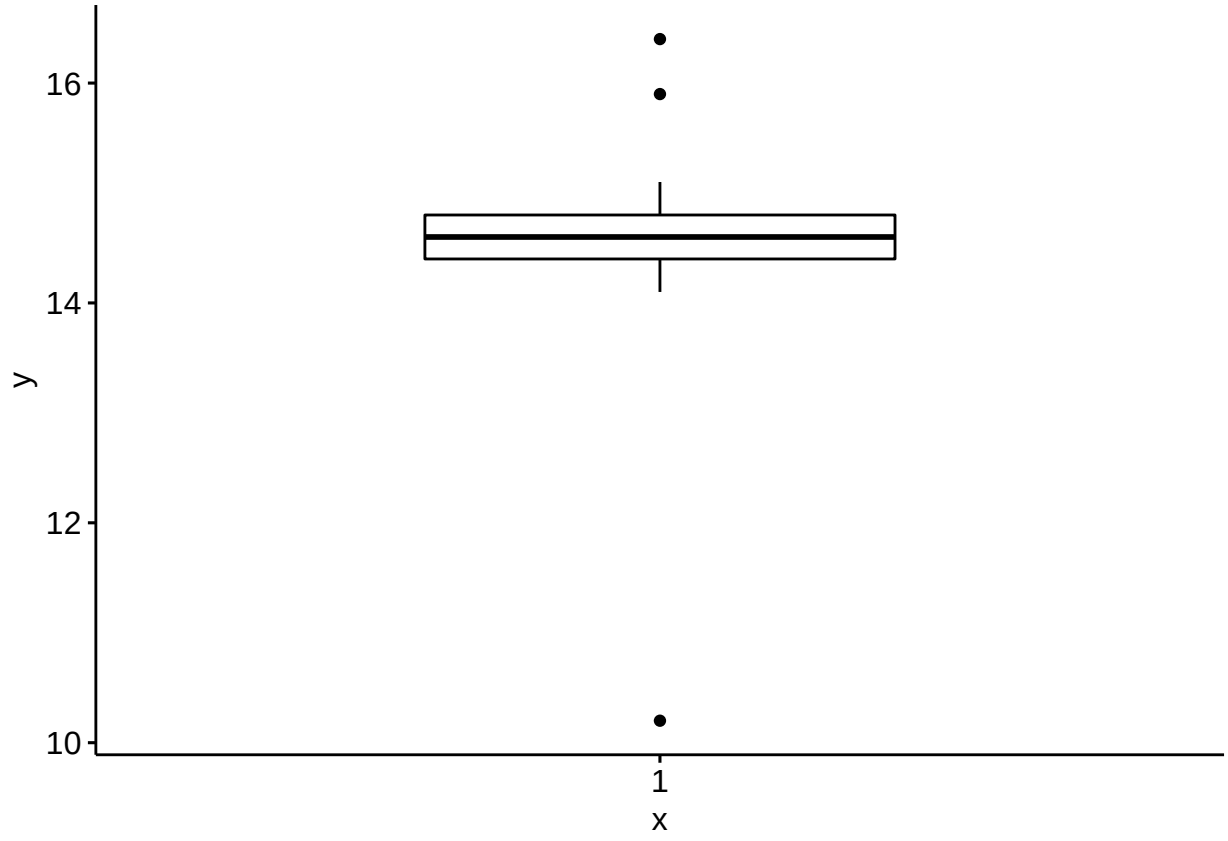
```r
q1 = summary(v)[2]
q3 = summary(v)[5]
limite_inferior = q1-1.5*IQR(v)
limite_inferior
```

```
## 1st Qu.
##    13.8
```

```r
limite_superior = q3+1.5*IQR(v)
limite_superior
```

```
## 3rd Qu.
##    15.4
```

```r
ggboxplot(v, width = 0.5)
```



Histograma

```
gghistogram(dados, x = "Sepal.Length", bins = 9, add = "mean")
```

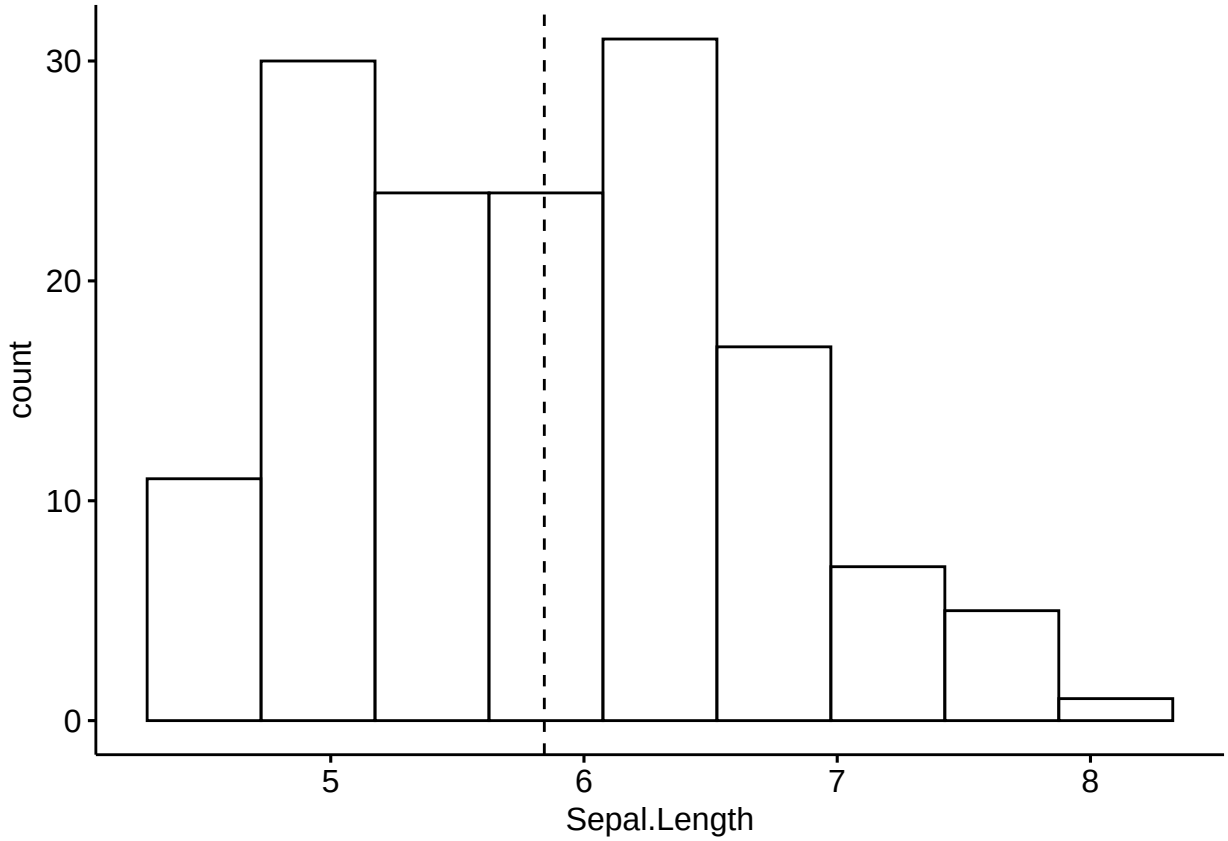
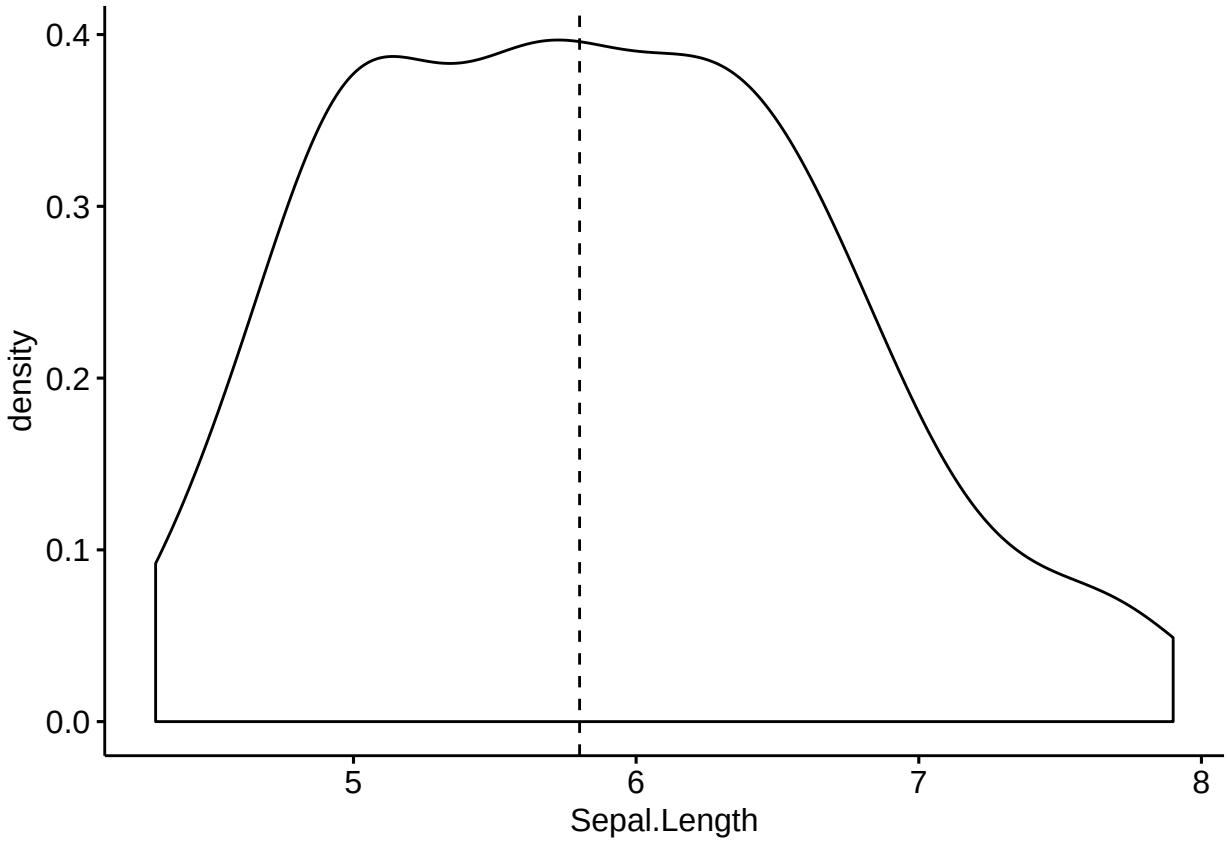


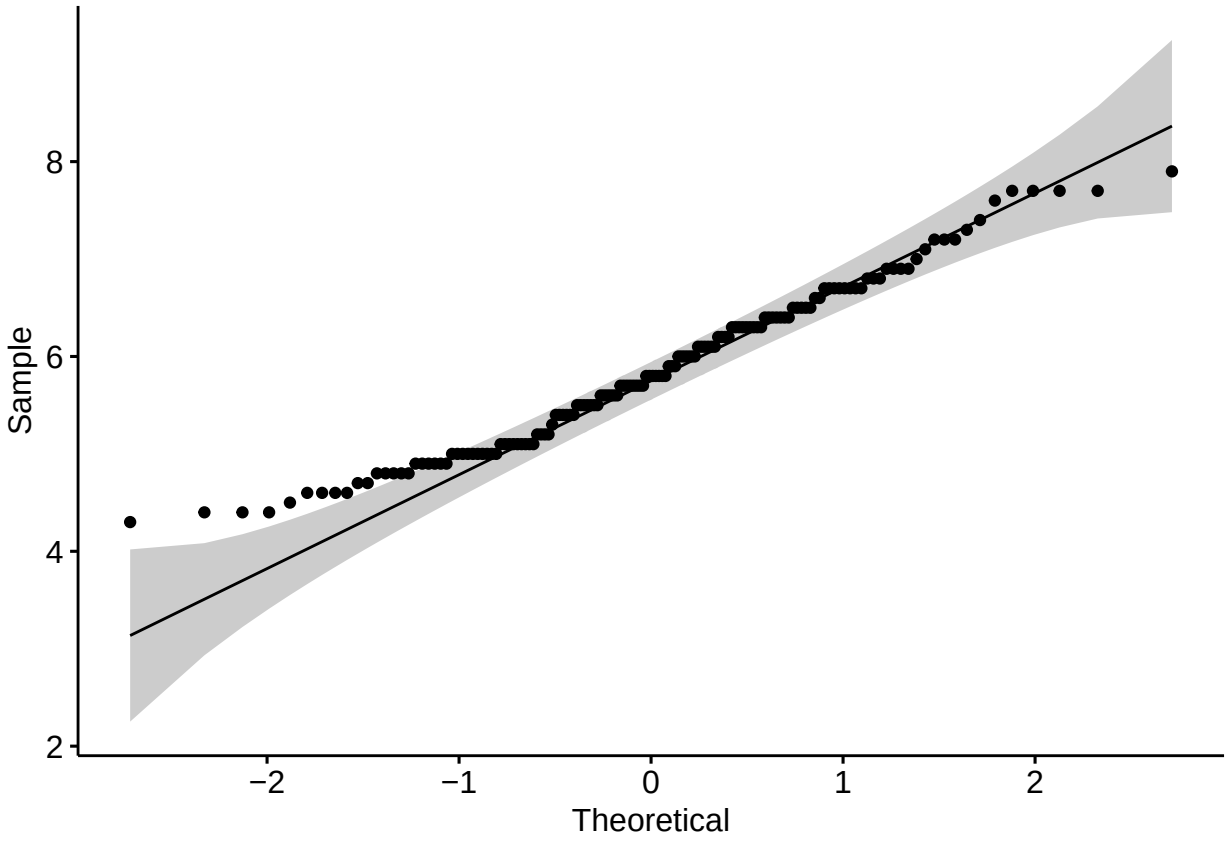
Gráfico de densidade

```
ggdensity(dados, x = "Sepal.Length", add = "median")
```



Análise de distribuição normal

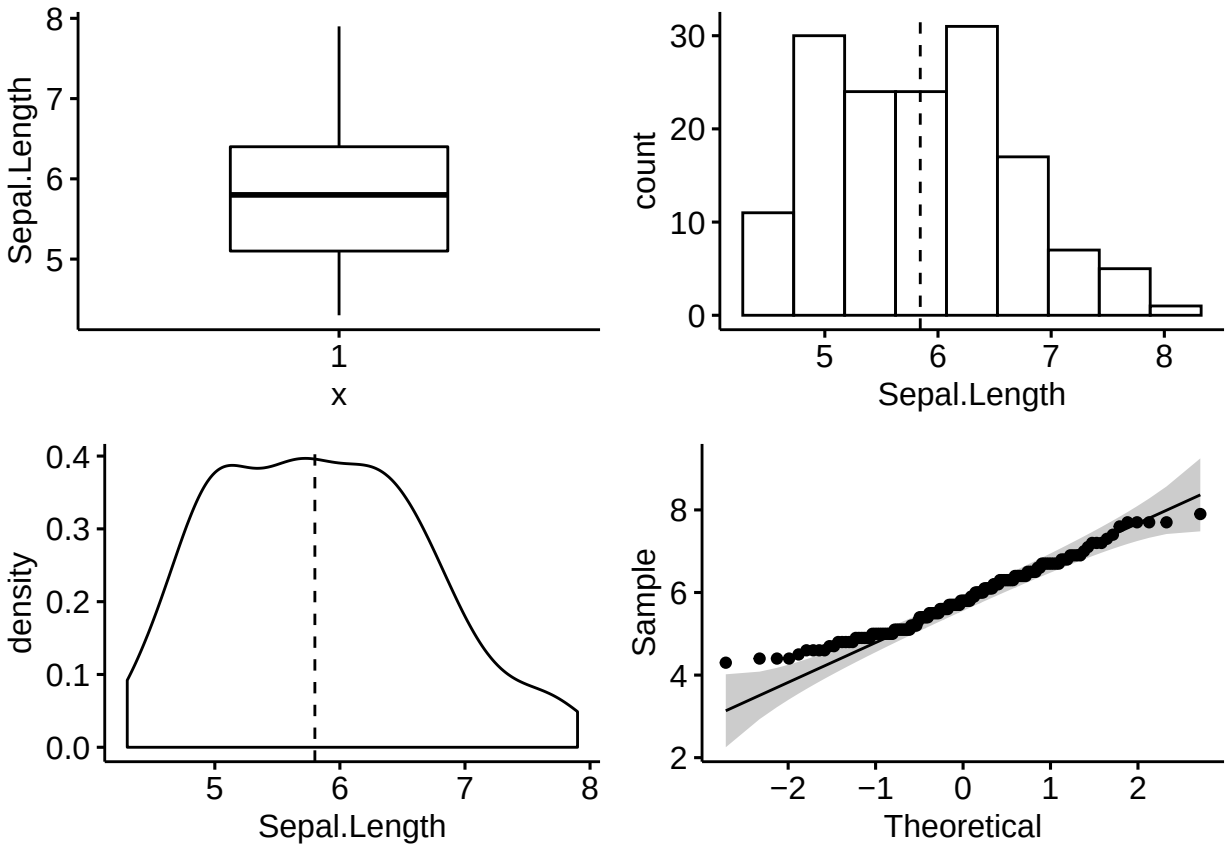
```
ggqqplot(dados, x="Sepal.Length")
```



Combinando os gráficos na mesma área de plotagem

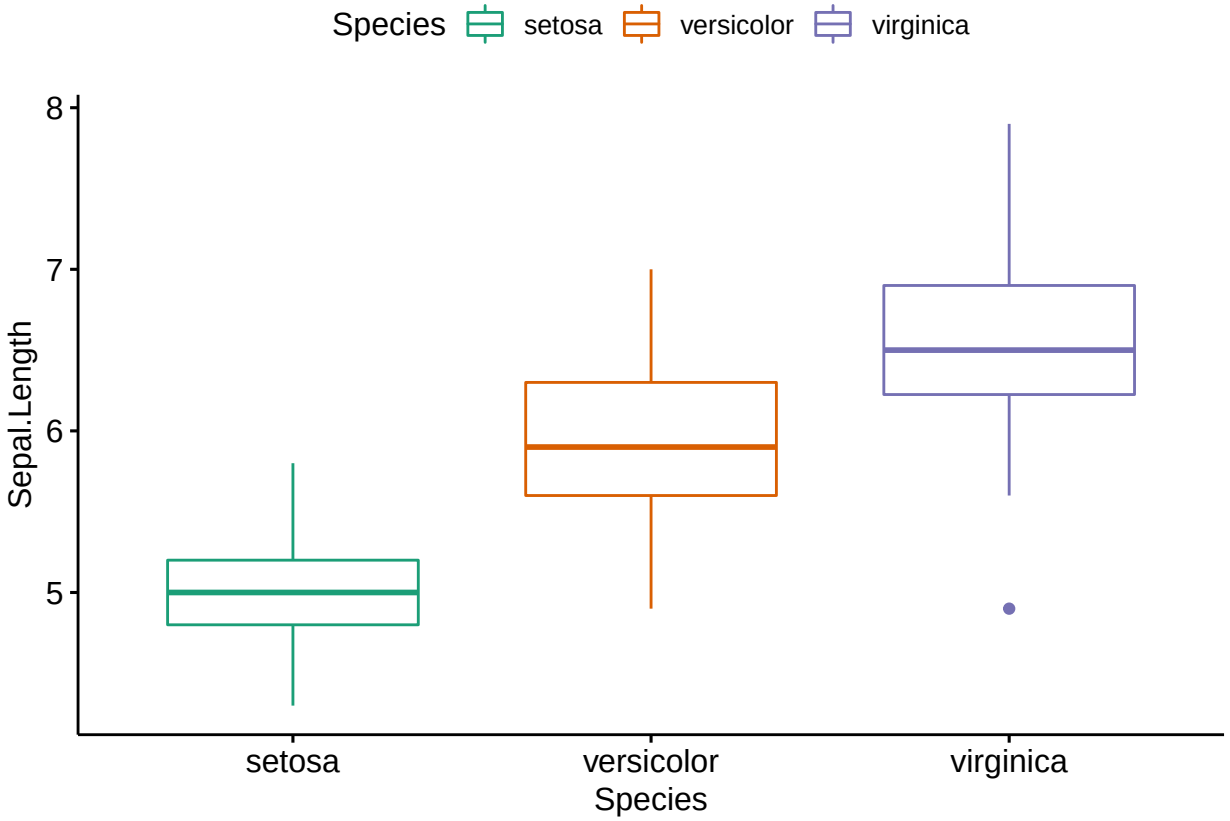
```
bp <- ggboxplot(dados, y="Sepal.Length", width = 0.5)
ht <- gghistogram(dados, x = "Sepal.Length", bins = 9, add = "mean")
ds <- ggdensity(dados, x = "Sepal.Length", add = "median")
dn <- ggqqplot(dados, x="Sepal.Length")

ggarrange(bp, ht, ds, dn)
```



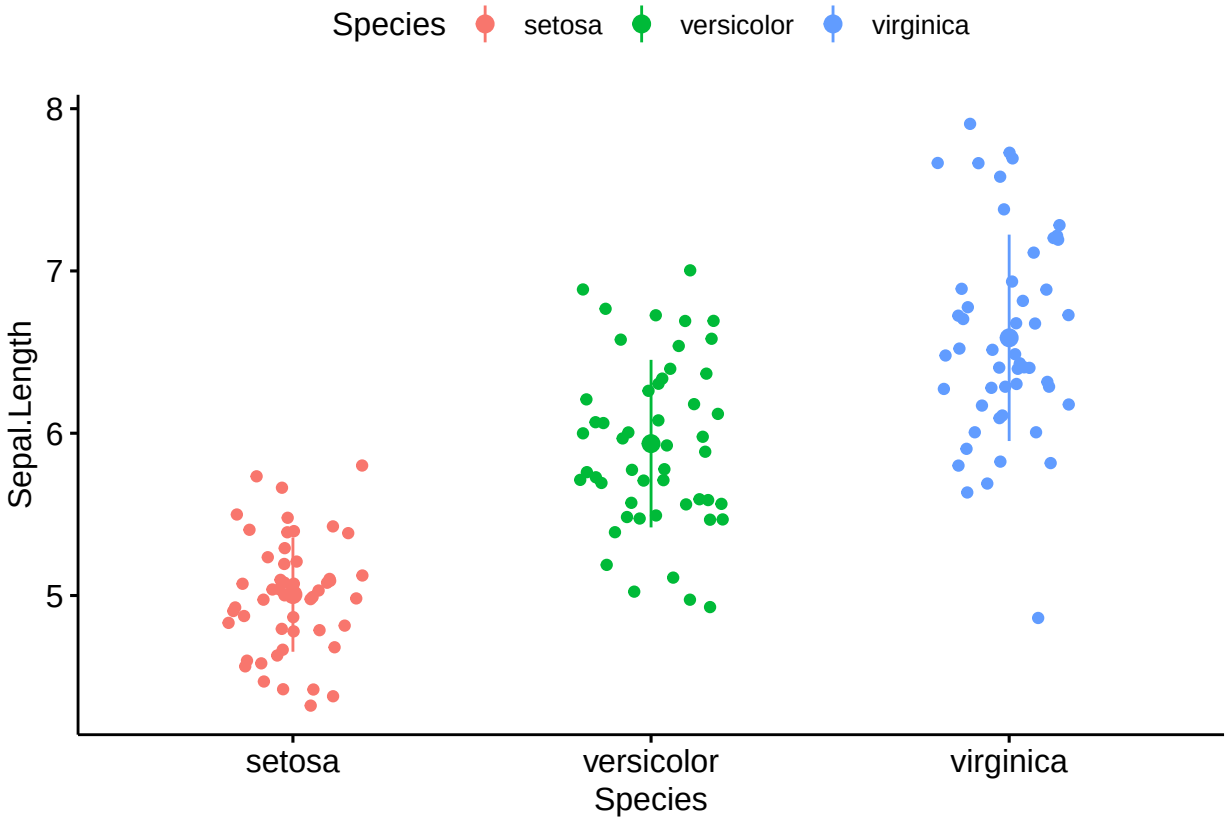
Gráficos para dados agrupados

```
ggboxplot(dados, x = "Species", y = "Sepal.Length",
          color = "Species",
          palette = "Dark2")
```



Os valores permitidos para o parâmetro palette são: "grey" para paleta de cores cinzas; paletas de cores "brewer": "RdBu", "Blues", "Dark2"; Para ver todas: RColorBrewer::display.brewer.all(); paletas customizadas: c("blue", "red"); paletas de jornais científicos do pacote "ggsci": "npg", "aaas", "lancet", "jco", "ucscgb", "uchicago", "simpsons" and "rickandmorty".

```
ggstripchart(dados, x = "Species", y = "Sepal.Length",
             color = "Species",
             palette = "ggsci",
             add = "mean_sd")
```



Conjunto de Dados (Dataset credito.csv)

```
df <- read.csv("credito.csv")
str(df)
```

```
## 'data.frame':    114 obs. of  12 variables:
##  $ Id             : Factor w/ 87 levels "004NZMX60E","017STAOLDV",..: 1 1 2 3 4 5 6 6 6 7 ...
##  $ estado         : Factor w/ 34 levels "AK","AL","AR",..: 4 4 23 23 7 22 23 23 23 26 ...
##  $ sexo           : Factor w/ 2 levels "Female","Male": 2 2 1 2 2 2 1 1 1 2 ...
##  $ idade          : int  36 36 34 48 32 44 60 60 60 48 ...
##  $ raca           : Factor w/ 7 levels "American Indian or Alaska Native",..: 5 5 7 5 7 6 2 2 2 1 ...
##  $ estado_civil   : Factor w/ 3 levels "Divorced","Married",..: 2 2 2 2 3 3 3 3 3 2 ...
##  $ ocupacao       : Factor w/ 5 levels "Accout","Business",..: 5 5 3 1 2 1 4 4 4 1 ...
##  $ score_credito  : int  710 720 720 670 720 540 840 824 824 490 ...
##  $ rendimento     : num  9371 9371 9010 6538 8679 ...
##  $ debitos        : num  2000 3014 1000 2099 1000 ...
##  $ tipo_financ    : Factor w/ 4 levels "Auto","Credit",..: 4 1 2 3 3 4 4 1 2 4 ...
##  $ decisao_financ: Factor w/ 3 levels "Approved","Denied",..: 1 1 1 1 1 2 1 1 1 2 ...
```

Tabelas de frequência

Usada para descrever variáveis categóricas. Contém as contagens de cada combinação dos níveis dos fatores.

```
tipo.financiamento <- df$tipo_financ
ocupacao <- df$ocupacao
parecer <- df$decisao_financ
```

Distribuição de frequência:

```
table(tipo.financiamento)
```

```
## tipo.financiamento
##     Auto   Credit     Home Personal
##       40       17       23       34
```

```
table(ocupacao)
```

```
## ocupacao
##   Accout Business       IT  Manager     NYPD
##       18       15       27       26       28
```

```
table(parecer)
```

```
## parecer
##  Approved    Denied Withdrawn
##        70        32        12
```

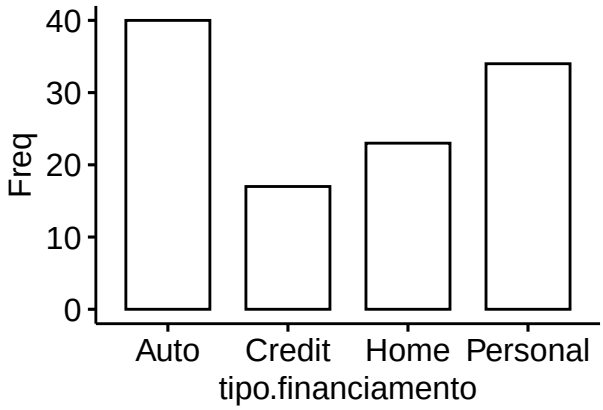
Convertendo as tabelas para dataframes

```
df_fin <- as.data.frame(table(tipo.financiamento))
df_oc <- as.data.frame(table(ocupacao))
df_par <- as.data.frame(table(parecer))
```

Gráfico de barras

```
fin <- ggbarplot(df_fin, x="tipo.financiamento", y="Freq")
oc <- ggbarplot(df_oc, x="ocupacao", y="Freq")
par <- ggbarplot(df_par, x="parecer", y="Freq")

ggarrange(fin, oc, par)
```



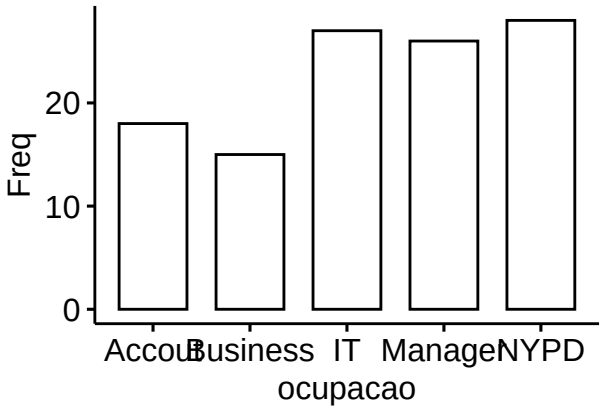


Gráfico de pizza

```
ggpie(df_par, x="Freq", label = "parecer",
      color = "white",
      fill = "parecer",
      palette = c("blue", "red", "gray"))
```

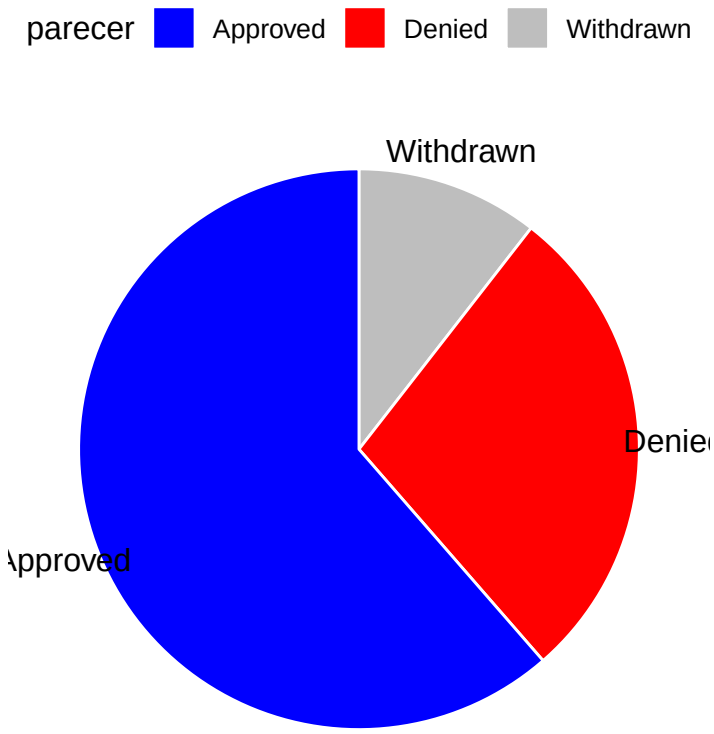


Tabela com duas variáveis categóricas

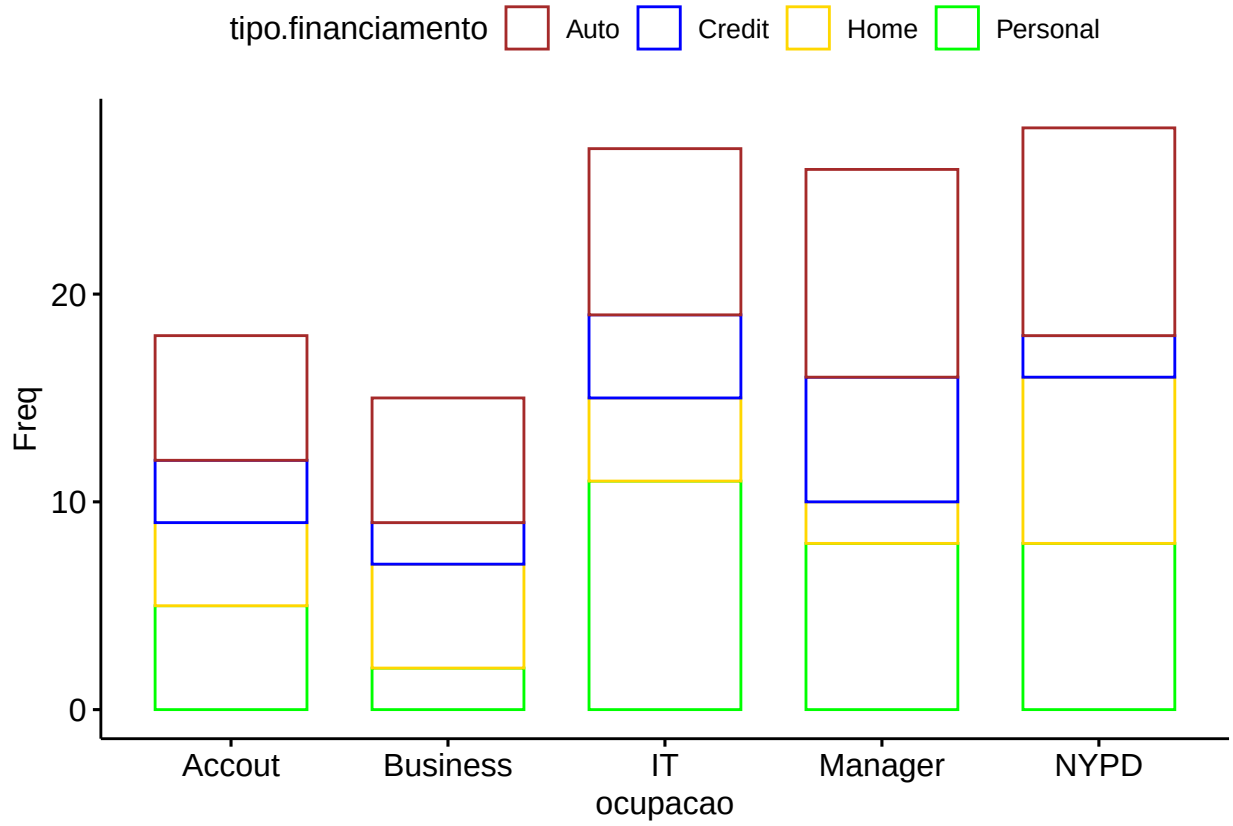
```
tbl2 <- table(tipo.financiamento, ocupacao)
tbl2
```

```
##                   ocupacao
## tipo.financiamento Accout Business IT Manager NYPD
##           Auto          6        6  8      10   10
##           Credit        3        2  4       6    2
##           Home          4        5  4       2    8
##           Personal      5        2 11       8    8
```

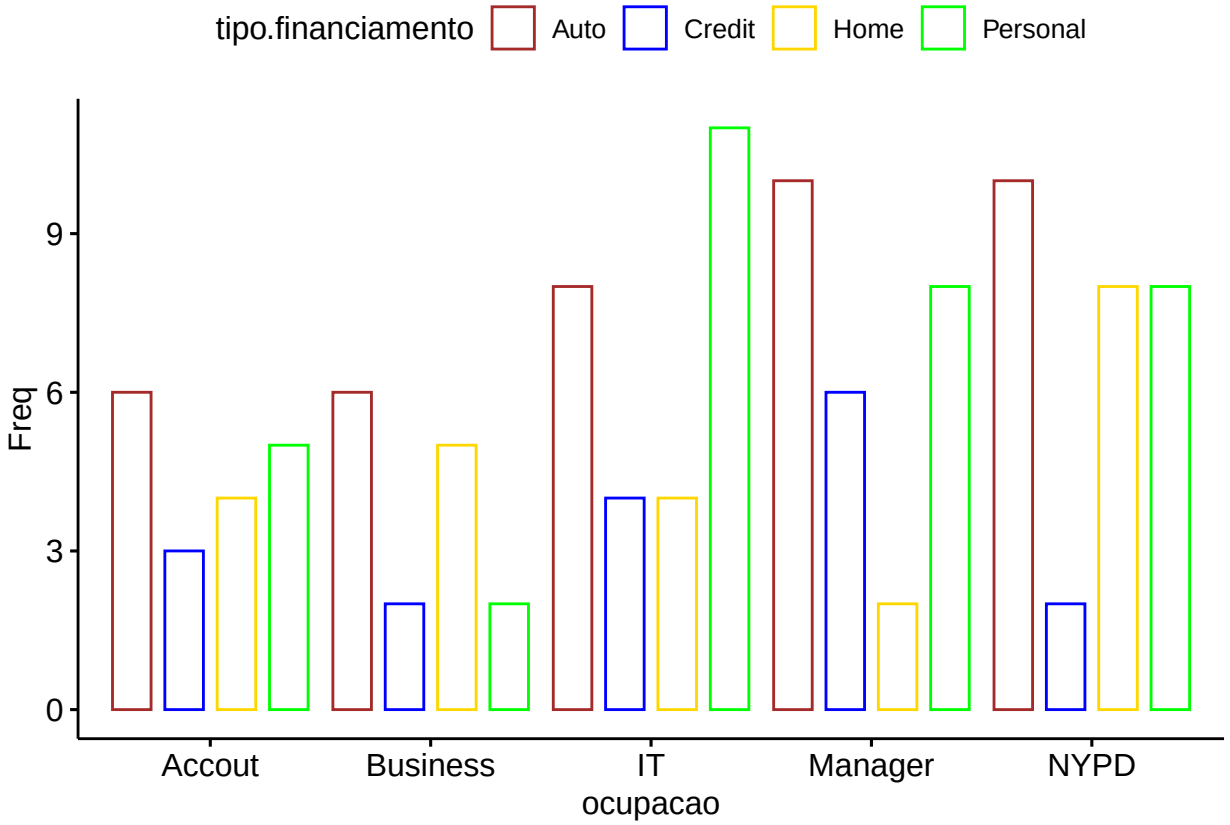
Transformando a tabela em um dataframe para visualizar o gráfico de barras

```
df2 <- as.data.frame(tbl2)

ggbarplot(df2, x="ocupacao", y="Freq",
          color = "tipo.financiamento",
          palette = c("brown", "blue", "gold", "green"))
```




```
ggbarplot(df2, x = "ocupacao", y = "Freq",
          color = "tipo.financiamento", position = position_dodge(),
          palette = c("brown", "blue", "gold", "green"))
```



Frequência relativa com a função prop.table() Segundo parâmetro: 1 para linhas e 2 para colunas

```
prop.table(tbl2, 1)
```

```
##                   ocupacao
## tipo.financiamento     Accout   Business         IT    Manager       NYPD
##           Auto     0.15000000 0.15000000 0.20000000 0.25000000 0.25000000
##           Credit   0.17647059 0.11764706 0.23529412 0.35294118 0.11764706
##           Home     0.17391304 0.21739130 0.17391304 0.08695652 0.34782609
##           Personal 0.14705882 0.05882353 0.32352941 0.23529412 0.23529412
```

```
prop.table(tbl2, 2)
```

```
##                   ocupacao
## tipo.financiamento     Accout   Business         IT    Manager       NYPD
##           Auto     0.33333333 0.40000000 0.29629630 0.38461538 0.35714286
##           Credit   0.16666667 0.13333333 0.14814815 0.23076923 0.07142857
##           Home     0.22222222 0.33333333 0.14814815 0.07692308 0.28571429
##           Personal 0.27777778 0.13333333 0.40740741 0.30769231 0.28571429
```

Percentuais

```
round(prop.table(tbl2, 1), 2)*100
```

```
##                   ocupacao
```

```
## tipo.financiamento Accout Business IT Manager NYPD
##            Auto         15       15 20      25   25
##            Credit       18       12 24      35   12
##            Home         17       22 17       9   35
##            Personal     15        6 32      24   24
```