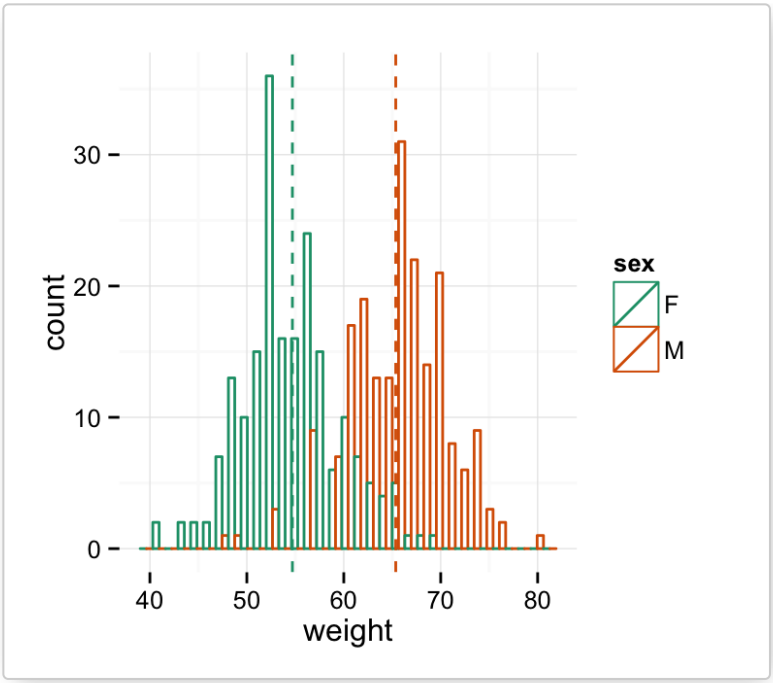
ggplot2 histogram plot : Quick start guide - R software and data visualization

This **R tutorial** describes how to create a **histogram plot** using **R software** and **ggplot2** package.

The function **geom_histogram()** is used. You can also add a line for the mean using the function geom_vline.



Prepare the data

The data below will be used :

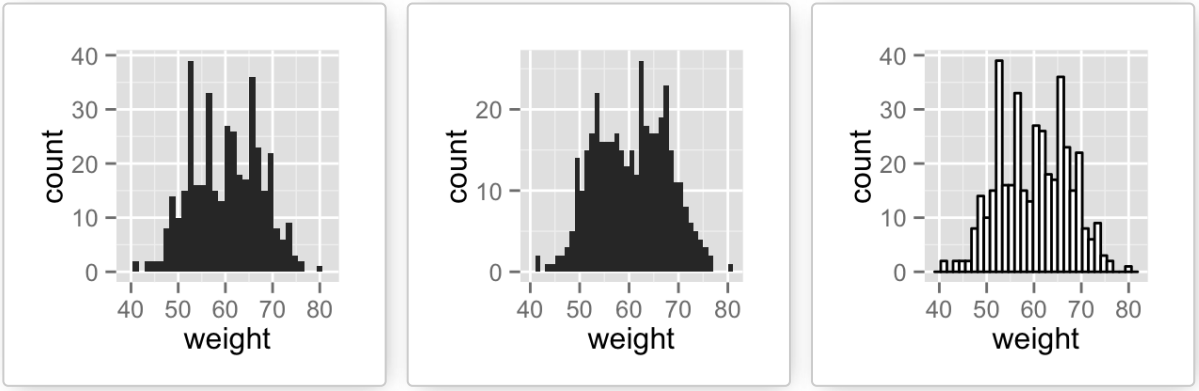
```
set.seed(1234)
df <- data.frame(
  sex=factor(rep(c("F", "M"), each=200)),
  weight=round(c(rnorm(200, mean=55, sd=5), rnorm(200, mean=65, sd=5)))
  )
head(df)
```

```
##   sex weight
## 1   F     49
## 2   F     56
## 3   F     60
## 4   F     43
## 5   F     57
## 6   F     58
```

Basic histogram plots

```
library(ggplot2)
# Basic histogram
ggplot(df, aes(x=weight)) + geom_histogram()
# Change the width of bins
ggplot(df, aes(x=weight)) +
  geom_histogram(binwidth=1)
# Change colors
p<-ggplot(df, aes(x=weight)) +
```

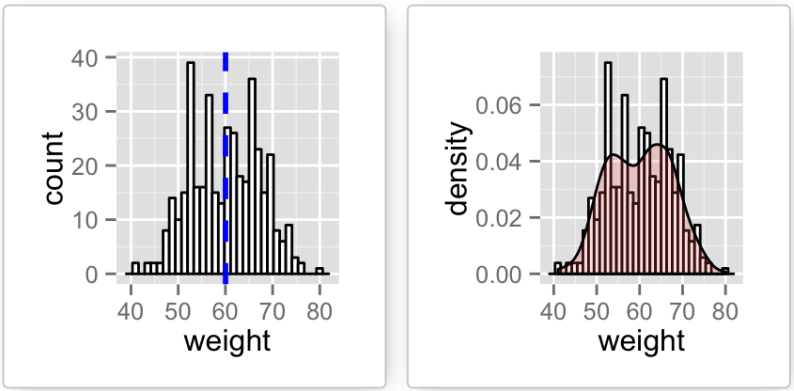
```
  geom_histogram(color="black", fill="white")
p
```



Add mean line and density plot on the histogram

- The histogram is plotted with density instead of count on y-axis
- Overlay with transparent density plot. The value of *alpha* controls the level of transparency

```
# Add mean line
p+ geom_vline(aes(xintercept=mean(weight)),
            color="blue", linetype="dashed", size=1)
# Histogram with density plot
ggplot(df, aes(x=weight)) +
 geom_histogram(aes(y=..density..), colour="black", fill="white")+
 geom_density(alpha=.2, fill="#FF6666")
```

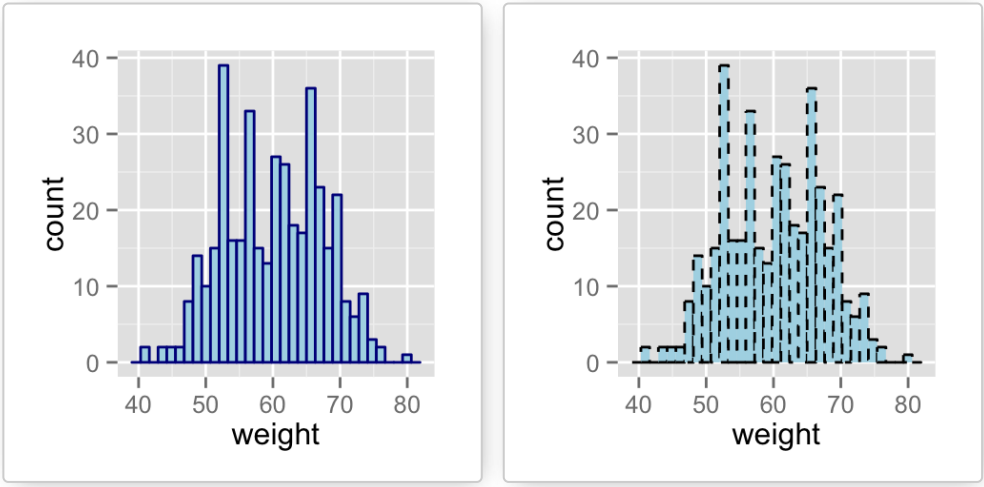


Read more on ggplot2 line types : ggplot2 line types

Change histogram plot line types and colors

```
# Change line color and fill color
ggplot(df, aes(x=weight))+
  geom_histogram(color="darkblue", fill="lightblue")
# Change line type
ggplot(df, aes(x=weight))+
```

```
  geom_histogram(color="black", fill="lightblue",
                 linetype="dashed")
```



Change histogram plot colors by groups

Calculate the mean of each group :

The package **plyr** is used to calculate the average weight of each group :

```
library(plyr)
mu <- ddply(df, "sex", summarise, grp.mean=mean(weight))
head(mu)
```

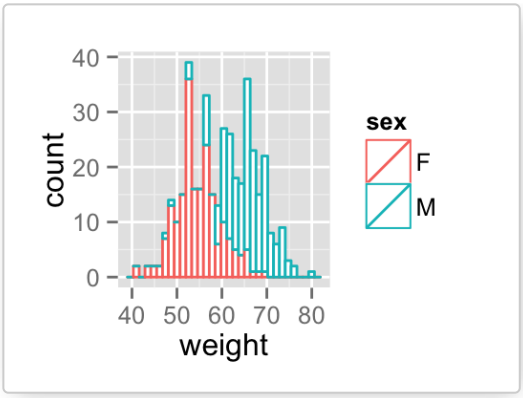
```
##   sex grp.mean
## 1   F    54.70
## 2   M    65.36
```

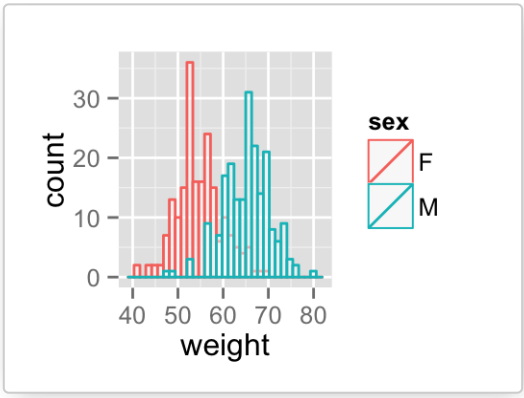
Change line colors

Histogram plot line colors can be automatically controlled by the levels of the variable *sex*.

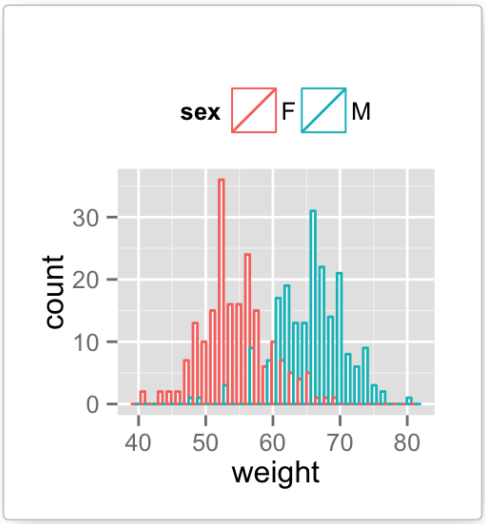
Note that, you can change the position adjustment to use for overlapping points on the layer. Possible values for the argument **position** are “identity”, “stack”, “dodge”. Default value is “stack”.

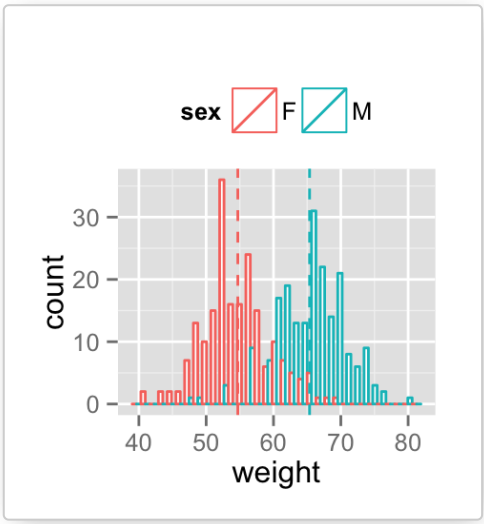
```
# Change histogram plot line colors by groups
ggplot(df, aes(x=weight, color=sex)) +
  geom_histogram(fill="white")
# Overlaid histograms
ggplot(df, aes(x=weight, color=sex)) +
  geom_histogram(fill="white", alpha=0.5, position="identity")
```






```
# Interleaved histograms
ggplot(df, aes(x=weight, color=sex)) +
  geom_histogram(fill="white", position="dodge")+
  theme(legend.position="top")
# Add mean lines
p<-ggplot(df, aes(x=weight, color=sex)) +
  geom_histogram(fill="white", position="dodge")+
  geom_vline(data=mu, aes(xintercept=grp.mean, color=sex),
             linetype="dashed")+
  theme(legend.position="top")
p
```

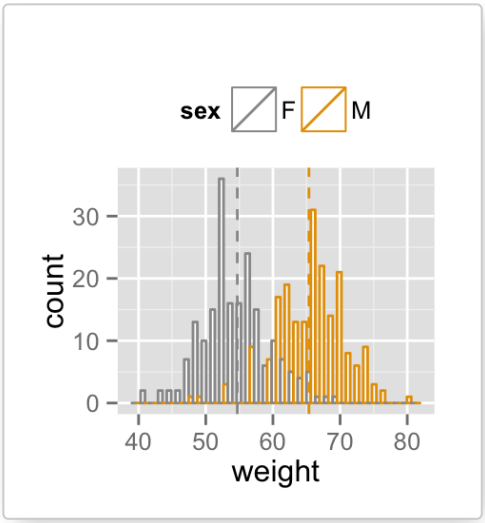


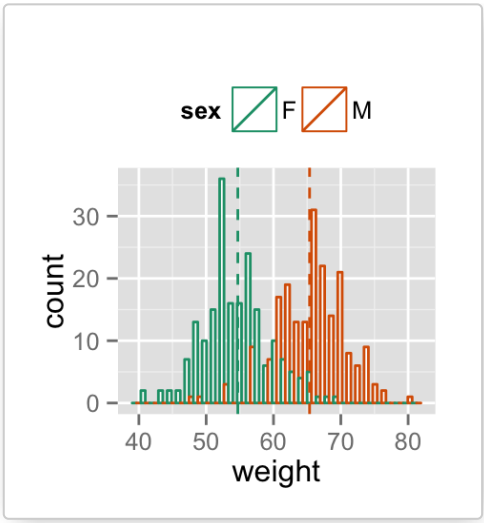


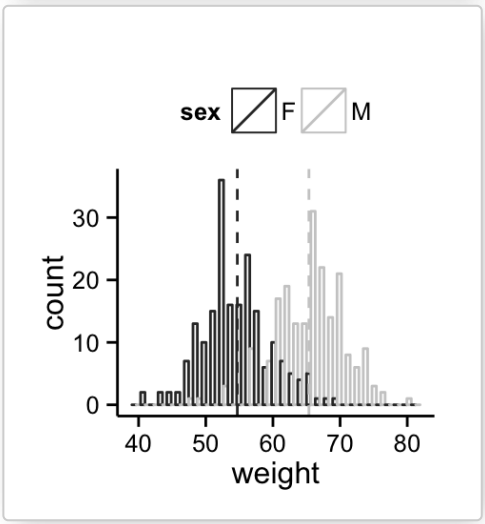
It is also possible to *change manually histogram plot line colors* using the functions :

- *scale_color_manual()* : to use custom colors
- *scale_color_brewer()* : to use color palettes from *RColorBrewer* package
- *scale_color_grey()* : to use grey color palettes

```
# Use custom color palettes
p+scale_color_manual(values=c("#999999", "#E69F00", "#56B4E9"))
# Use brewer color palettes
p+scale_color_brewer(palette="Dark2")
# Use grey scale
p + scale_color_grey() + theme_classic() +
  theme(legend.position="top")
```





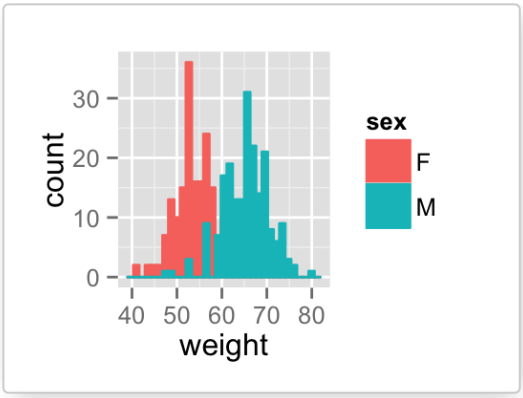


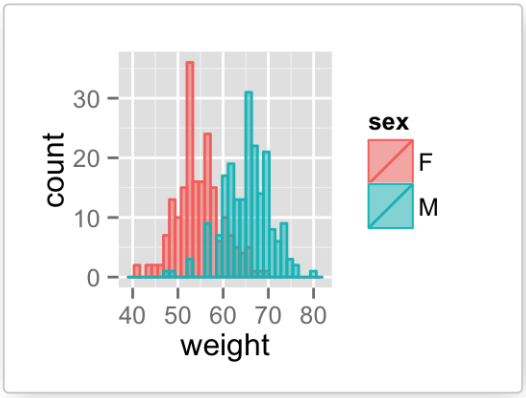
Read more on ggplot2 colors here : ggplot2 colors

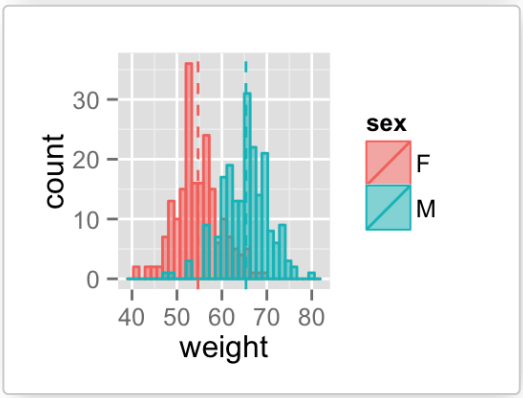
Change fill colors

Histogram plot fill colors can be automatically controlled by the levels of *sex* :

```
# Change histogram plot fill colors by groups
ggplot(df, aes(x=weight, fill=sex, color=sex)) +
  geom_histogram(position="identity")
# Use semi-transparent fill
p<-ggplot(df, aes(x=weight, fill=sex, color=sex)) +
  geom_histogram(position="identity", alpha=0.5)
p
# Add mean lines
p+geom_vline(data=mu, aes(xintercept=grp.mean, color=sex),
             linetype="dashed")
```



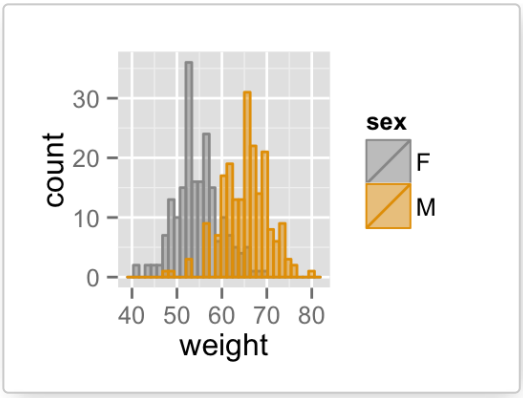


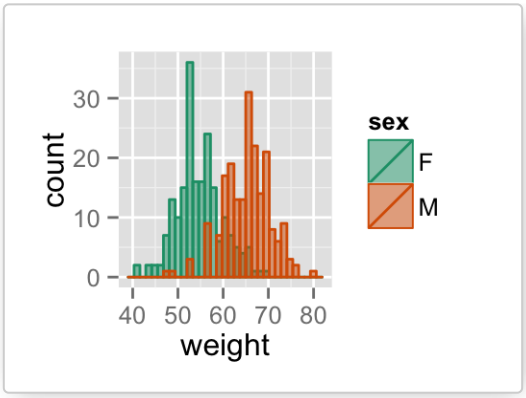


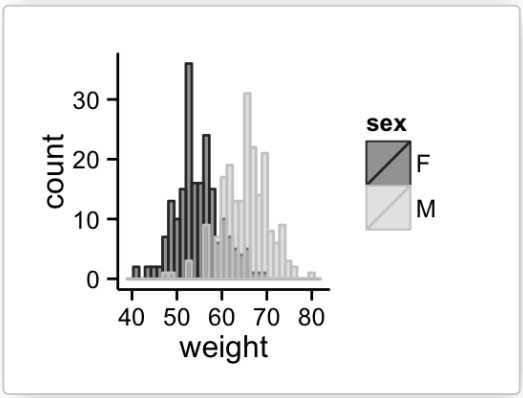
It is also possible to change manually histogram plot fill colors using the functions :

- *scale_fill_manual()* : to use custom colors
- *scale_fill_brewer()* : to use color palettes from *RColorBrewer* package
- *scale_fill_grey()* : to use grey color palettes

```
# Use custom color palettes
p+scale_color_manual(values=c("#999999", "#E69F00", "#56B4E9"))+
  scale_fill_manual(values=c("#999999", "#E69F00", "#56B4E9"))
# use brewer color palettes
p+scale_color_brewer(palette="Dark2")+
  scale_fill_brewer(palette="Dark2")
# Use grey scale
p + scale_color_grey()+scale_fill_grey() +
  theme_classic()
```



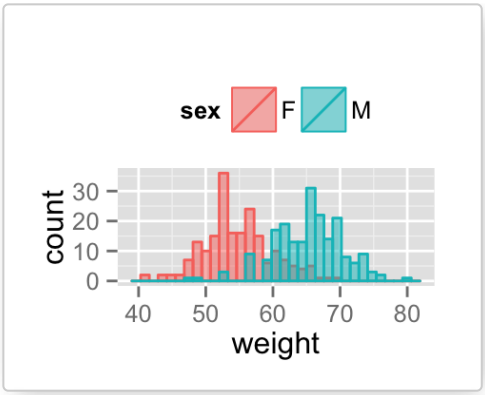


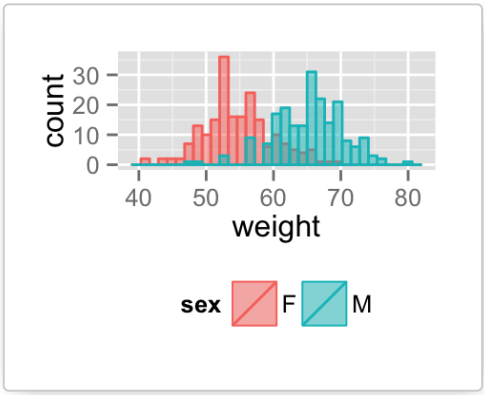


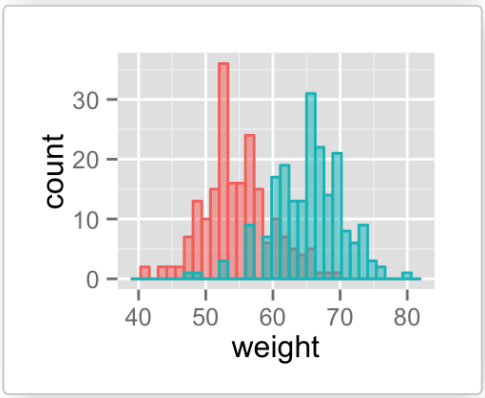
Read more on ggplot2 colors here : ggplot2 colors

Change the legend position

```
p + theme(legend.position="top")
p + theme(legend.position="bottom")
# Remove legend
p + theme(legend.position="none")
```







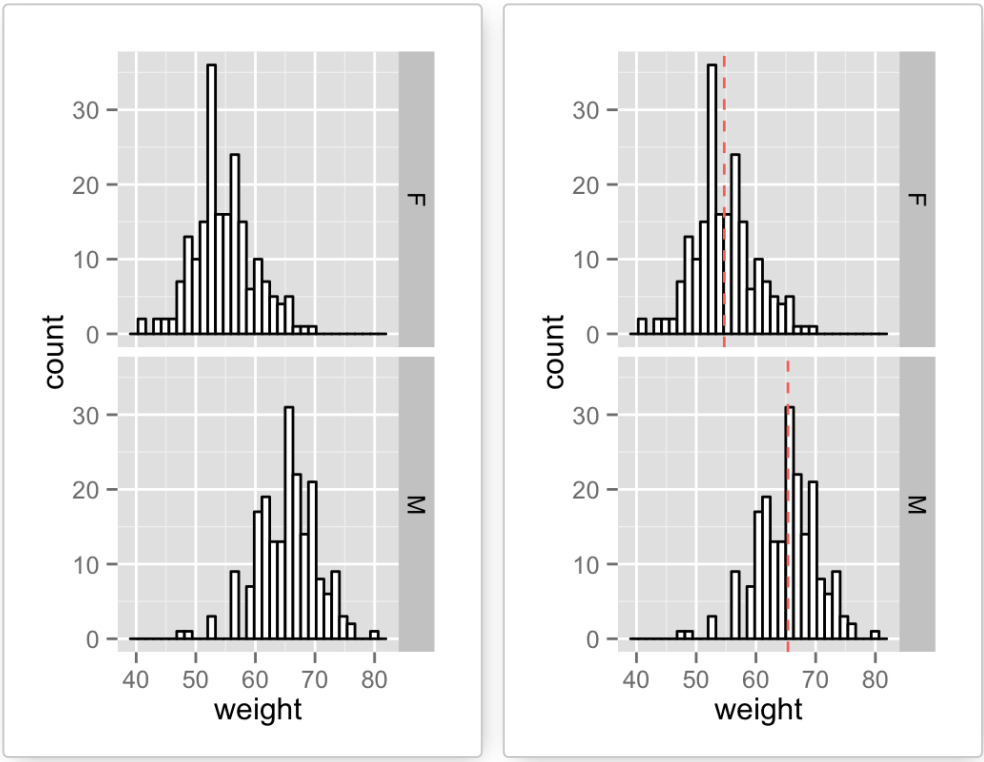
The allowed values for the arguments **legend.position** are : "left","top", "right", "bottom".

Read more on ggplot legends : ggplot2 legends

Use facets

Split the plot into multiple panels :

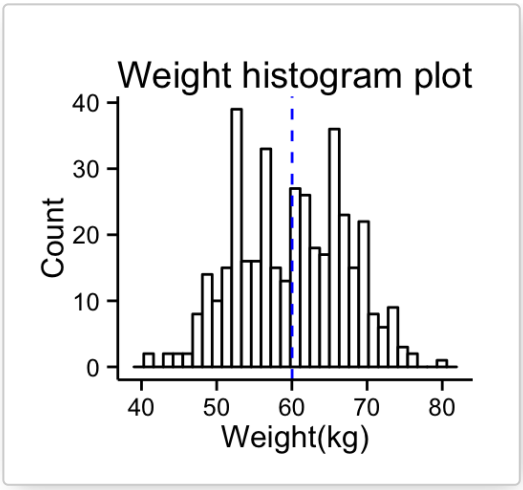
```
p<-ggplot(df, aes(x=weight))+
  geom_histogram(color="black", fill="white")+
  facet_grid(sex ~ .)
p
# Add mean lines
p+geom_vline(data=mu, aes(xintercept=grp.mean, color="red"),
             linetype="dashed")
```



Read more on facets : ggplot2 facets

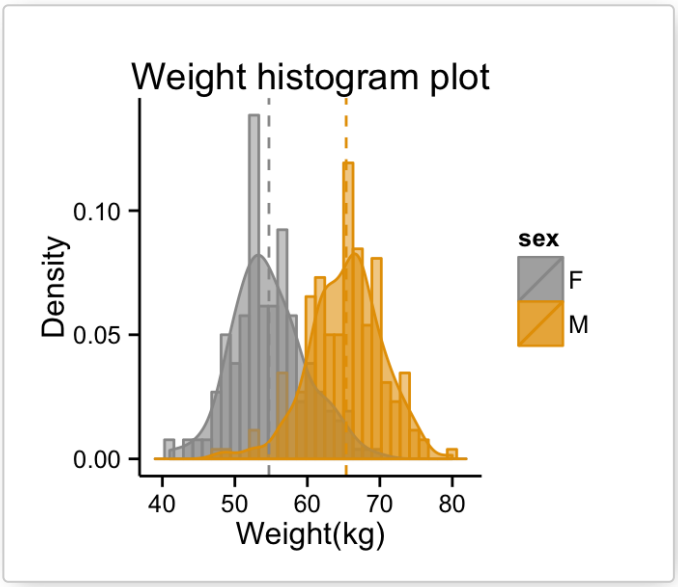
Customized histogram plots

```
# Basic histogram
ggplot(df, aes(x=weight, fill=sex)) +
  geom_histogram(fill="white", color="black")+
  geom_vline(aes(xintercept=mean(weight)), color="blue",
             linetype="dashed")+
  labs(title="Weight histogram plot",x="Weight(kg)", y = "Count")+
  theme_classic()
# Change line colors by groups
ggplot(df, aes(x=weight, color=sex, fill=sex)) +
  geom_histogram(position="identity", alpha=0.5)+
  geom_vline(data=mu, aes(xintercept=grp.mean, color=sex),
             linetype="dashed")+
  scale_color_manual(values=c("#999999", "#E69F00", "#56B4E9"))+
  scale_fill_manual(values=c("#999999", "#E69F00", "#56B4E9"))+
  labs(title="Weight histogram plot",x="Weight(kg)", y = "Count")+
  theme_classic()
```



Combine histogram and density plots :

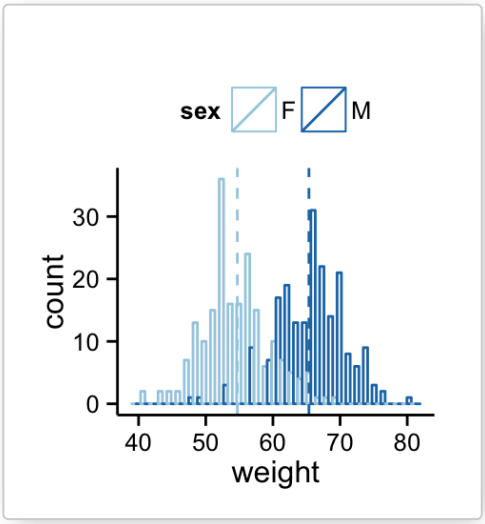
```
# Change line colors by groups
ggplot(df, aes(x=weight, color=sex, fill=sex)) +
geom_histogram(aes(y=..density..), position="identity", alpha=0.5)+
geom_density(alpha=0.6)+
geom_vline(data=mu, aes(xintercept=grp.mean, color=sex),
           linetype="dashed")+
scale_color_manual(values=c("#999999", "#E69F00", "#56B4E9"))+
scale_fill_manual(values=c("#999999", "#E69F00", "#56B4E9"))+
labs(title="Weight histogram plot",x="Weight(kg)", y = "Density")+
theme_classic()
```

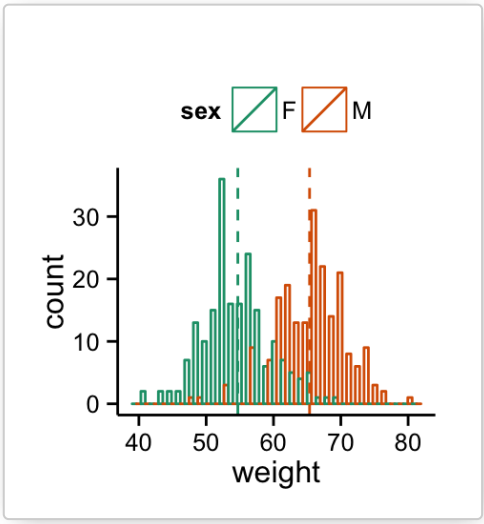


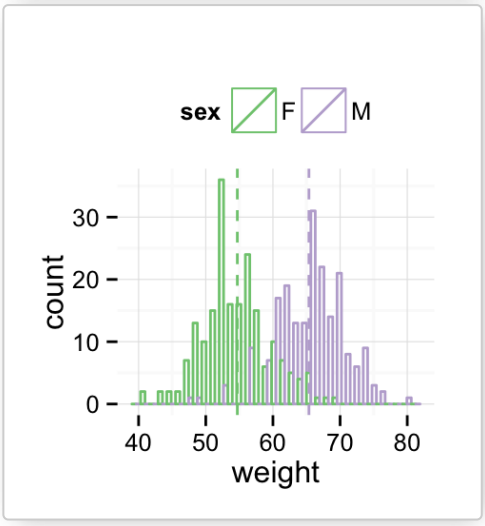
Change line colors manually :

```
p<-ggplot(df, aes(x=weight, color=sex)) +
  geom_histogram(fill="white", position="dodge")+
  geom_vline(data=mu, aes(xintercept=grp.mean, color=sex),
             linetype="dashed")
# Continuous colors
p + scale_color_brewer(palette="Paired") +
  theme_classic()+theme(legend.position="top")
```

```
# Discrete colors
p + scale_color_brewer(palette="Dark2") +
  theme_minimal()+theme_classic()+theme(legend.position="top")
# Gradient colors
p + scale_color_brewer(palette="Accent") +
  theme_minimal()+theme(legend.position="top")
```







Read more on ggplot2 colors here : ggplot2 colors

Infos

This analysis has been performed using **R software** (ver. 3.1.2) and **ggplot2** (ver. 1.0.0)

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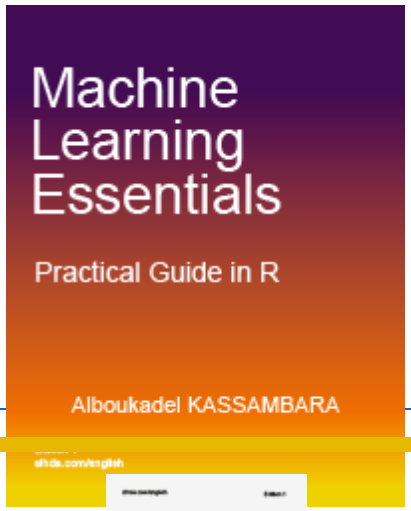

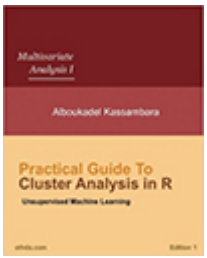

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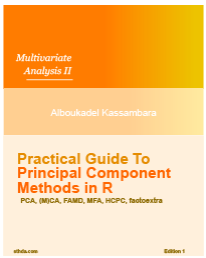

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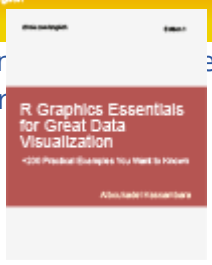

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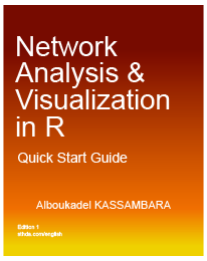

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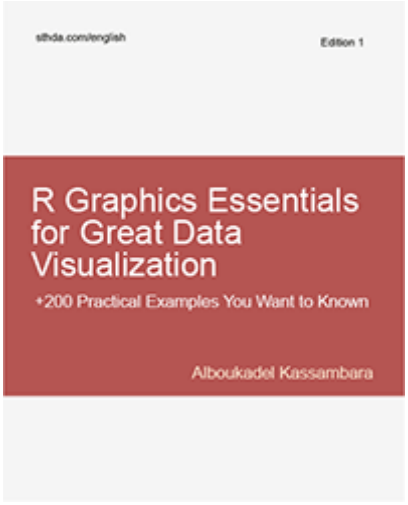

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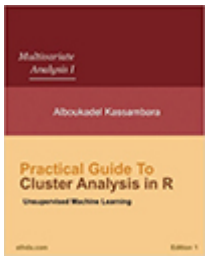
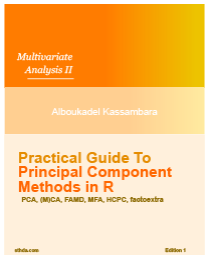
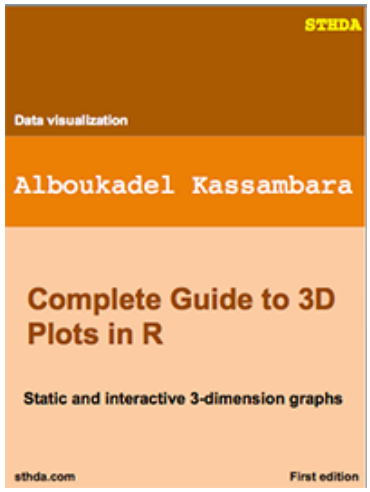


Practical Guide to Cluster Analysis in R



Practical Guide to Principal Component Methods in R

3D Plots in R



Guest Book

Thanks Mr Kassambara for the great work and energy to share knowledge!! Really love your work!! Keep on going!!

By *Visitor*

Guest Book