

ggplot Part I

Workshop on Data Visualization in R

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NBIS, SciLifeLab

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Grammar of Graphics



- **Data:** Input data
- **Geom:** A geometry representing data. Points, Lines etc
- **Aesthetics:** Visual characteristics of the geometry. Size, Color, Shape etc
- **Scale:** How visual characteristics are converted to display values
- **Statistics:** Statistical transformations. Counts, Means etc
- **Coordinates:** Numeric system to determine position of geometry. Cartesian, Polar etc
- **Facets:** Split data into subsets

Building a graph

```
ggplot (data = <DATA>) +
```

```
<GEOM_FUNCTION> (mapping = aes(<MAPPINGS>),
```

```
stat = <STAT> , position = <POSITION>) +
```

```
<COORDINATE_FUNCTION> +
```

```
<FACET_FUNCTION> +
```

```
<SCALE_FUNCTION> +
```

```
<THEME_FUNCTION>
```

required

Not
required,
sensible
defaults
supplied

Build-Demo

```
ggplot(iris)
```



Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width))
```



Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width))+  
  geom_point()
```



Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width,  
                colour=Species))+  
  geom_point()
```

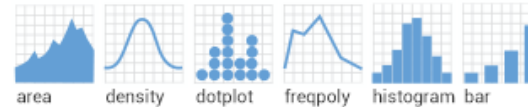


Geoms

Basic



One variable



Two variables



Error



Three variables



Map



```
p <- ggplot(iris)
# scatterplot
p+geom_point(aes(x=Sepal.Length,y=Sepal.Width))
# barplot
p+geom_bar(aes(x=Sepal.Length))
# boxplot
p+geom_boxplot(aes(x=Species,y=Sepal.Width))
# search
help.search("^geom_",package="ggplot2")
```

Aesthetics

- Aesthetic mapping vs aesthetic parameter

```
ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                y=Sepal.Width,  
                size=Petal.Length,  
                alpha=Petal.Width,  
                shape=Species,  
                color=Species))
```



```
ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                y=Sepal.Width,  
                size=2,  
                alpha=0.8,  
                shape=15,  
                color="steelblue"))
```



Multiple geoms

```
ggplot(iris,aes(x=Sepal.Length,y=Sepal.Width))+  
  geom_point()+  
  geom_line()+  
  geom_smooth()+  
  geom_rug()+  
  geom_step()+  
  geom_text(data=subset(iris,iris$Species=="setosa"),aes(label=Species))
```

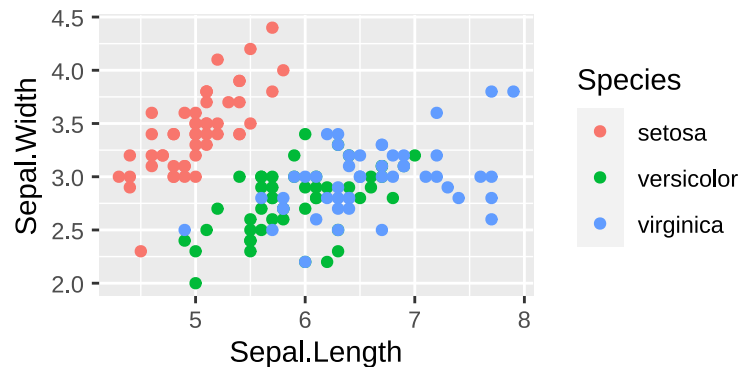


Scales • Discrete Colors

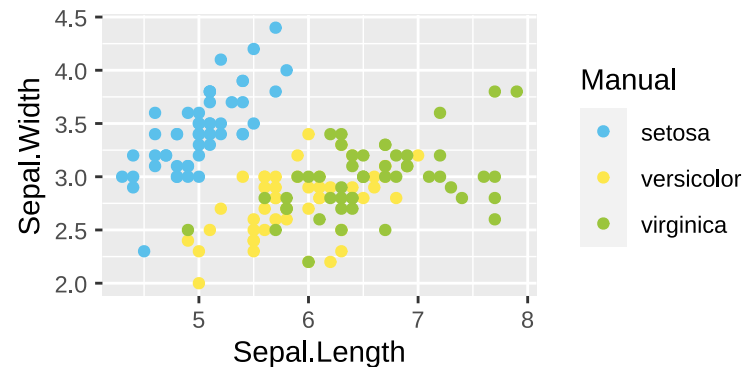
- scales: position, color, fill, size, shape, alpha, linetype
- syntax: `scale_<aesthetic>_<type>`



```
p <- ggplot(iris)+geom_point(aes(x=Sepal.Length,  
                                y=Sepal.Width,color=Species))  
p
```



```
p + scale_color_manual(  
  name="Manual",  
  values=c("#5BC0EB", "#FDE74C", "#9BC53D"))
```



Scales • Continuous Colors

- In RStudio, type `scale_`, then press **TAB**

```
p <- ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                 y=Sepal.Width,  
                 shape=Species,color=Petal.Length))  
p
```



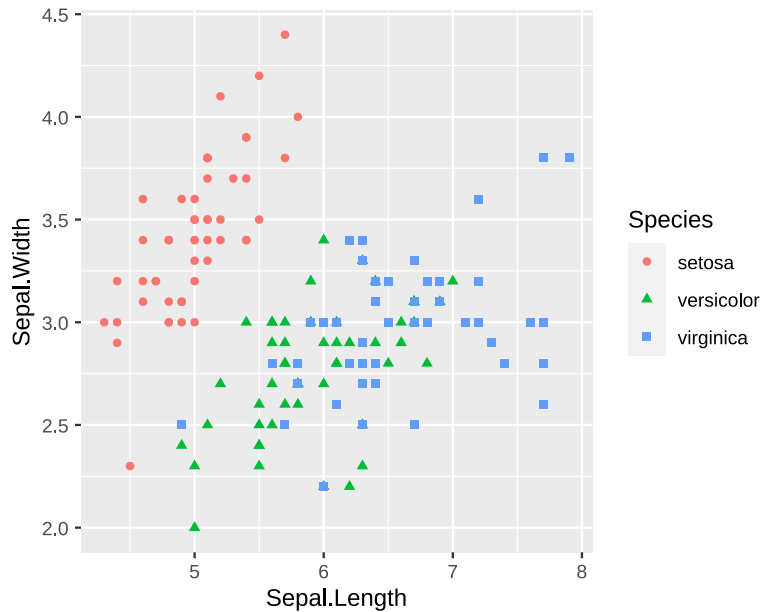
```
p +  
  scale_color_gradient(name="Pet Len",  
                       breaks=range(iris$Petal.Length),  
                       labels=c("Min", "Max"),  
                       low="black", high="red")
```



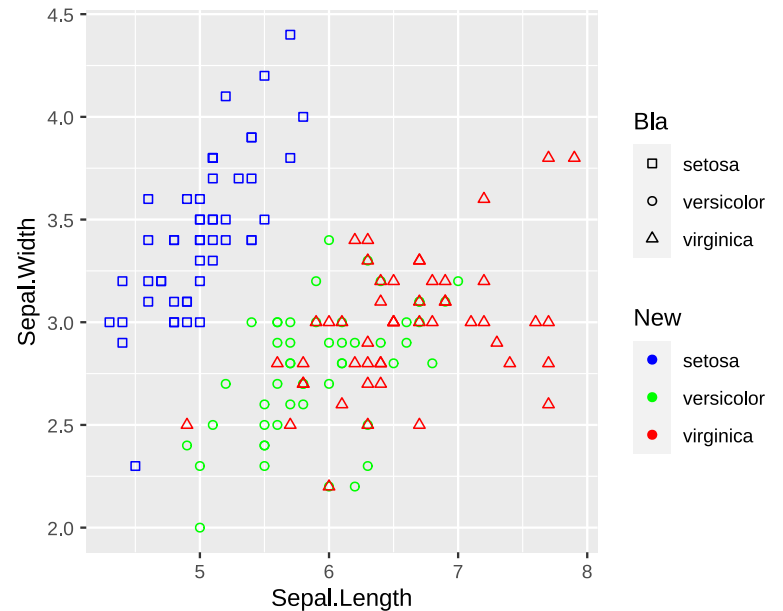
Scales • Shape

```
p <- ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                y=Sepal.Width,  
                shape=Species,color=Species))
```

p



```
p +  
  scale_color_manual(name="New",  
                    values=c("blue","green","red"))+  
  scale_shape_manual(name="Bla",values=c(0,1,
```



Facets • **facet_wrap**

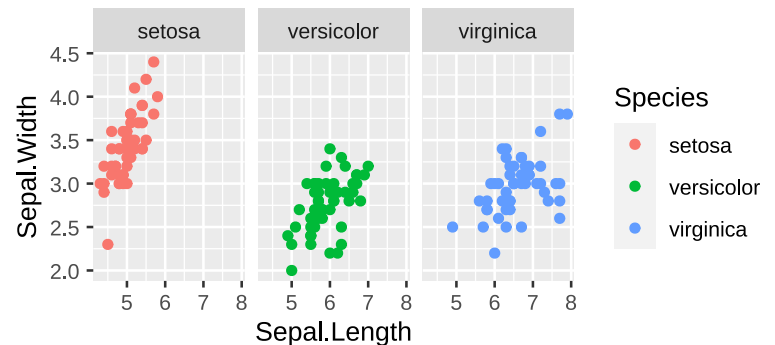
- Split to subplots based on variable(s)
- Facetting in one dimension

```
p <- ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                 y=Sepal.Width,  
                 color=Species))
```

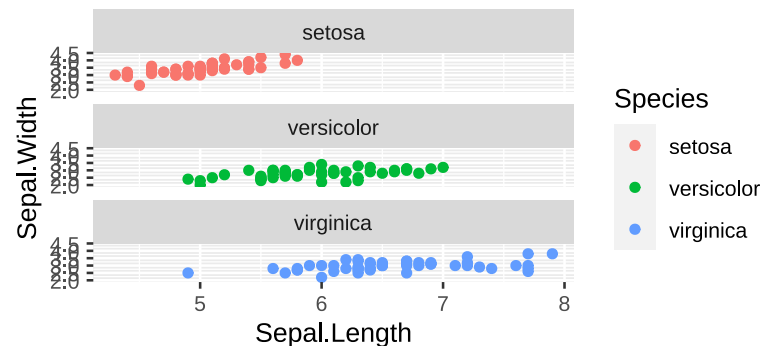
p



```
p + facet_wrap(~Species)
```



```
p + facet_wrap(~Species, nrow=3)
```





Thank you. Questions?

R version 4.1.3 (2022-03-10)

Platform: x86_64-pc-linux-gnu (64-bit)

OS: Ubuntu 18.04.6 LTS

Built on: 📅 18-Oct-2022 at 🕒 09:48:25

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