

Modifying a Ggplot

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Modifying a Ggplot



Data visualization types and their geoms

- Histogram, box plot, bar chart
- Exploring the common code structure

Accessing the plot layout via the theme

- Ready made themes and manual editing

The guide elements of a plot: Legend and axes

Text based plot elements

Course summary and further resources



Data Visualization Types and their Geoms



Plot type is defined in
the geom

The suitable plot type
depends on the
variables

Mostly numeric
variables and factors

```
ggplot(data, aes( ))
```



```
geom_type( )
```



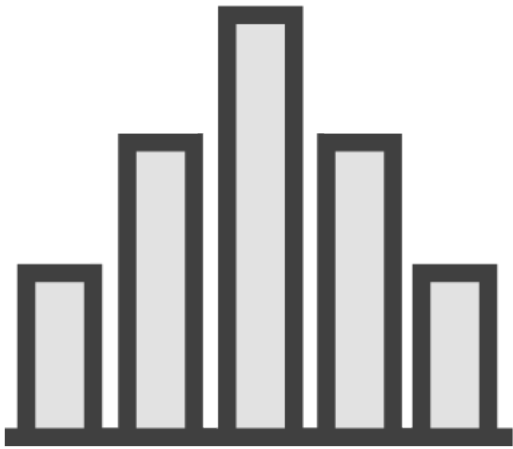
```
geom_annotation(optional)
```



```
theme(optional)
```



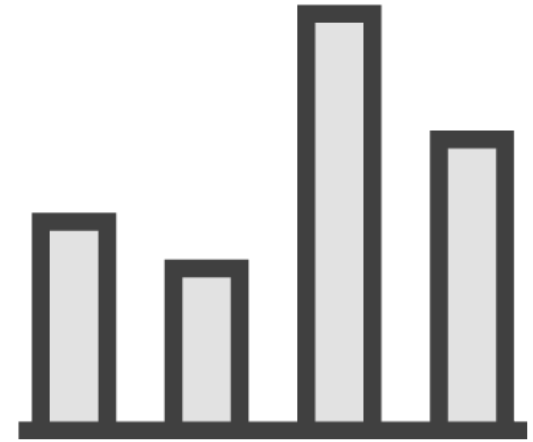
Selecting Plot Types with ggplot2 Geoms



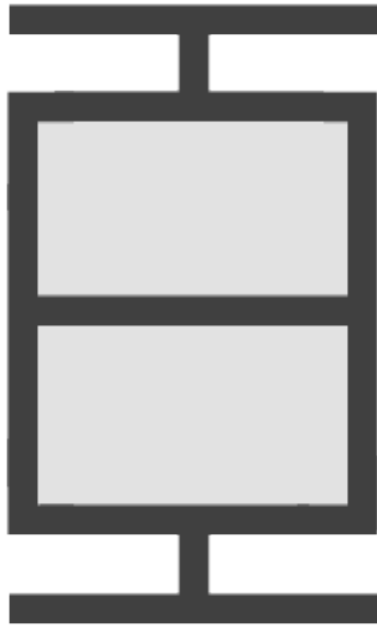
Histogram
`geom_histogram()`



Box plot
`geom_boxplot()`



Bar chart
`geom_bar()`



Required variables:

- 1 factor e.g. 'SHOP.ID'
- 1 numeric variable e.g. 'QUANTITY', 'REVENUE'

Variables are provided in the ggplot(), no formula argument is required



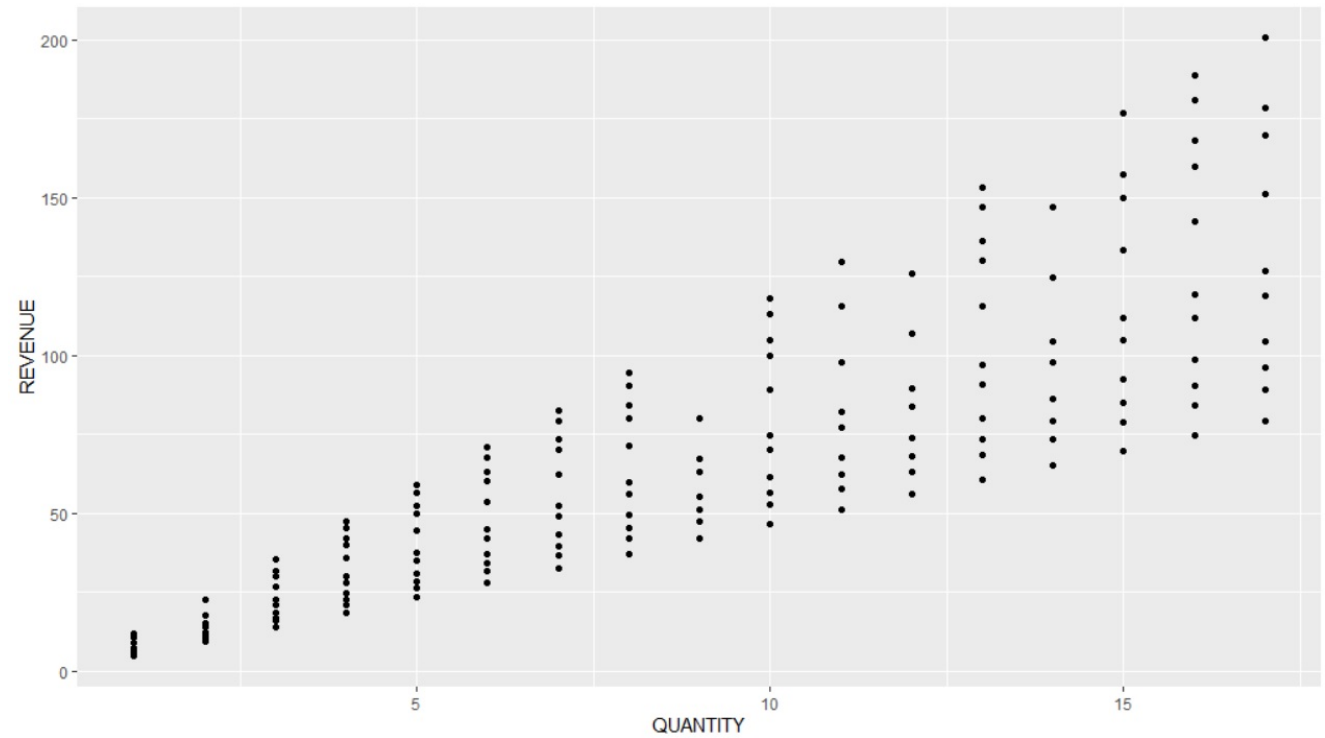
Changing the Plot Appearance with Themes



Signature appearance

Complete makeover
with themes

Formatting hand
picked plot elements



Extensional Libraries

Additional packages provide more themes for ggplot2 visualizations

Library 'ggthemes'

- A collection of themes modelled after well-known layouts



Changing the Appearance with Themes



Complete themes provided by ggplot2



Extra themes from additional libraries



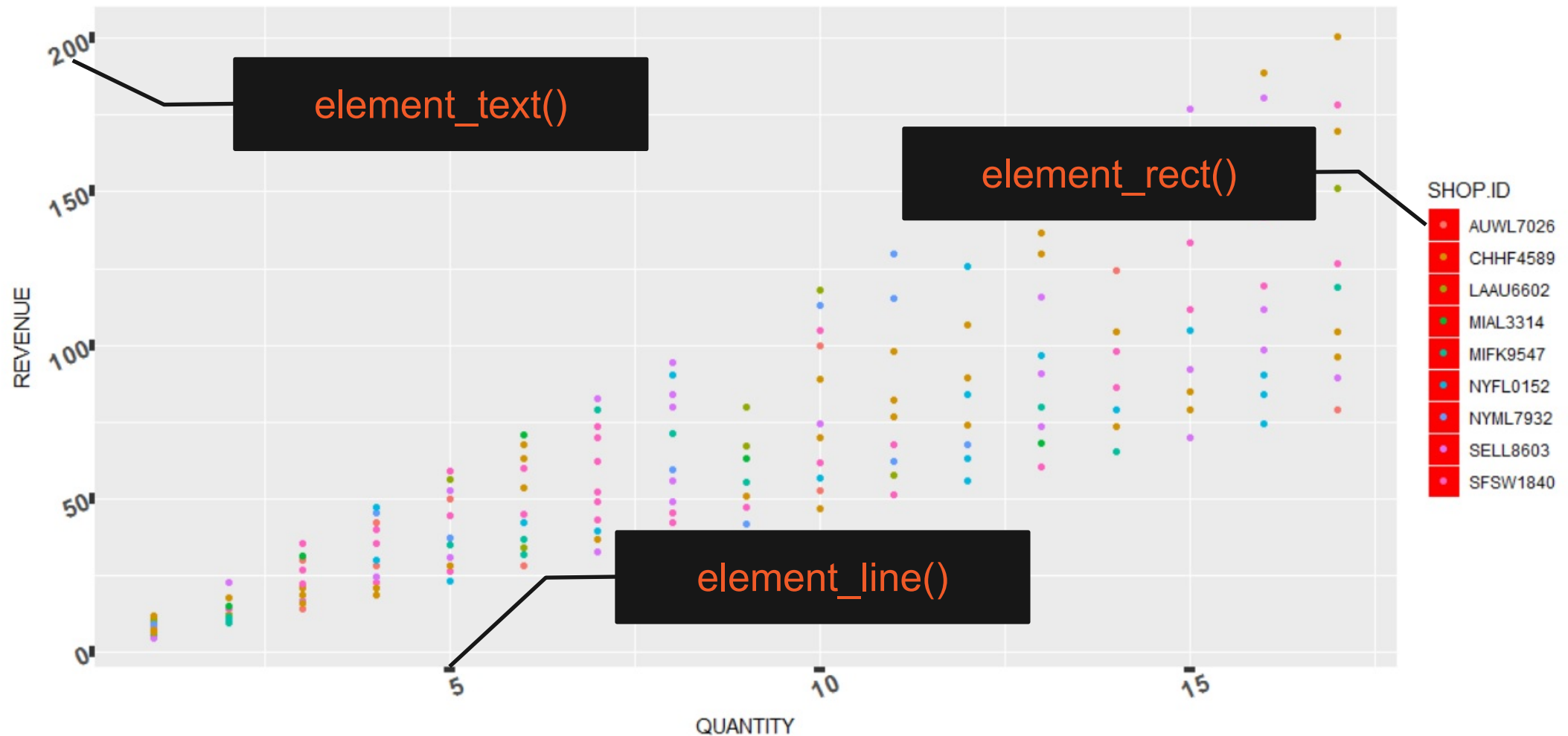
Custom solutions via the theme() function



Manual Adjustments to the Theme



Demo Project on Helper Functions



```
ggplot(lures, aes(x = QUANTITY, y = REVENUE, color = SHOP.ID)) +  
  geom_point() +  
  theme(axis.text = element_text(size = rel(1.25), angle = 25, face = "bold"),  
        axis.ticks = element_line(size = 3),  
        legend.key = element_rect(fill = "red"))
```

Manual Adjustments to the Theme

Scatterplot including a grouping variable as data point color



```
ggplot(lures, aes(x = QUANTITY, y = REVENUE, color = SHOP.ID)) +  
  geom_point() +  
  theme(axis.text = element_text(size = rel(1.25), angle = 25, face = "bold"),  
        axis.ticks = element_line(size = 3),  
        legend.key = element_rect(fill = "red"))
```

Manual Adjustments to the Theme

Scatterplot including a grouping variable as data point color

- Three arguments of the theme() function to change certain visual features of the plot



```
ggplot(lures, aes(x = QUANTITY, y = REVENUE, color = SHOP.ID)) +  
  geom_point() +  
  theme(axis.text = element_text(size = rel(1.25), angle = 25, face = "bold"),  
        axis.ticks = element_line(size = 3),  
        legend.key = element_rect(fill = "red"))
```

Manual Adjustments to the Theme

Helper functions to modify plot elements

- `element_text()`: Set the relative text size to +25%, tilt it at 25° angle and make the font bold



```
ggplot(lures, aes(x = QUANTITY, y = REVENUE, color = SHOP.ID)) +  
  geom_point() +  
  theme(axis.text = element_text(size = rel(1.25), angle = 25, face = "bold"),  
        axis.ticks = element_line(size = 3),  
        legend.key = element_rect(fill = "red"))
```

Manual Adjustments to the Theme

Helper functions to modify plot elements

- `element_text()`: Set the relative text size to +25%, tilt it in 25° angle and make the font bold
- `element_line()`: Increase the tick mark size
- `element_rect()`: Color the legend keys' body to red



Modifying the Appearance of Plot Elements

Select an
argument of the
`theme()` function

Use one of the
helper functions

Adjust the
appearance



Titles and Text Based Elements



Providing Context via Text Based Elements

Main title

Subtitle

Identification tag

**Caption with data source
information**



Ggplot2 Functions

`ggtitle(label, subtitle)`

`labs(title, subtitle, caption, tag)`

```
ggplot() +  
  geom_point() +  
  theme(  
    plot.title,  
    plot.subtitle,  
    plot.caption,  
    plot.tag)
```

- ◀ Formatting text based elements is done in the `theme()` function
- ◀ Relevant `theme()` arguments



```
ggplot(lures, aes(x = QUANTITY, y = REVENUE)) +  
  geom_point() +  
  ggtitle(label = "Revenue Dependency on Quantity",  
          subtitle = "Linear Relation Between\nSold Quantity and Revenue") +  
  theme(plot.title = element_text(hjust = 0.5))
```

Changing the Alignment of the Main Title

Access the visual settings of the main title via the theme() function

- Argument: plot.title
- Helper function: element_text()
- Horizontal adjustment with argument hjust = scalar



Guides of a Plot: Legends and Axes

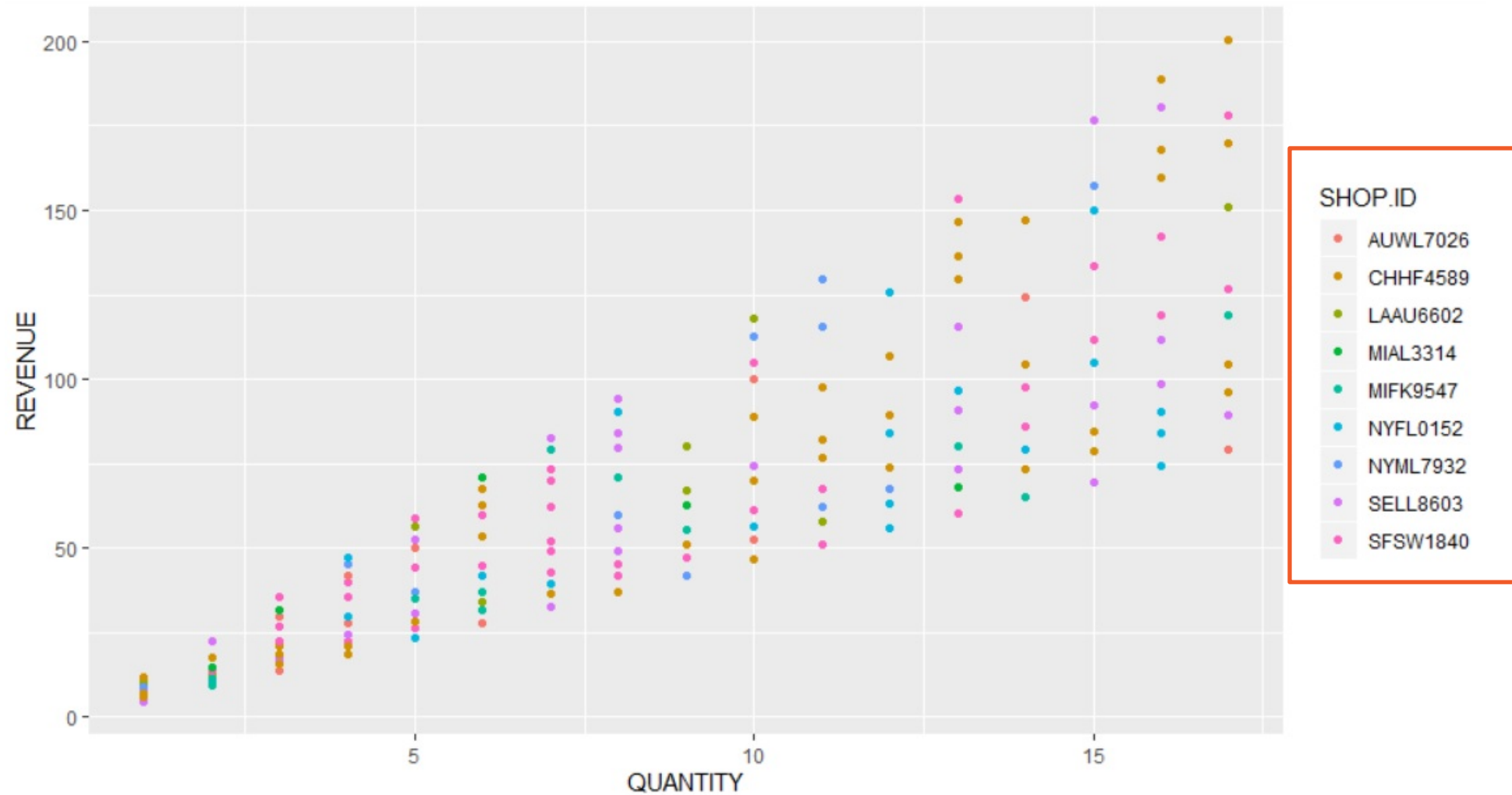


Guides

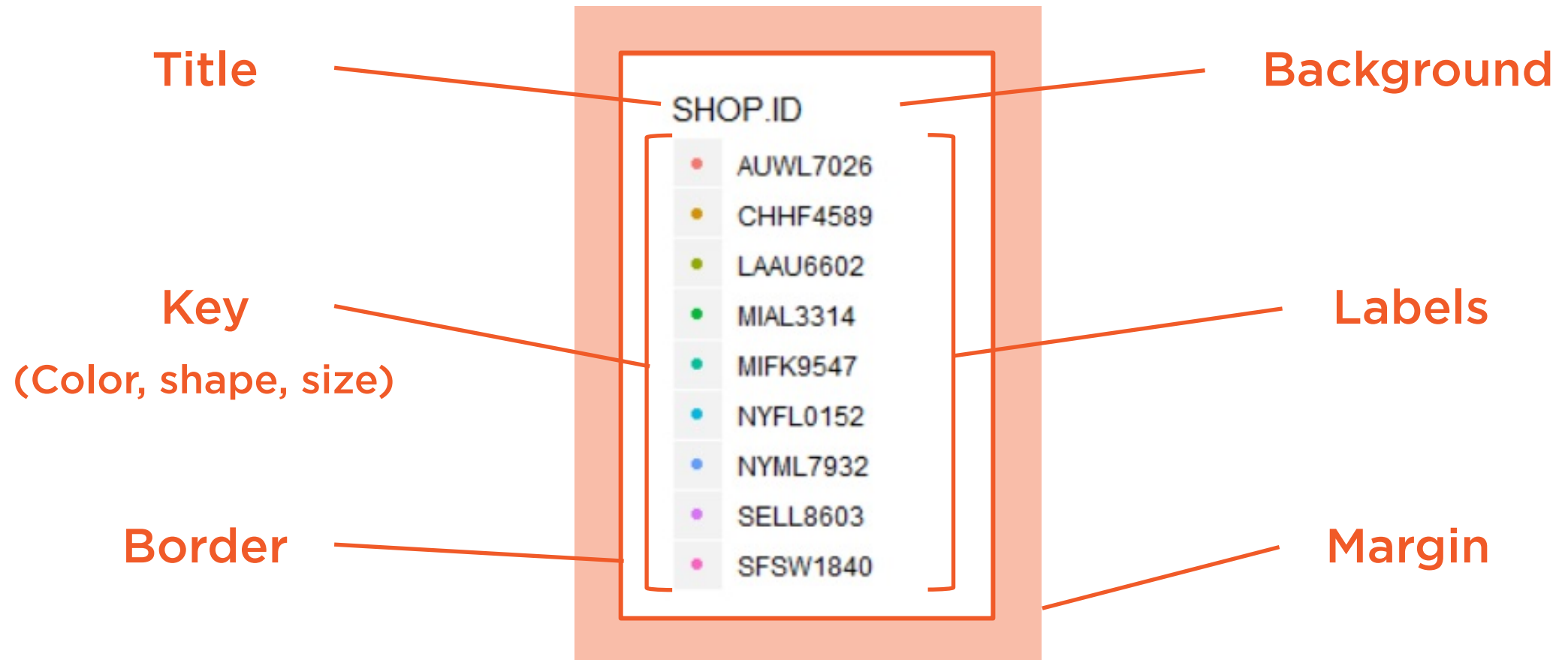
A family of plot elements in ggplot2 consisting of the legend and the axes. Guides help to interpret the plot and to read the values visualized.



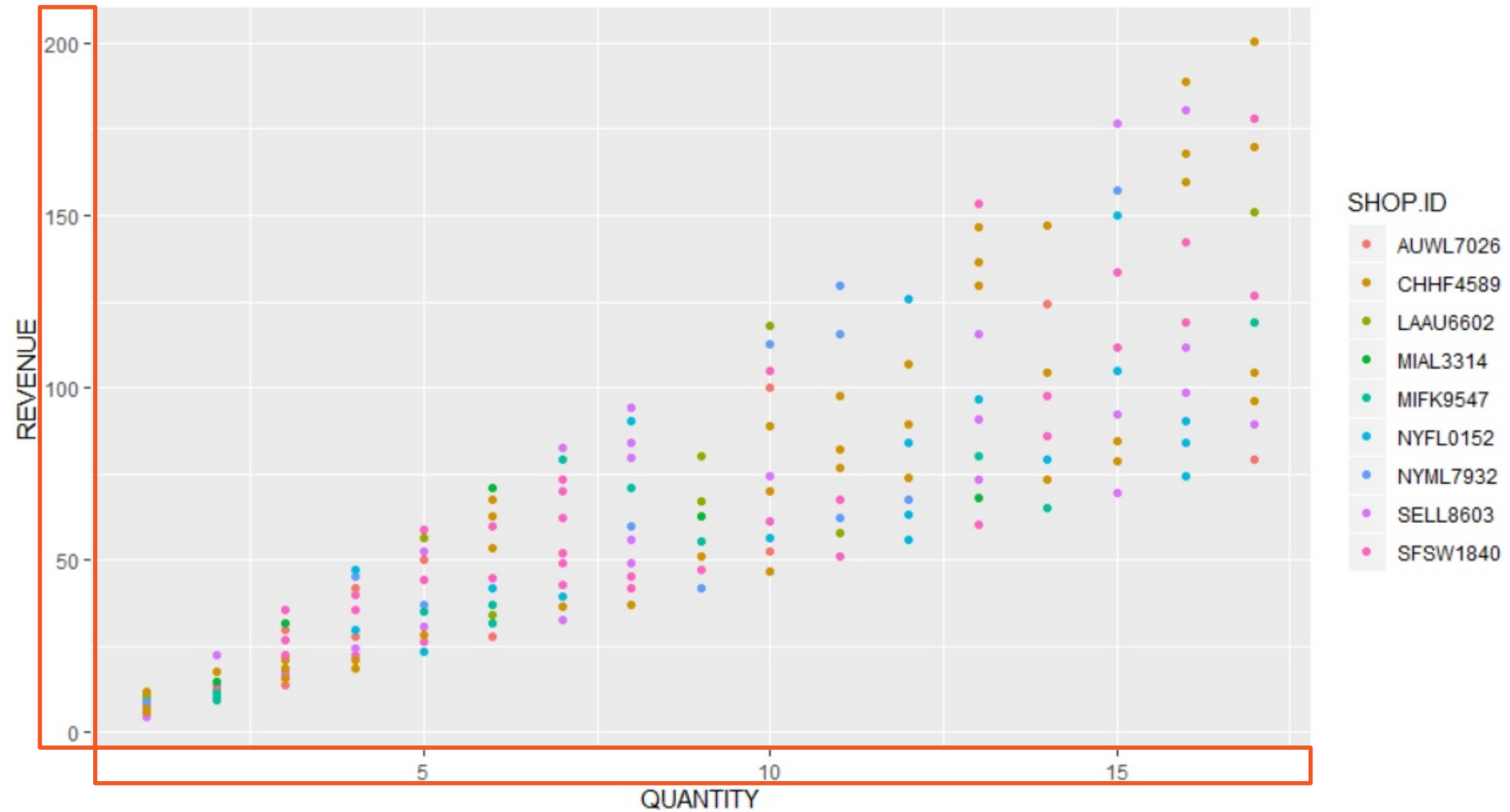
Guide Elements of a Data Visualization



Legend Elements



Guide Elements of a Data Visualization



Plot Axes

Axis scale: Read the values behind the visualized data points

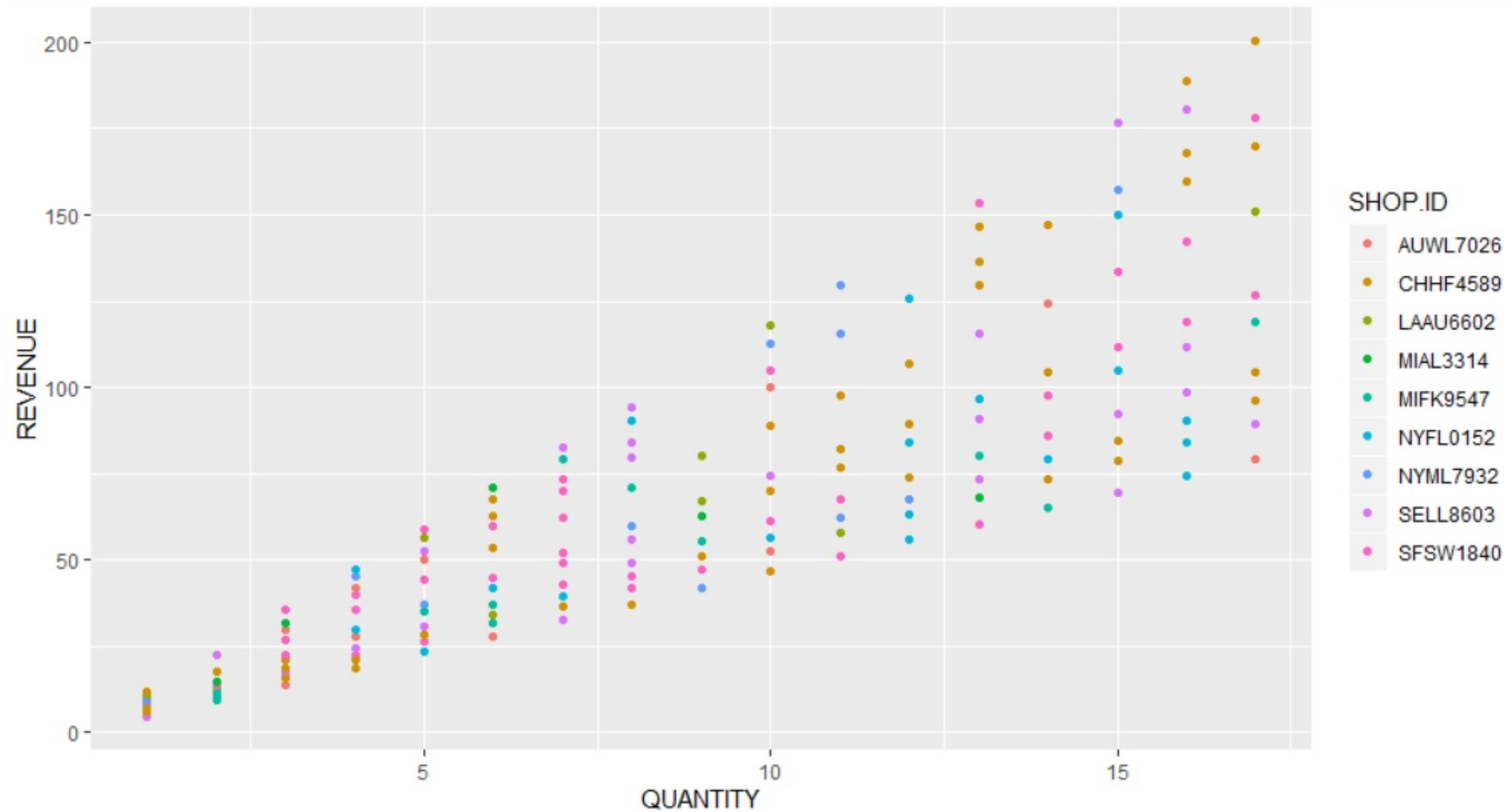
- Numeric scale
- Categorical scale/ header
- Secondary axis

Major and minor tick marks

- Tick mark labels help to read the plot
- Tick marks are evenly spaced
- Lower and upper limits can be set



Guide Elements of a Data Visualization



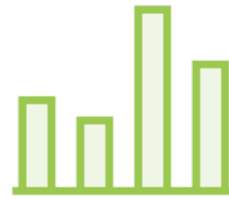
Ggplot2 and the R Data Visualization Ecosystem



Data Visualization Beyond ggplot2

Ggplot2 is a consistent and versatile system

Certain scenarios might be covered better in alternative libraries



R Base plots



Library 'lattice' for facet plots



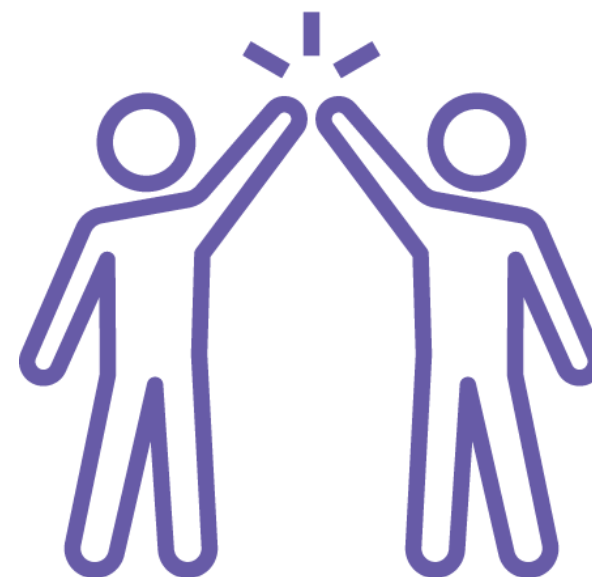
Ggplot2 ports for other languages



Research and Community



CRAN task view 'Graphic Displays'



Stack Overflow community of R
programmers



The RShiny Web App Framework

Library 'ggplot2'

A product of the RStudio Team

Data visualization system

Plots are produced and viewed locally

No interactive features (e.g. tooltip or user defined parameter)

Library 'shiny'

A product of the RStudio Team

An interactive framework for data visualizations and apps

Online publishing support

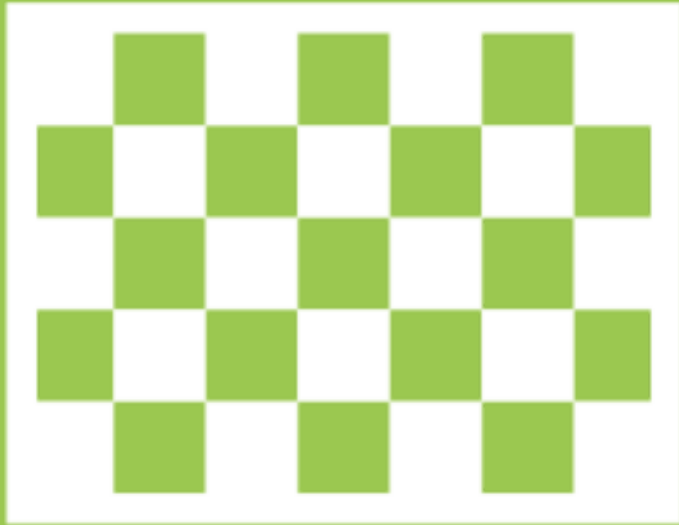
Enables interactive features

Ggplot2 (and other) visualizations can be used in the Shiny app



Summary: Build your First Data Visualization with Ggplot2





Congratulations

Great job on finishing the course
'Build your First Data Visualization
with Ggplot2'



Your First Steps with Ggplot2



Understanding the general principles of the ggplot2 graphics system



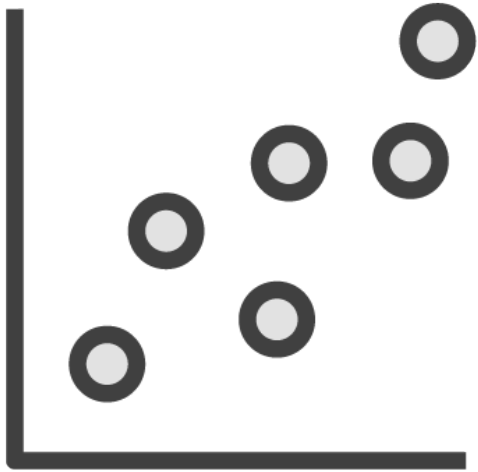
Simple adjustments allow a variety of visualizations



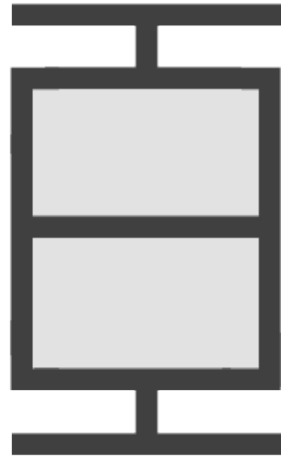
Learning when to use which plot type takes practice



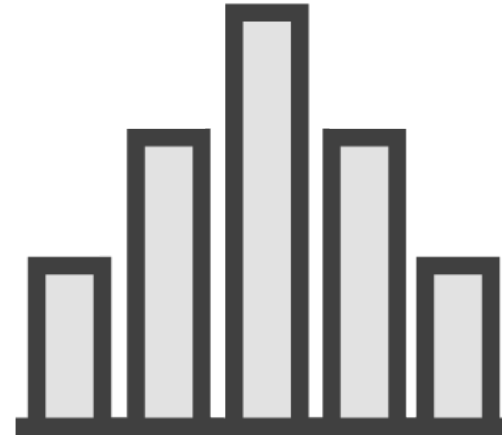
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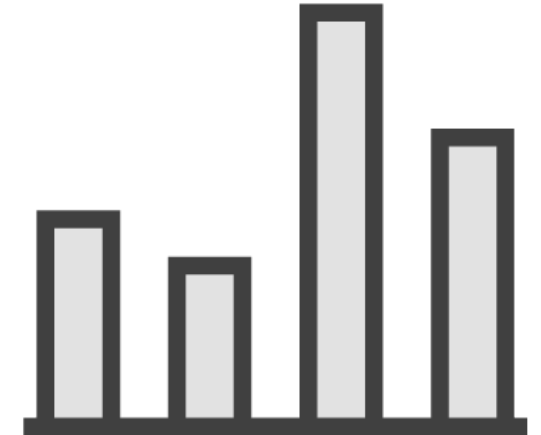
Scatterplot
`geom_point()`



Box plot
`geom_boxplot()`



Histogram
`geom_histogram()`



Bar chart
`geom_bar()`

Visual Enhancements

**Complete themes in ggplot2
and ggthemes**

**Manual adjustments via
theme()**

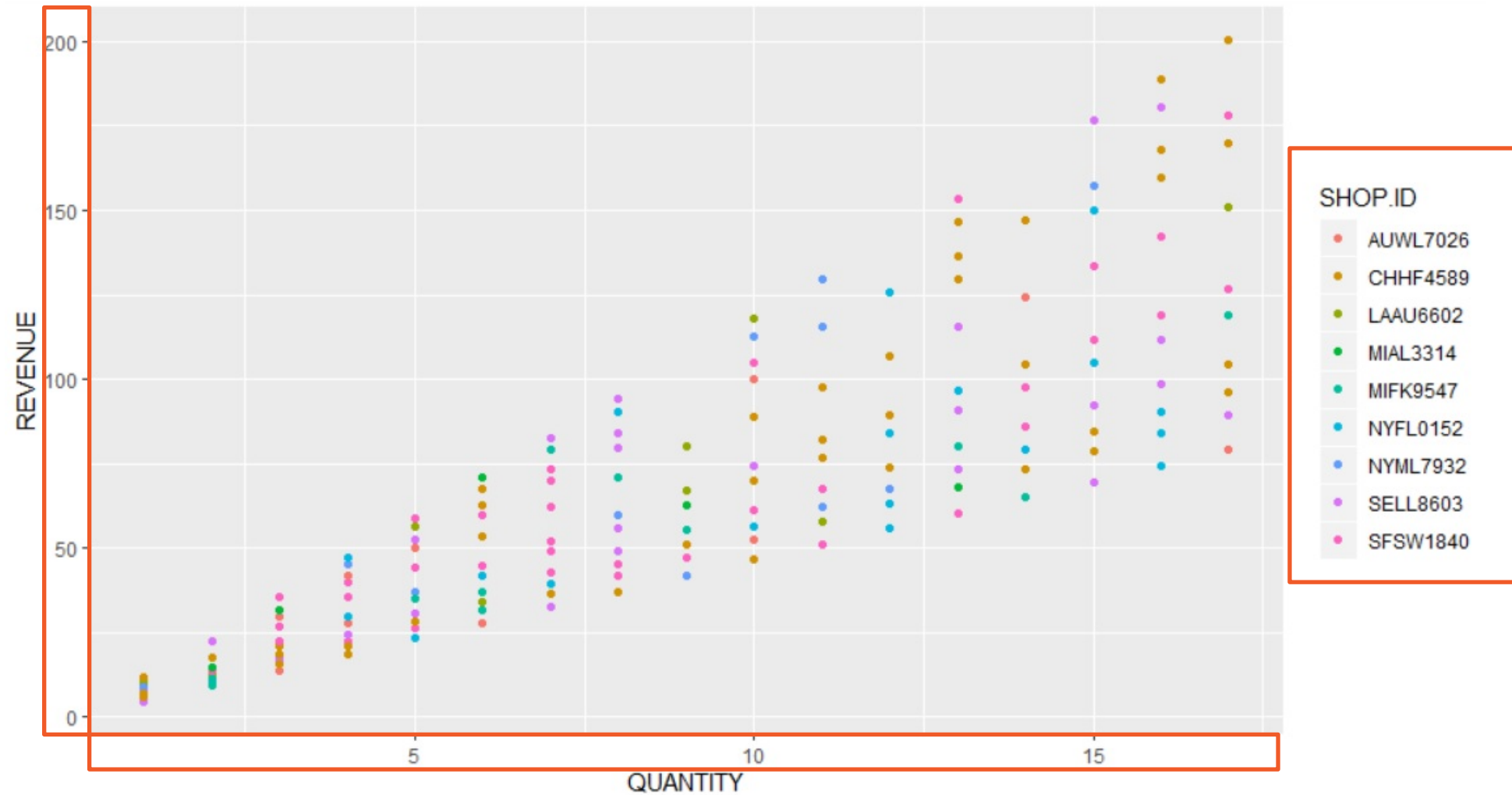


Functions for Text Elements

`ggtitle(label, subtitle)`

`labs(title, subtitle, caption, tag)`

Guide Elements of a Data Visualization





Recommendations

Recommended Pluralsight courses on ggplot2
and data visualization with R





Annotating ggplot2 Data Visualizations

Formatting ggplot2 Data Visualization Elements in R

Exploring Data Visually in R

- Practical implementation of three visual systems: R Base, ggplot2 and Lattice



Keep on learning R and data analytics with

