Box and Whisker Plots

Data Science for Quality Management: Describing Data Graphically

with **Wendy Martin**

Learning objective:

Create a Box and Whisker Plot using RStudio

Box and Whisker Plot

Box & Whisker Plots are used to display data corresponding to Percentiles, and typically from two or more sources or process streams, simultaneously

Box and Whisker Plot

One distinct advantages of this display is that the two sample data sets do not have to possess the same shape, but are directly comparable nonetheless.

Box and Whisker Plot

A second major advantage is that the Box & Whisker plot can display outliers; which we will see later can represent Special Causes of Variation.

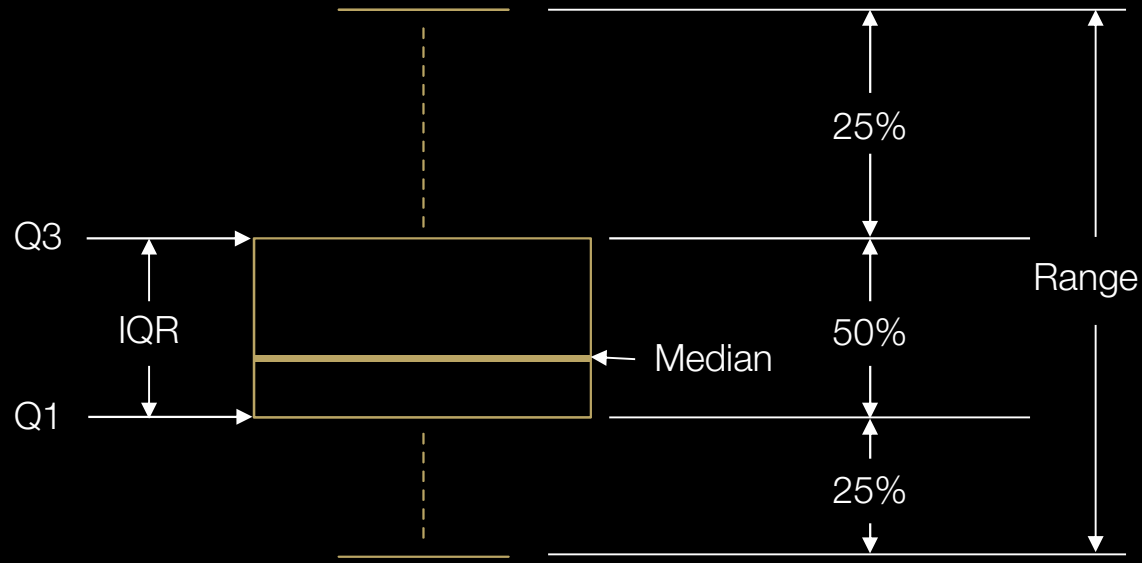
5 Number Summary

Maximum
Q3 (3^{rd} Quartile)
Median (Q2) (2^{nd} Quartile)
Q1 (1^{st} Quartile)
Minimum

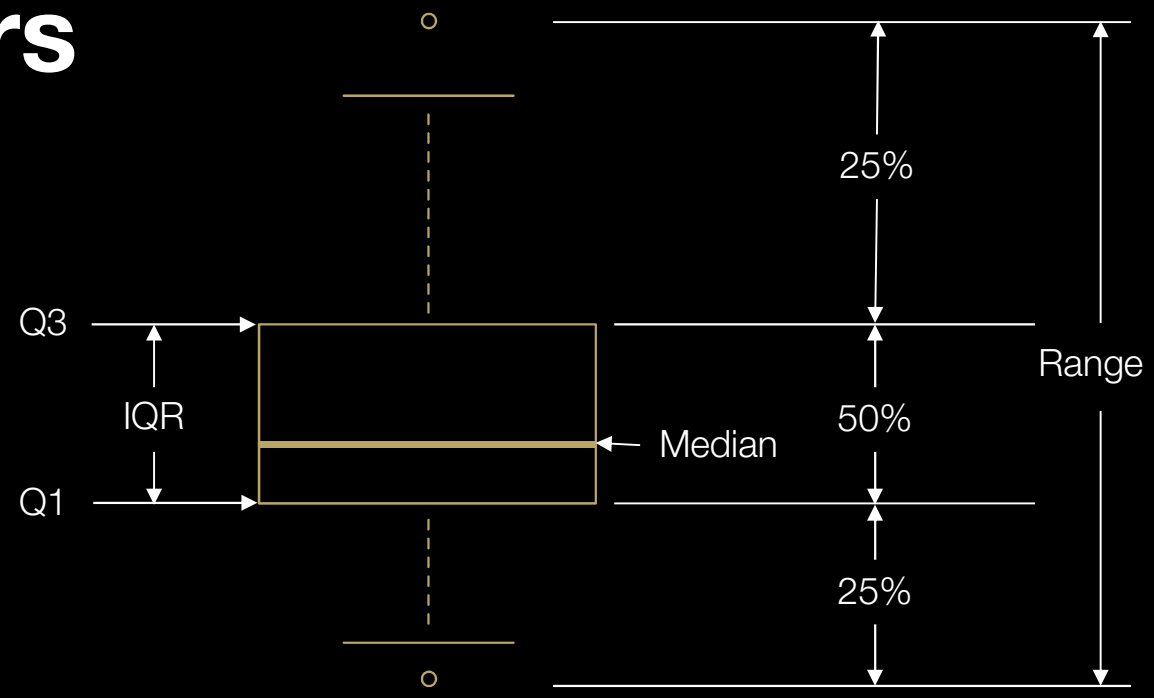
5 Number Summary

```
> summary(castings$weight)
```

Box and Whisker Plot



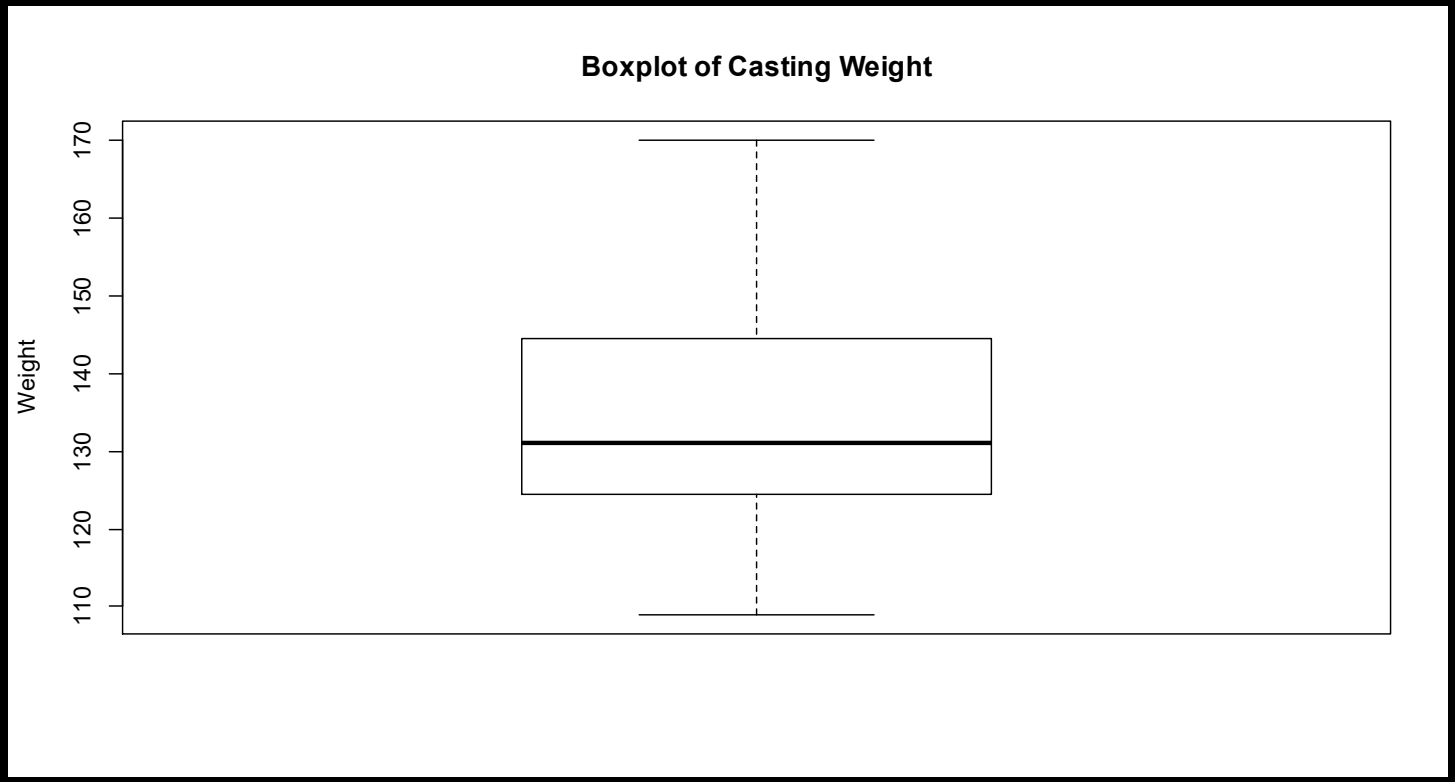
Box and Whisker Plot with Outliers



Box and Whisker Plot in R

```
> boxplot(castings$weight)
```

Box and Whisker Plot Example

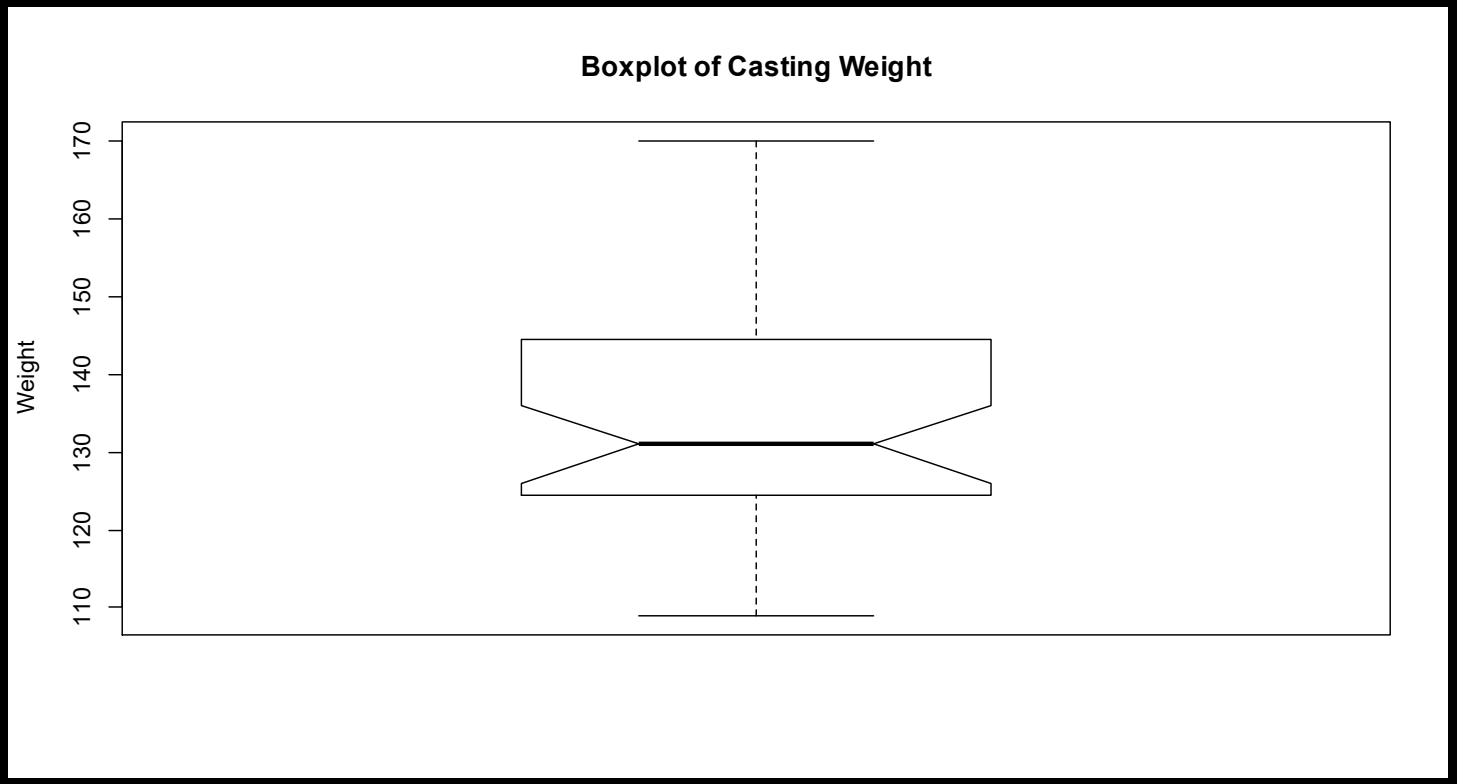


Notched Box and Whisker Plot

A notched Box and Whisker plot shows the 95% confidence interval of the median.

```
> boxplot(castings$weight, notch=T)
```

Notched Box and Whisker Plot



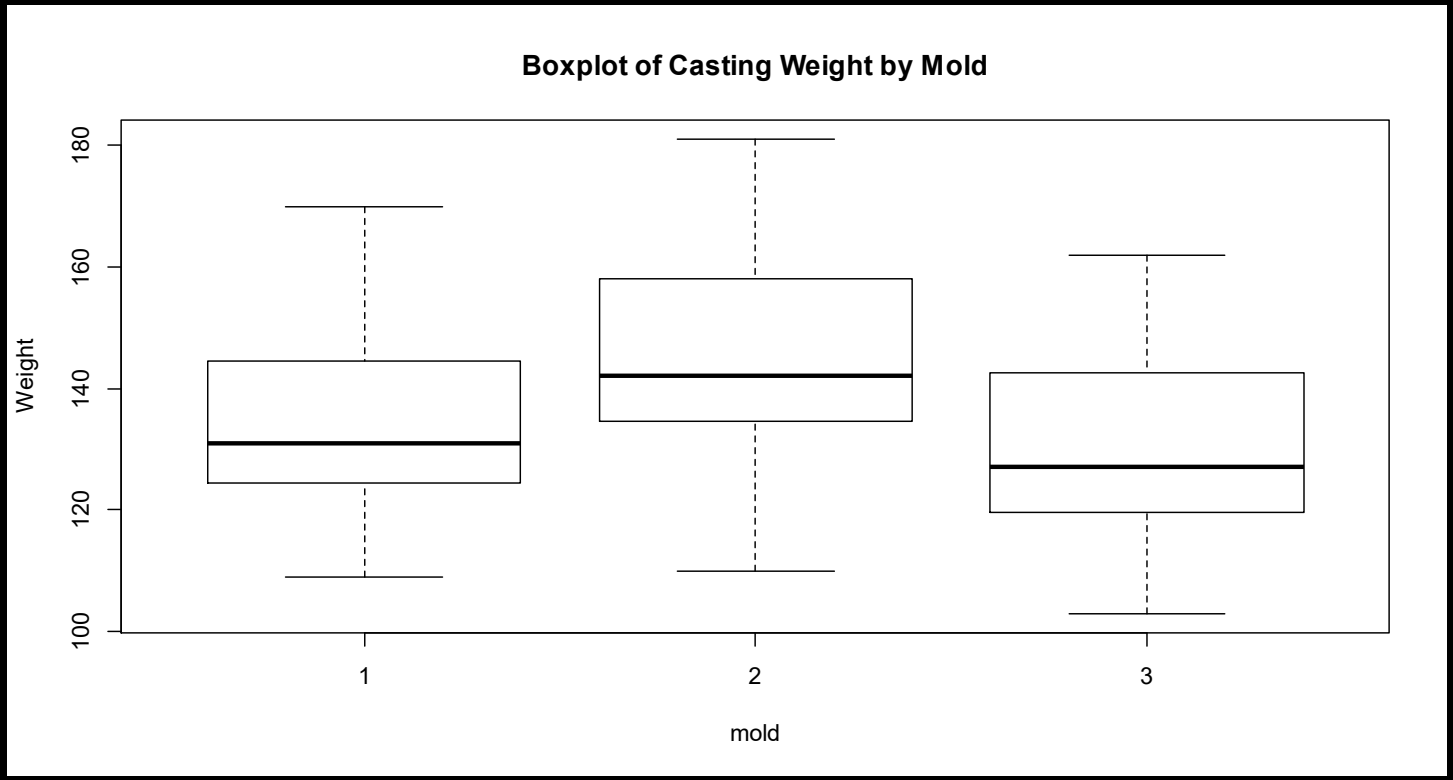
Boxplot to Compare Groups

```
> boxplot(y ~ x, data = data.frame)
```

Boxplot to Compare Groups

```
> boxplot(y ~ x, data = data.frame)
> boxplot(weight ~ mold, data = castings3)
```

Boxplot to Compare Groups



Sources

The material used in the PowerPoint presentations associated with this course was drawn from a number of sources. Specifically, much of the content included was adopted or adapted from the following previously-published material:

- Luftig, J. An Introduction to Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1982
- Luftig, J. Advanced Statistical Process Control & Capability. Luftig & Associates, Inc. Farmington Hills, MI, 1984.
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- Luftig, J. Guidelines for Reporting the Capability of Critical Product Characteristics. Anheuser-Busch Companies, St. Louis, MO. 1994
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- Luftig, J. and Petrovich, M. Quality with Confidence in Manufacturing. SPSS, Inc. Chicago, IL 1997
- Littlejohn, R., Ouellette, S., & Petrovich, M. Black Belt Business Improvement Specialist Training, Luftig & Warren International, 2000
- Ouellette, S. Six Sigma Champion Training, ROI Alliance, LLC & Luftig & Warren, International, Southfield, MI 2005