



Quantitative Data Graphical Summary: Boxplots

Brenda Gunderson

What is a Boxplot?

Five Number Summary

Min Q1 Median Q3 Max

What is a Boxplot?

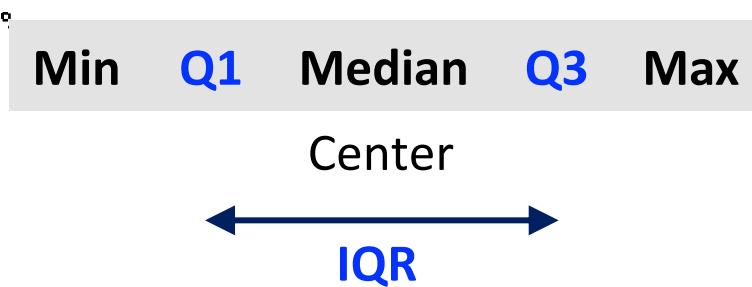
Five Number Summary

Min Q1 **Median** Q3 Max

Center

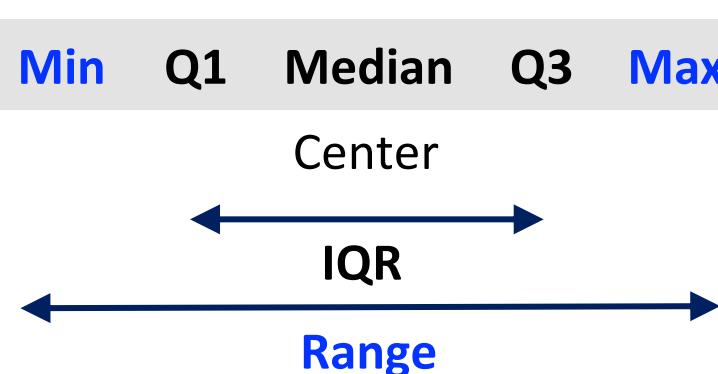
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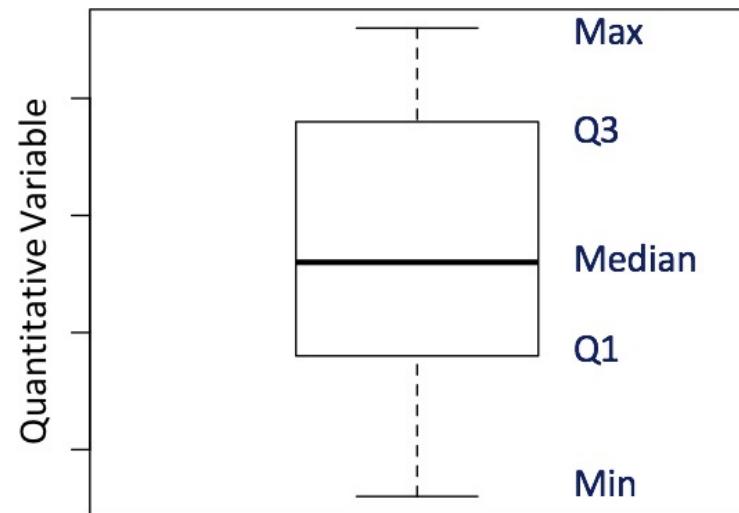
Five Number Summary

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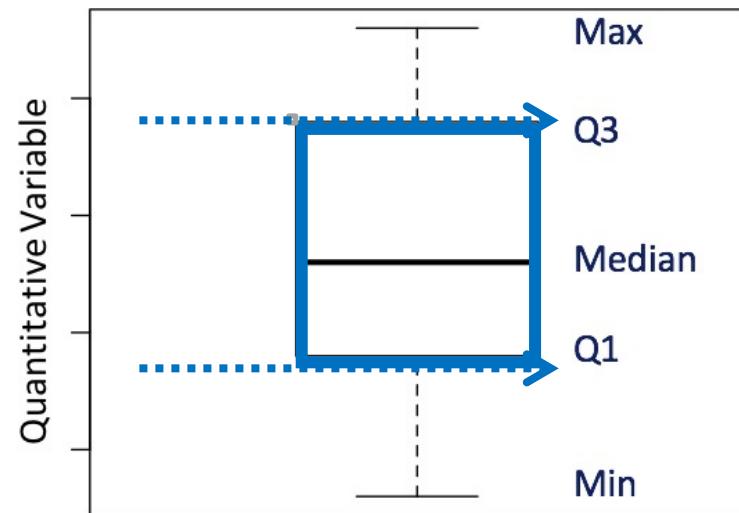
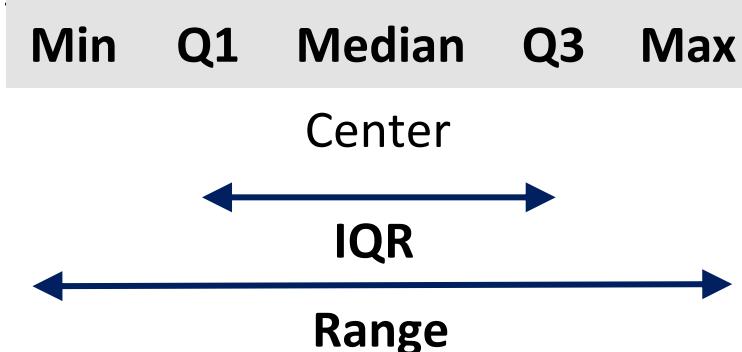
IQR

Range



What is a Boxplot?

Five Number Summary



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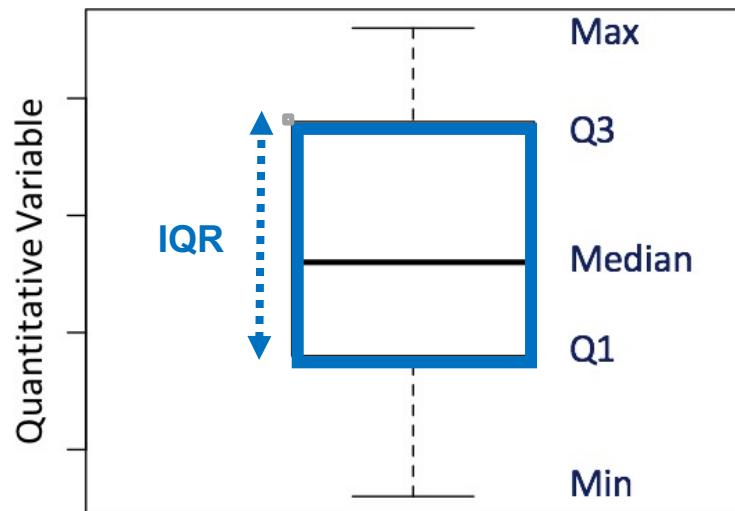
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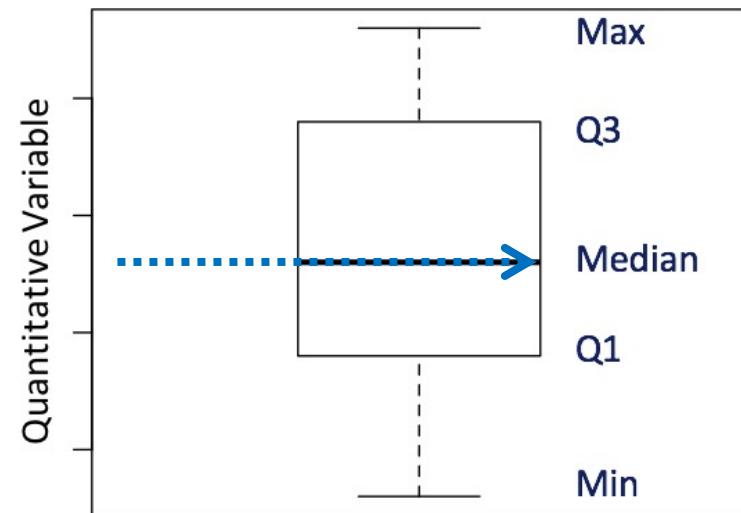
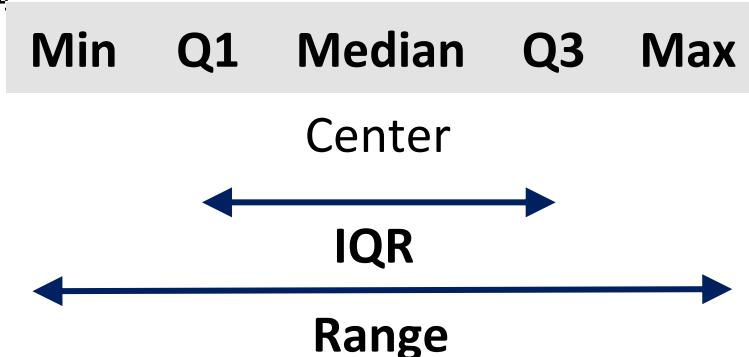
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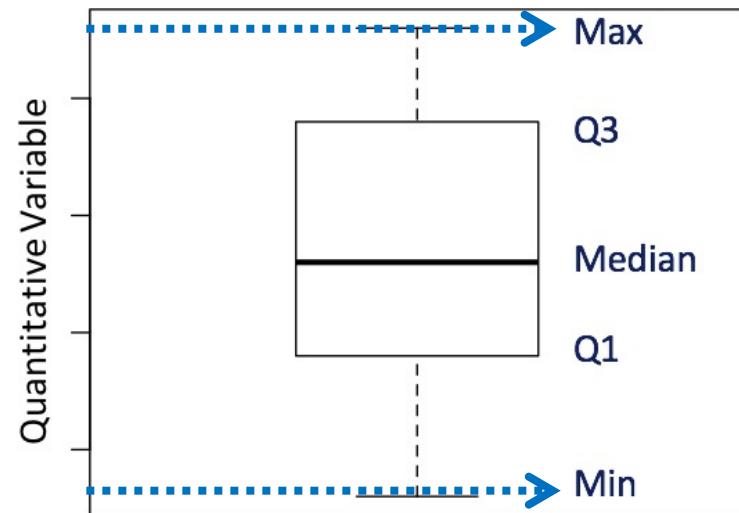
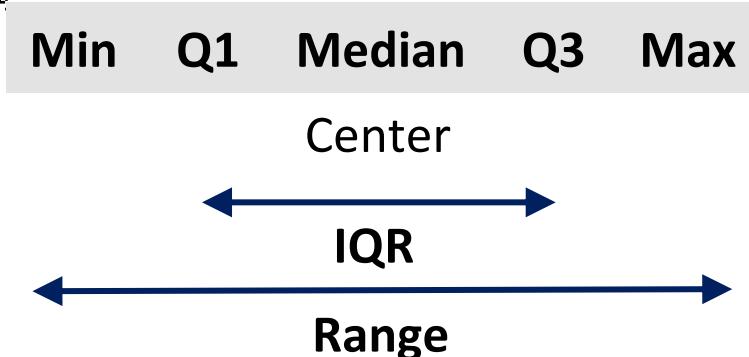
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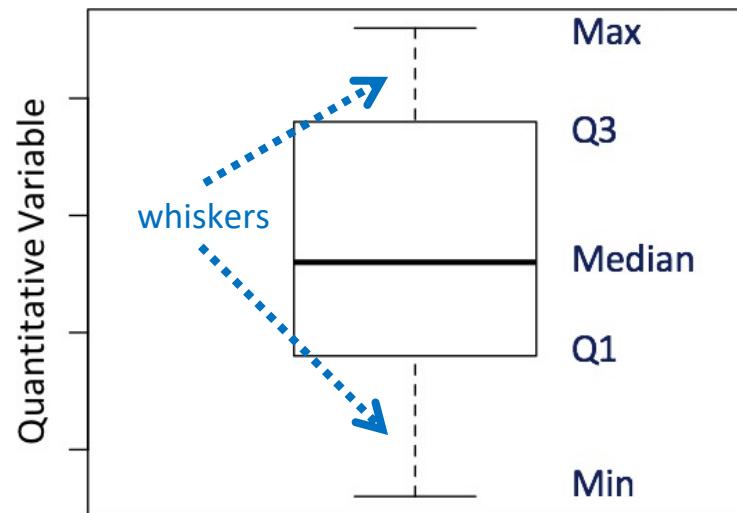
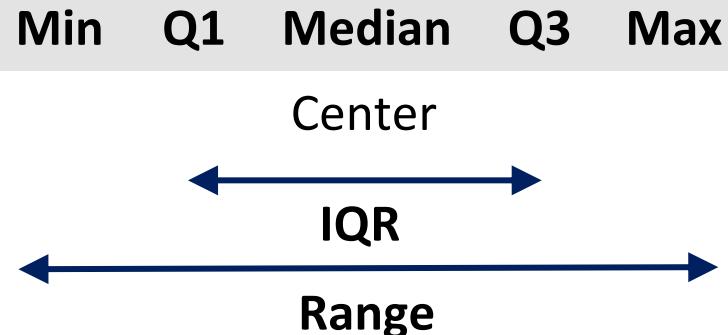
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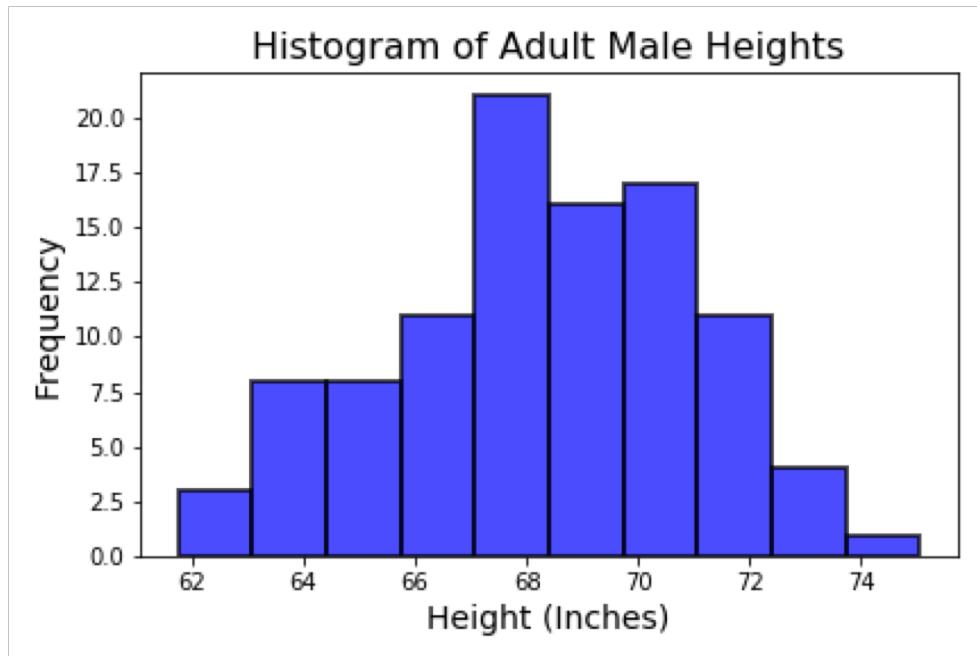


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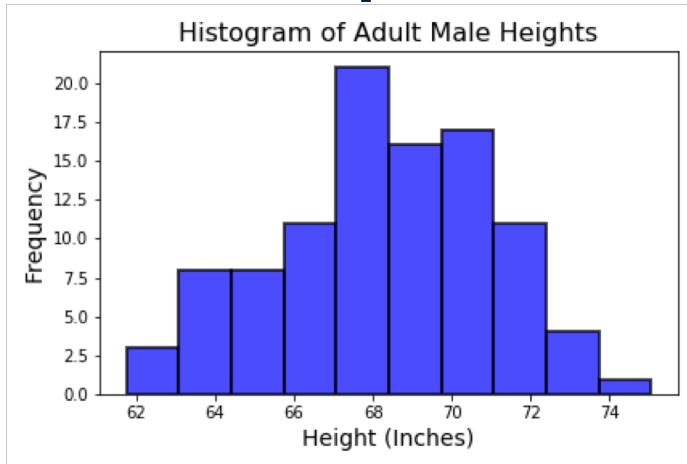


Example I: Heights of Adult Males

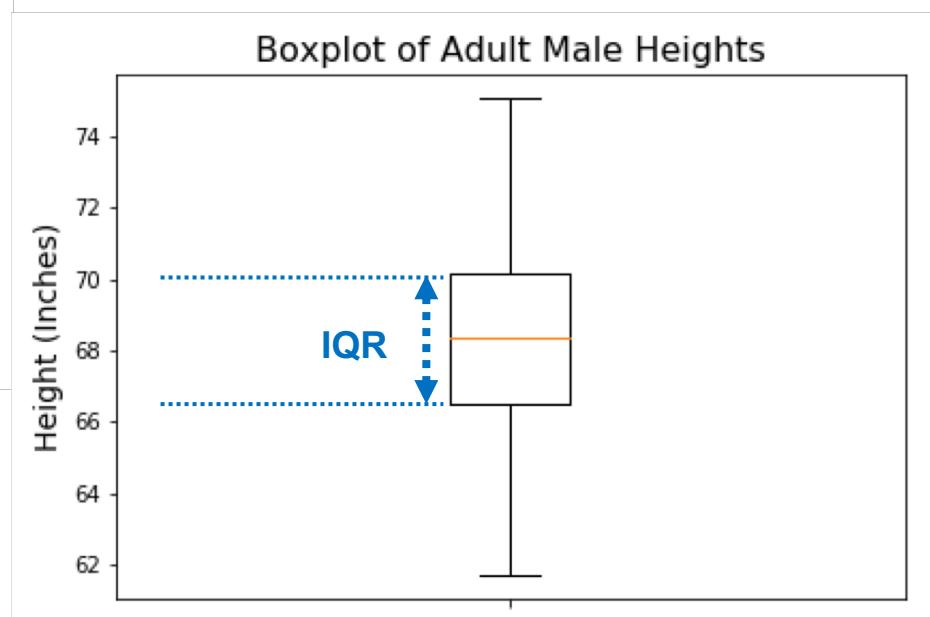


Height	
Min.	: 61.7
1st Qu.	: 66.5
Median	: 68.3
Mean	: 68.3
3rd Qu.	: 70.1
Max.	: 75.1

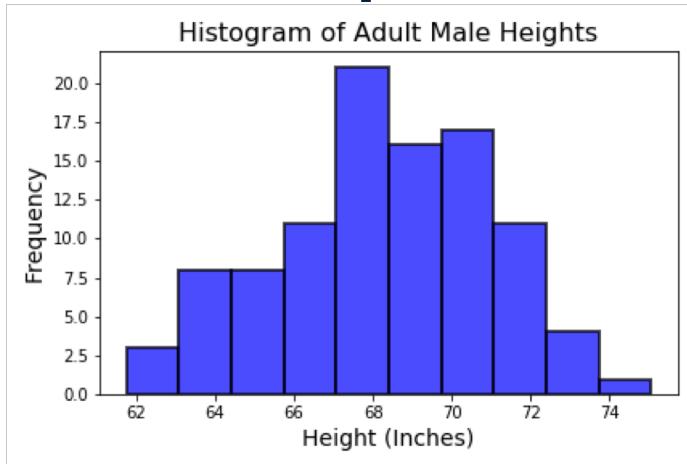
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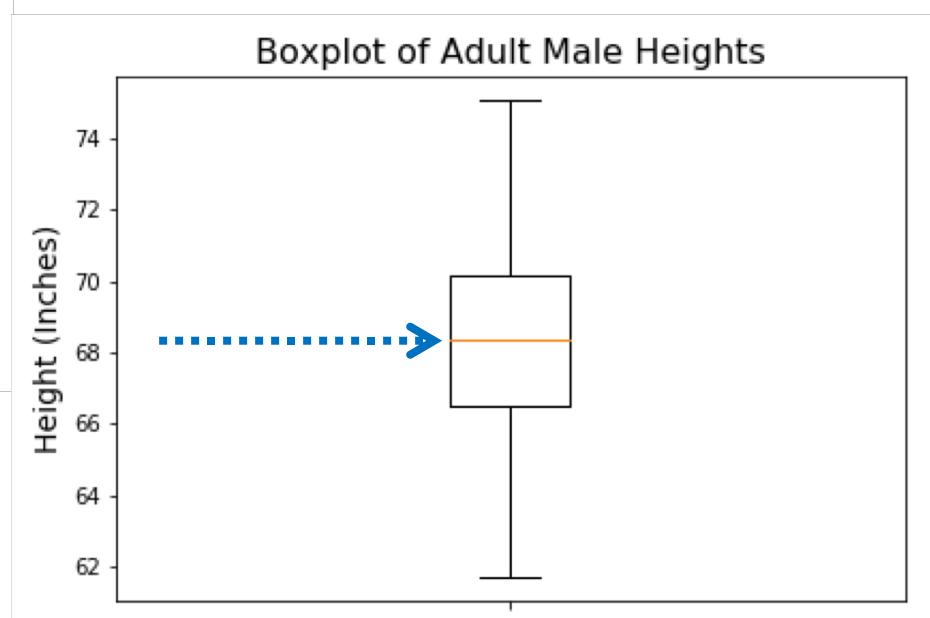
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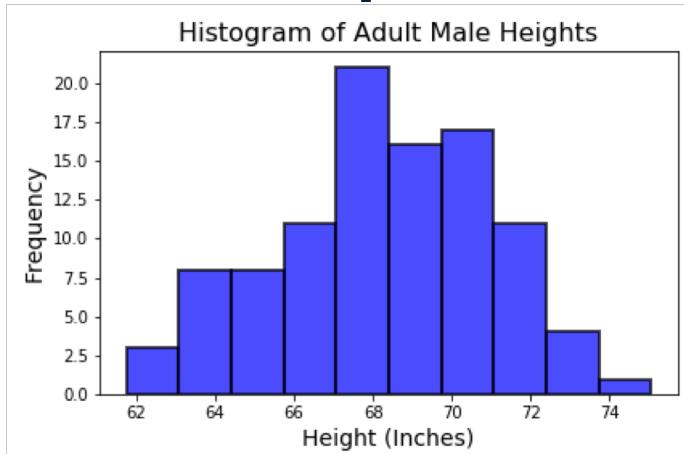
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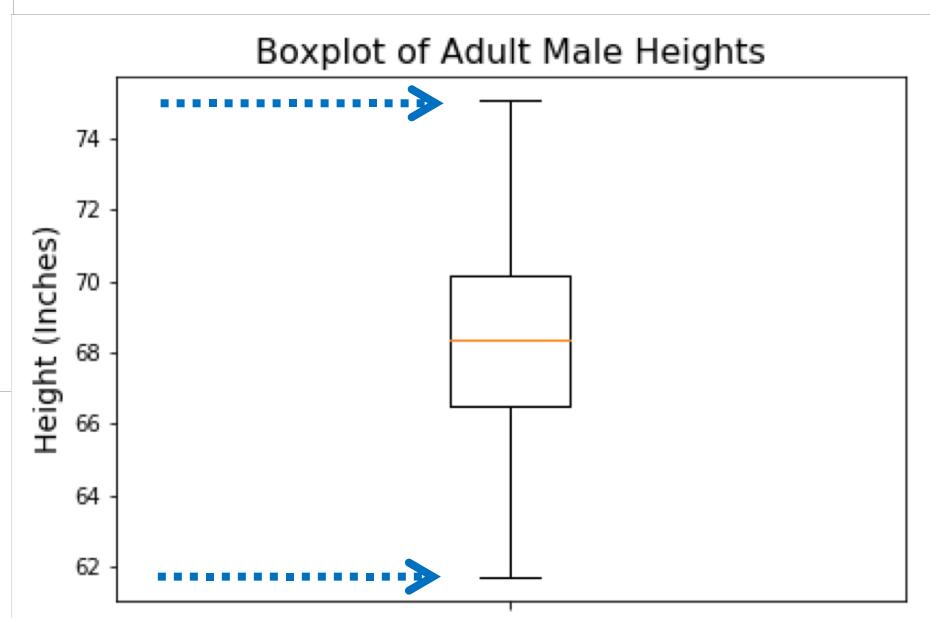
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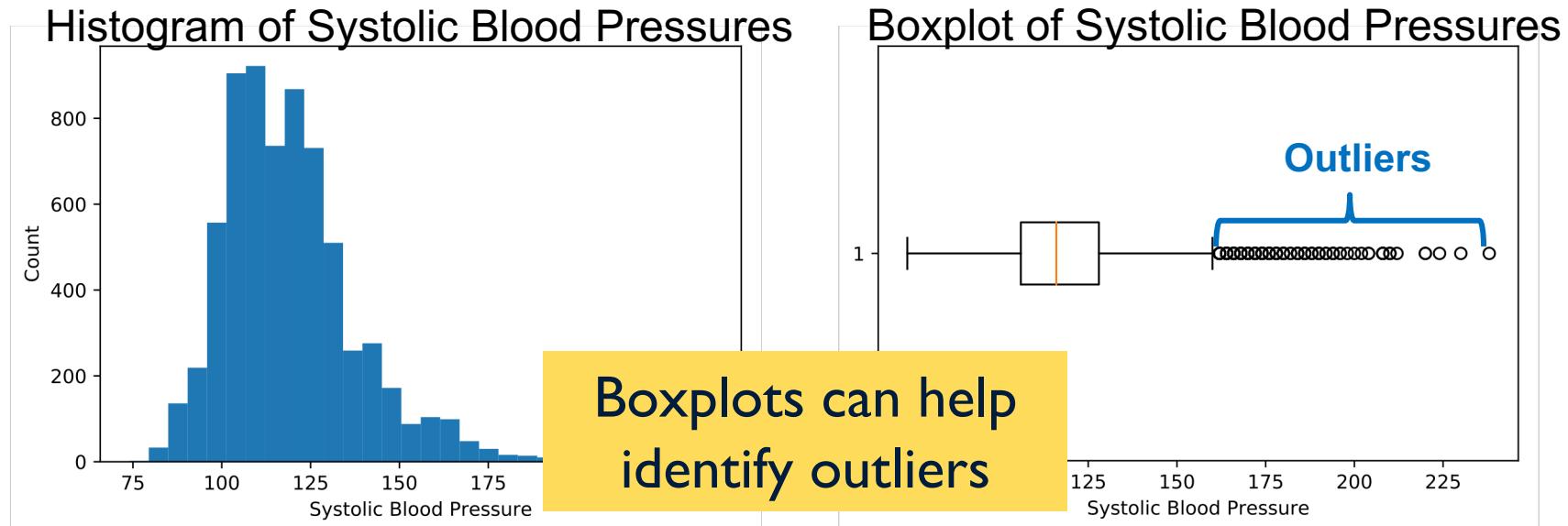
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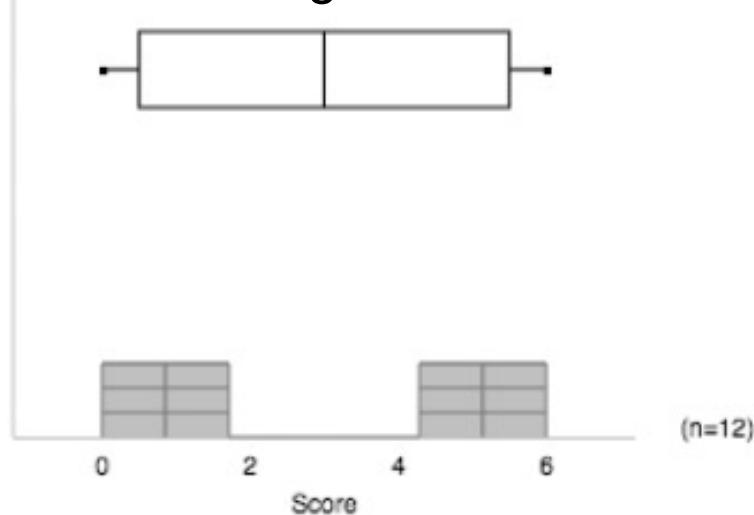


Example 2: Systolic Blood Pressures



Example 3: Quiz Scores

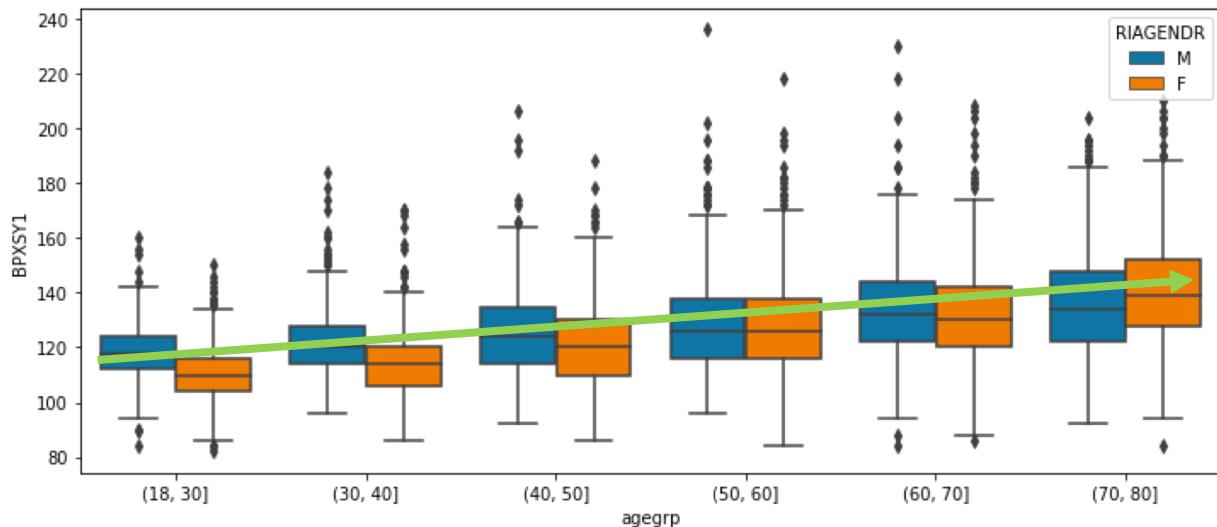
Boxplot and Histogram of Quiz Scores



Boxplots can hide gaps and clusters

Example 4: Side by Side Boxplots

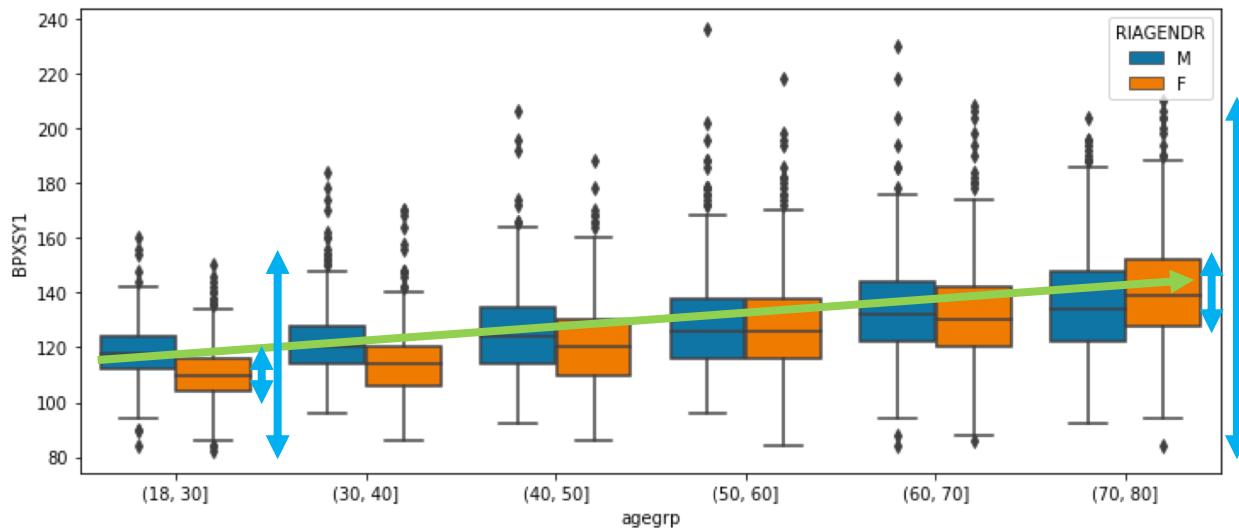
Boxplots of Systolic Blood Pressure by Age and Gender



What do you see?
Old vs Young:
BP higher

Example 4: Side by Side Boxplots

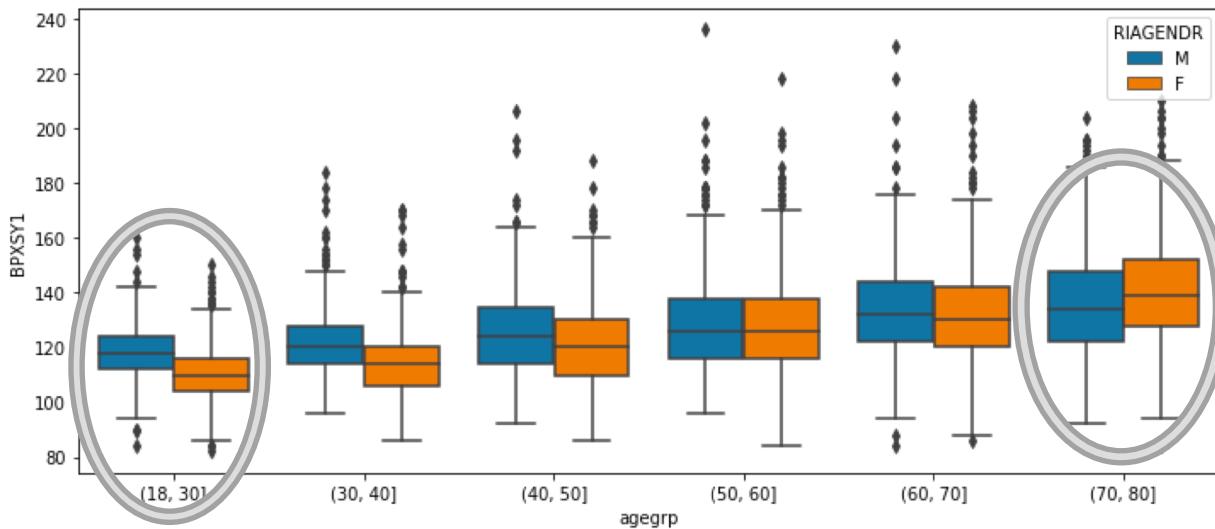
Boxplots of Systolic Blood Pressure by Age and Gender



What do you see?
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BP higher, more
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Example 4: Side by Side Boxplots

Boxplots of Systolic Blood Pressure by Age and Gender

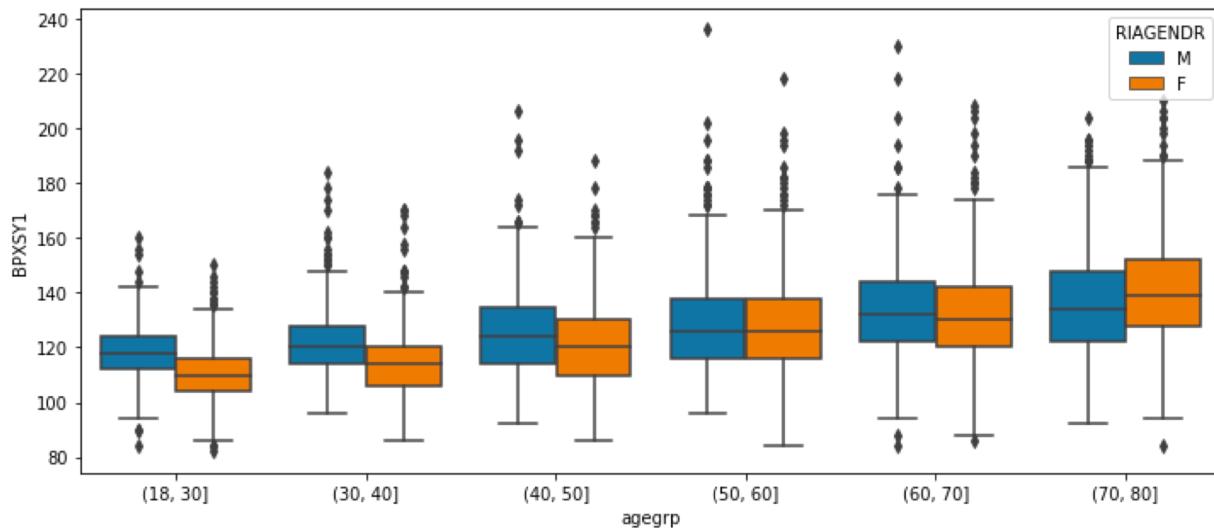


What do you see?

- Old vs Young: BP higher, more disperse
- BP **higher** for **young men** vs young women
- BP **lower** for **old men** vs old women

Example 4: Side by Side Boxplots

Boxplots of Systolic Blood Pressure by Age and Gender



Boxplots are useful
for comparing sets
of observations

Notes about Boxplots

- Boxplots provide a graphical picture of the five-number summary: showing center (median), spread (IQR and range), and identifies potential outliers.
- Boxplots can hide some shape aspects (*histograms do better job at displaying shape*)
- Side-by-Side Boxplots are useful for comparing two or more sets of observations.