Introduction to Business Analytics

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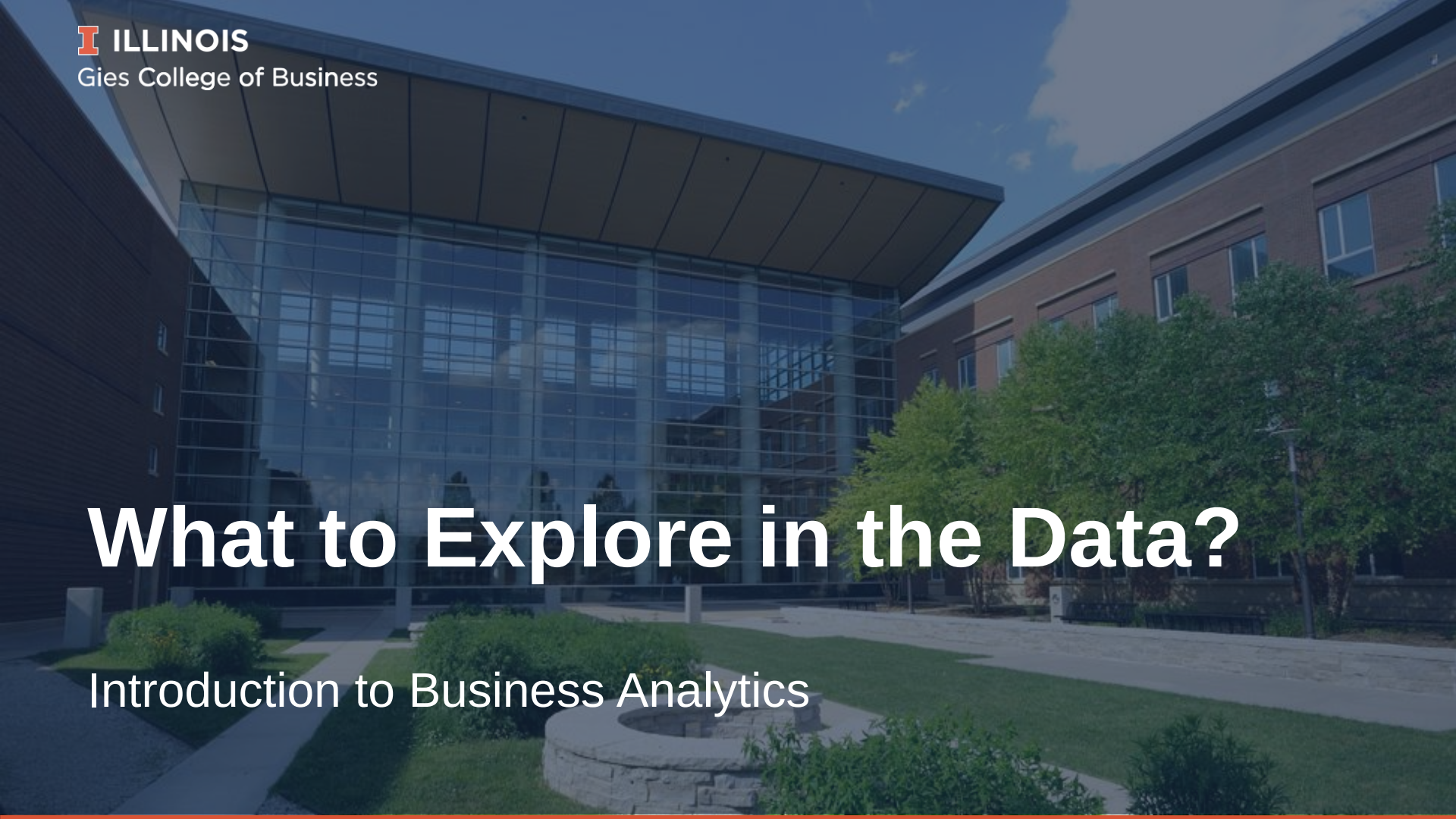

What to Explore in the Data?

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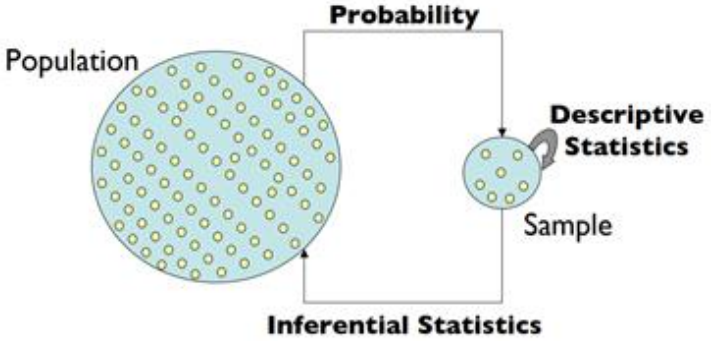
Exploratory Data Analysis (EDA)

An approach to analyzing datasets to summarize their main characteristics, often with visual methods

Exploratory Data Analysis (EDA)

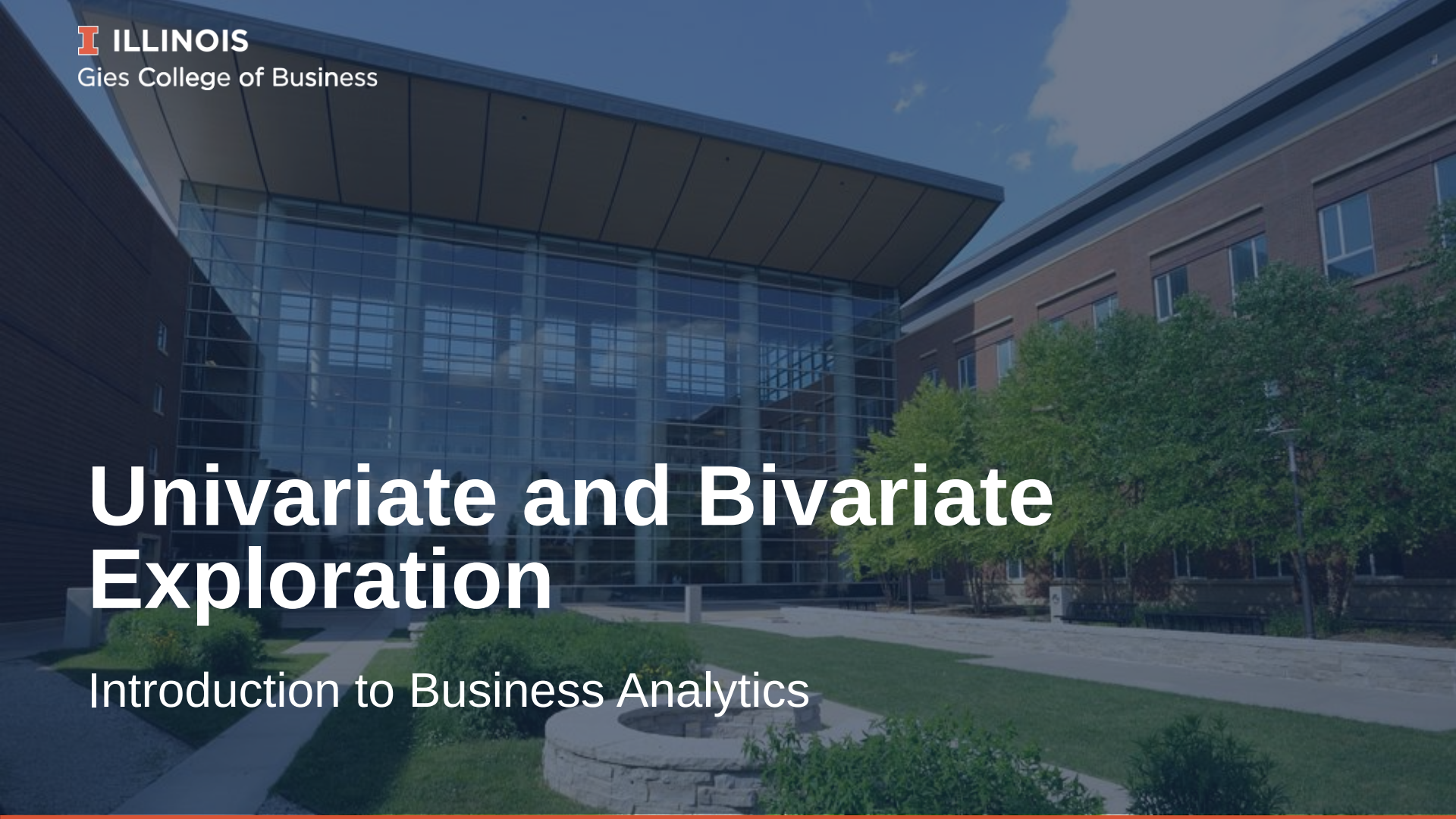
- Trends
- Outliers
- Patterns in data



http://orzo.union.edu/~khetans/Teaching/BNG202/Stats%20Lecture%201.pdf

What do we explore?

- Missing values
- Outliers
- Univariate distribution
- Bivariate and multivariate distribution



Univariate and Bivariate Exploration

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Two Types of Variables

1) Numeric

- Continuous – Age, Income, Weight
- Discreet – Count

2) Categorical

- Race, Gender, Socioeconomic Status

Exploration

- Univariate
- Bivariate
- Multivariate

Univariate Exploration

For numeric variable

1) Measures of central tendency
    Mean, median, quartiles

2) Measure of dispersion
    Variance, range, interquartile range

Visualization – Histogram and boxplot

Univariate Exploration

For categorical variable

1) Counts/frequency
2) Counts proportion

Frequency table

Visualization - Bar chart/column chart

Bivariate Exploration

Assessing relationship between two numeric variables

Correlation captures the degree of association between two numeric variables

Visualization – Scatter plot

Bivariate Exploration

Assessing relationship between a numeric and a categorical variable

Visualization – Grouped boxplot and grouped histogram

Multivariate Exploration

Map other variables using

1. Color *(for numeric and categorical variables)*
2. Shape *(for categorical variables)*
3. Size *(for numeric variables)*
4. Facet grid – show separate chart for various subsets of data

Introduction to the ggplot2 Package

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GGplot2

Each chart is a combination of:

1. Data
2. Aesthetic **mappings** (variables) (x axis, y axis, color, shape, size)
3. Layer: geometric objects (histogram, boxplot, violin plot, point, line, smooth, bar, col)
4. Layer: statistical transformation (identity, log)

GGplot2

Each chart is a combination of:

5. Scales: map values from data space to aesthetic space
6. Coordinate system (most frequent is Cartesian, others are polar)
7. Faceting: break up data into subsets for creating separate graphics based on each subset
8. Theme: font size, background color, legend position

Introduction to ggplot Syntax

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Two Functions That Cover Three Major Components

Components are

Function

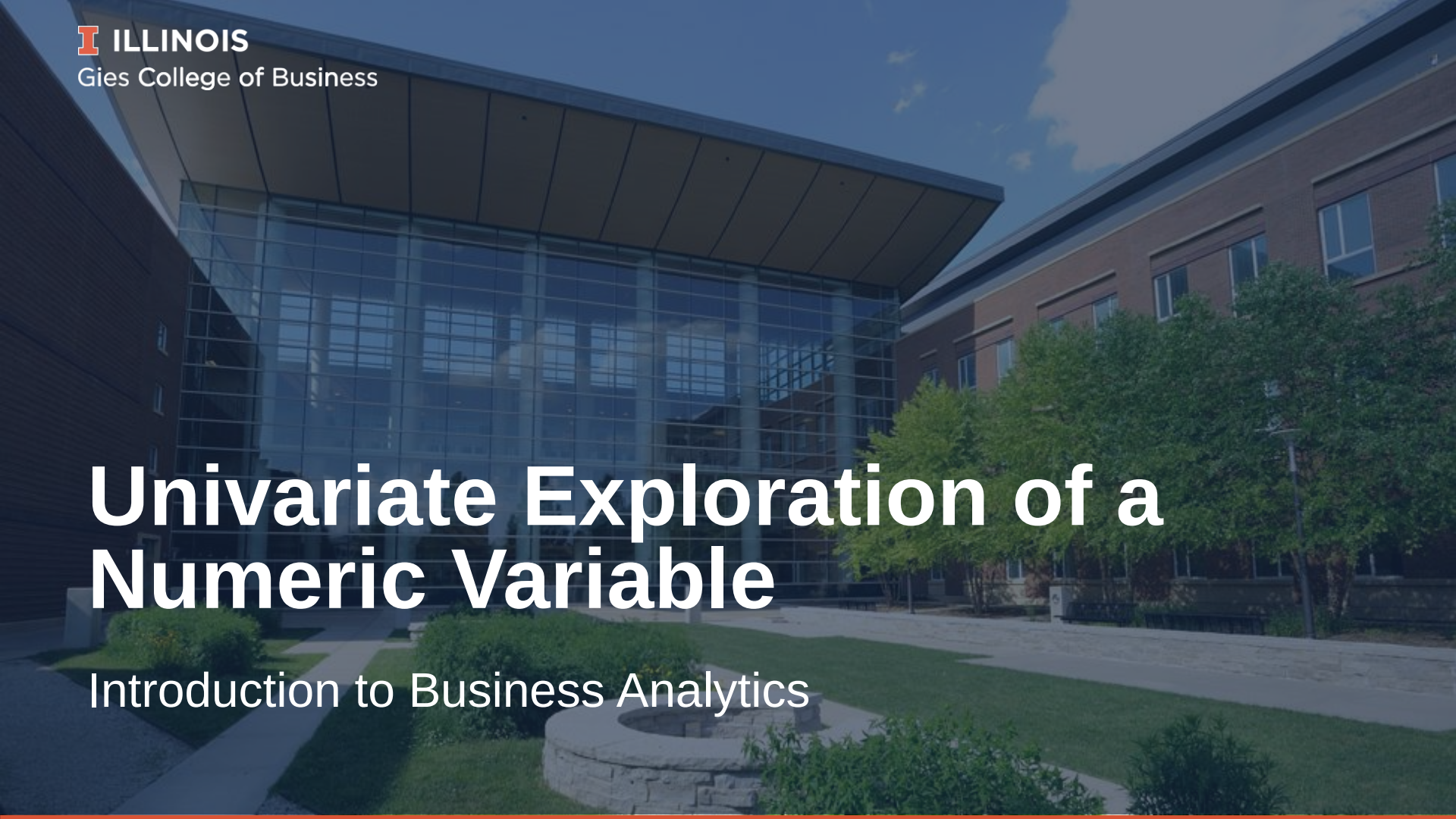
1. Data
2. Aesthetic

ggplot()

3. Geometric Object

geom_OBJECT

OBJECT is NOT the real word that comes here. It has to be replaced by either ***histogram***, ***bar, point, line***, etc., depending on what geometric object you want to create



Univariate Exploration of a Numeric Variable

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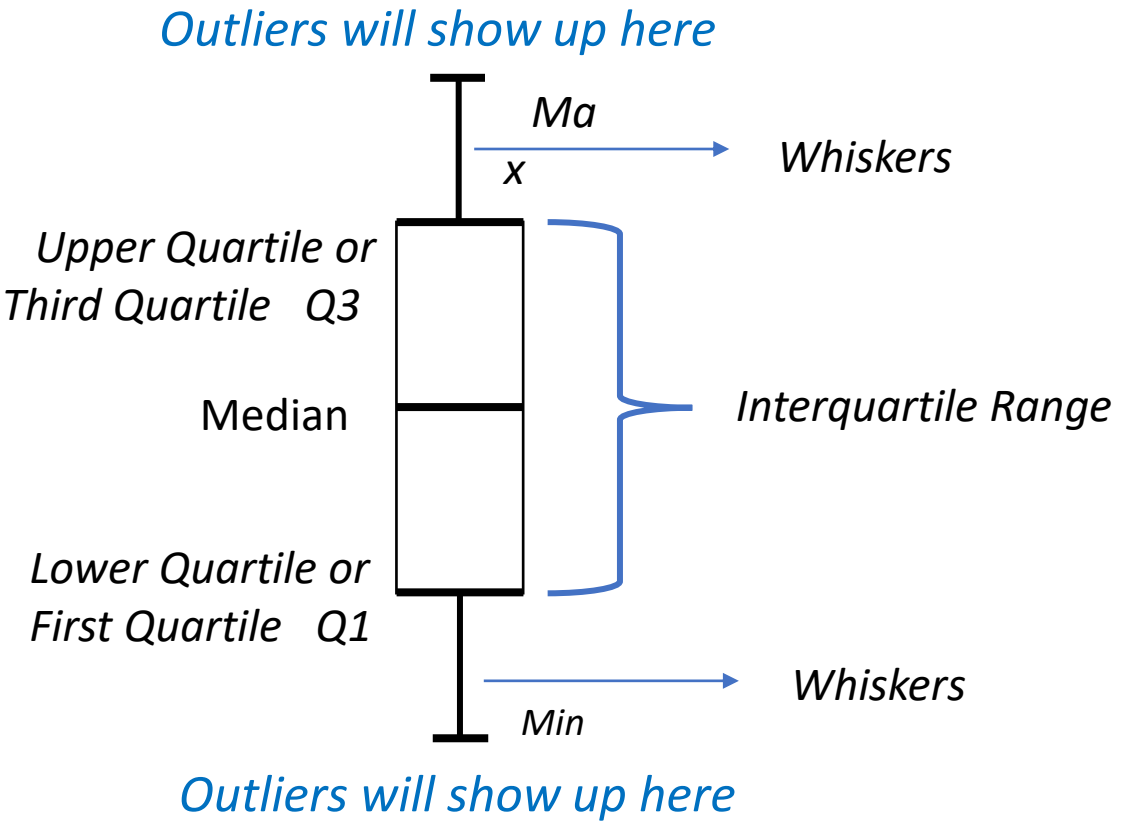
Visualization for Univariate Exploration of Numeric Variable

- Histogram
- Boxplot

Histogram

- Shows a numeric variable grouped in bins/intervals on X axis
- The number of observations that fall in each bucket is represented on Y axis

Boxplot of Price



*Price of **75%** observations < Q3 price*

***50%** observations < median price*

***50%** observations > median price*

*Price of **25%** observations < Q1 price*