

# Lesson 2: Choosing the Right Visualisation

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# What will you learn from this lesson?

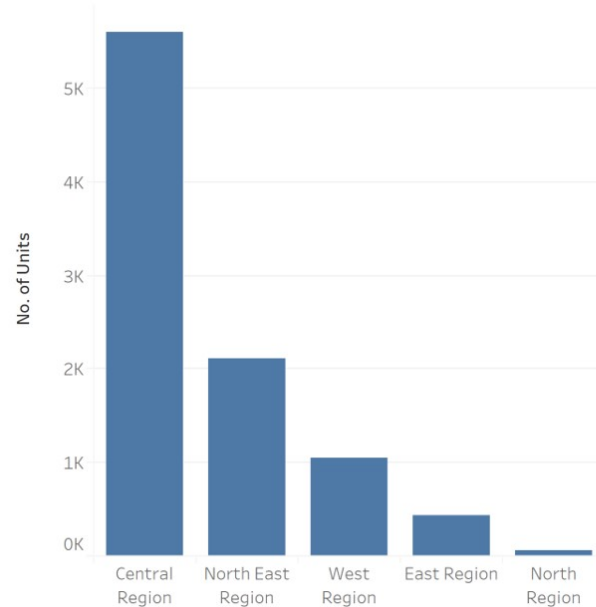
- Visualising count
- Visualising proportion
  - Part-whole and ranking analysis
- Visualising distribution
- Visualising deviation
- Visualising relationships
  - between two continuous variables
  - between two categorical variables
- Visualising relationship between sub-categories

# Visualising Count

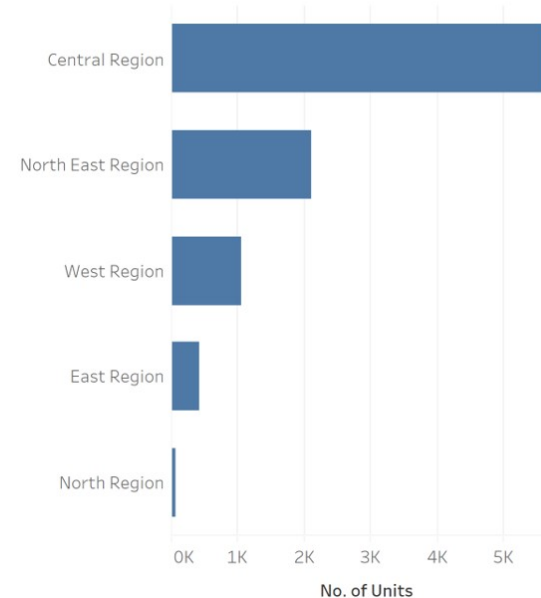
## Bar Chart

- A bar chart is used for plotting categorical data.
- It can be mapped horizontally or vertically.
- When displaying data using bar chart, it is a good practice to sort the count or frequency ascendingly or descendingly.

No. of apartment units sold by region, 2019



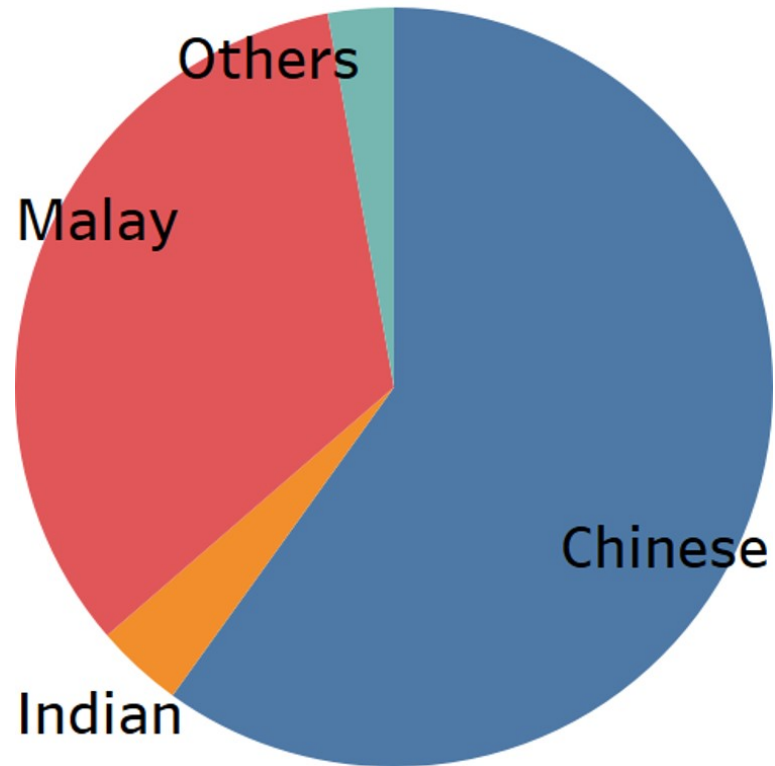
No. of apartment units sold by region, 2019



# Visualising Proportion

## A case for pie chart

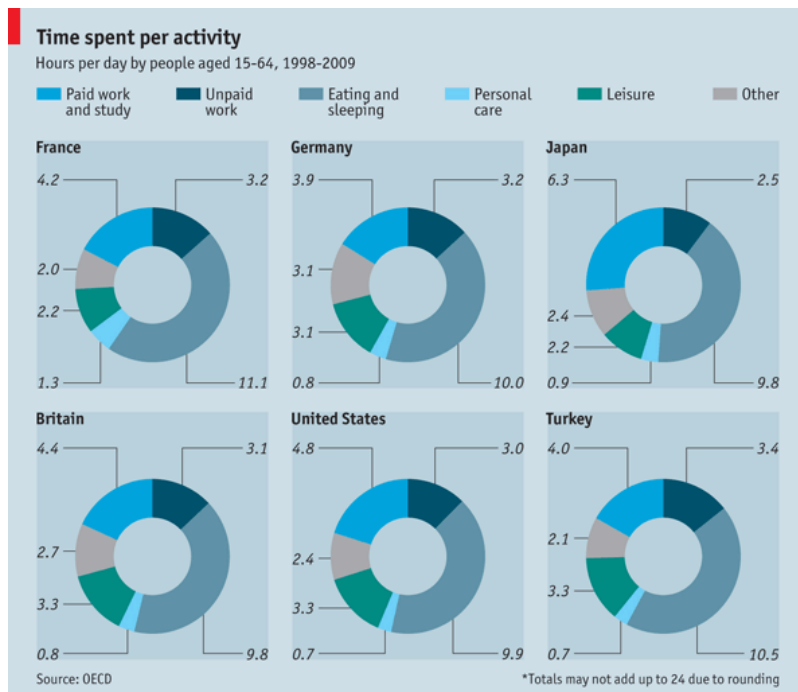
Proportion of students by race



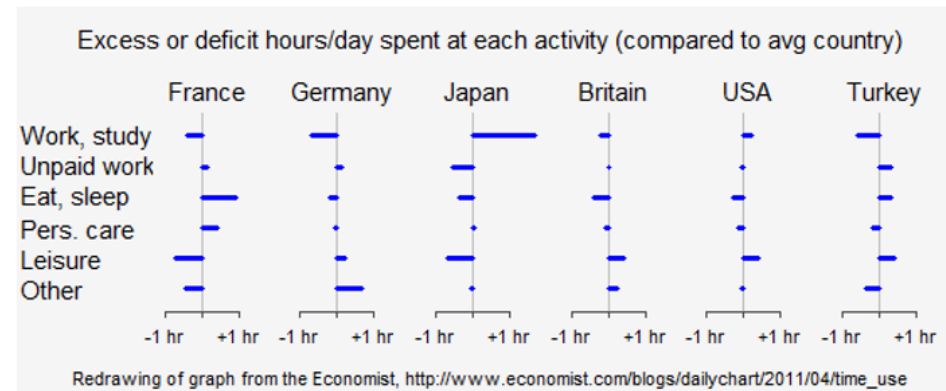
# Visualising Proportion

## A case against pie chart

- Avoid pie chart if the sub-groups are very similar because our eyes are not good in reading areas



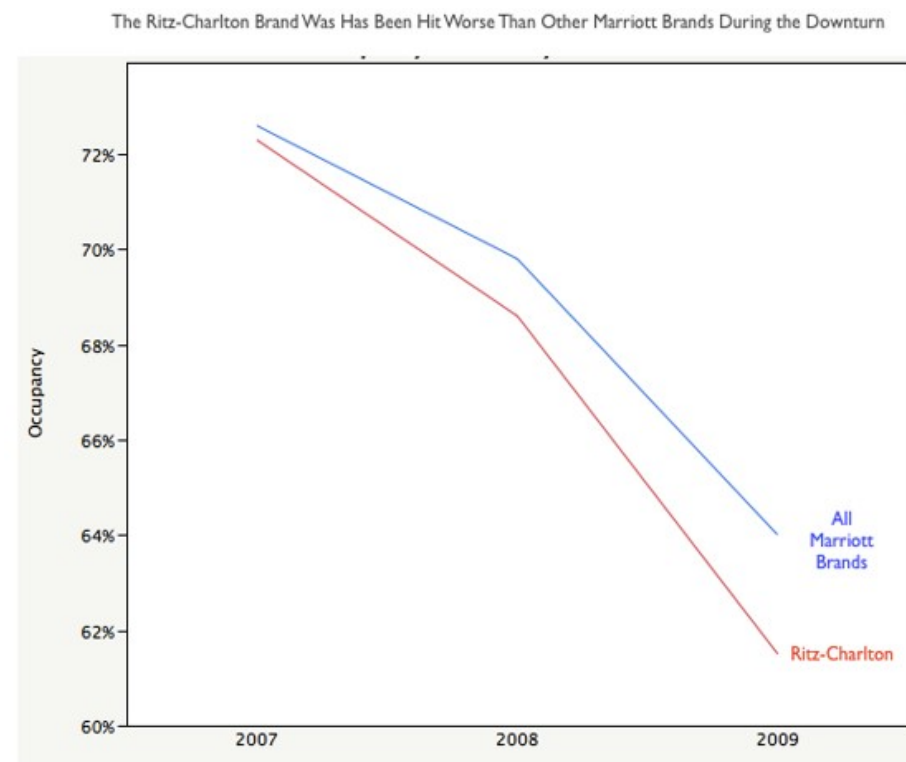
Source: Time use: A day in the life,  
Apr 19th 2011, 15:00 by The Economist online



# Visualising Proportion

## A case against pie chart

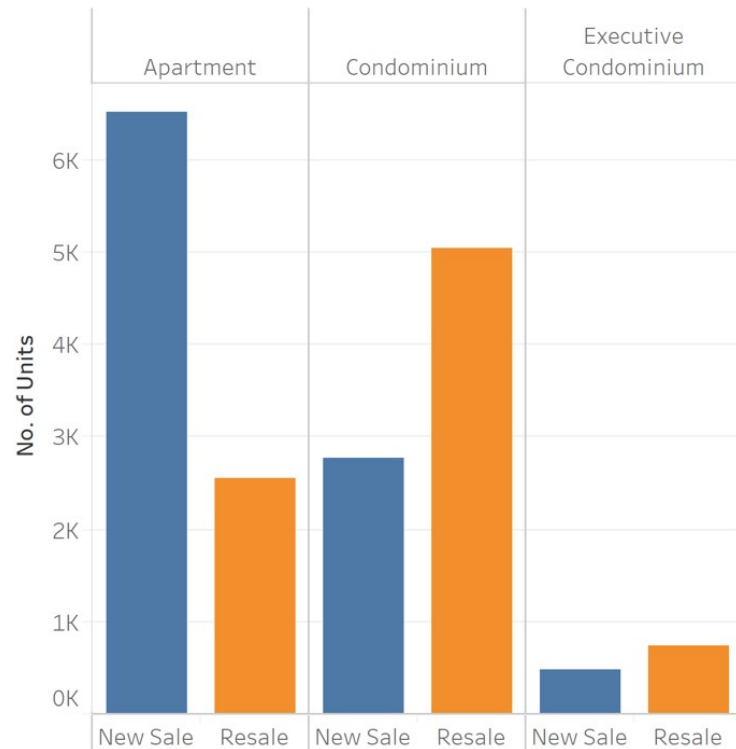
- Avoid pie chart if you are comparing changes over time



# Visualising Proportion

## Side-by-side bar chart

Distribution of highrise private property sold by type of sales, 2019



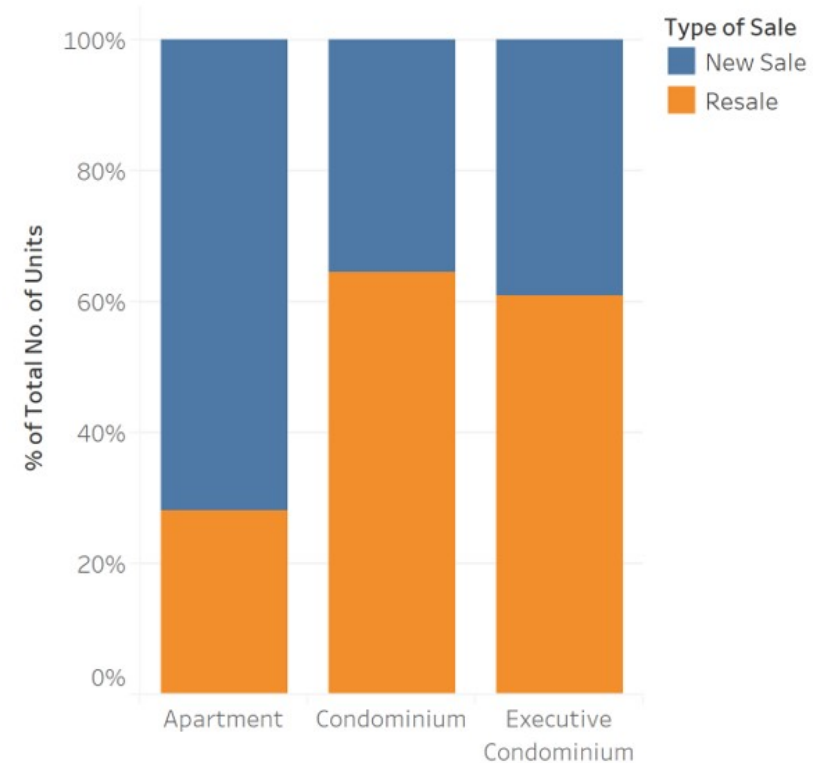
# Visualising Proportion

## Stacked bar chart

Distribution of highrise private property sold by type of sales, 2019



Distribution of highrise private property sold by type of sales, 2019



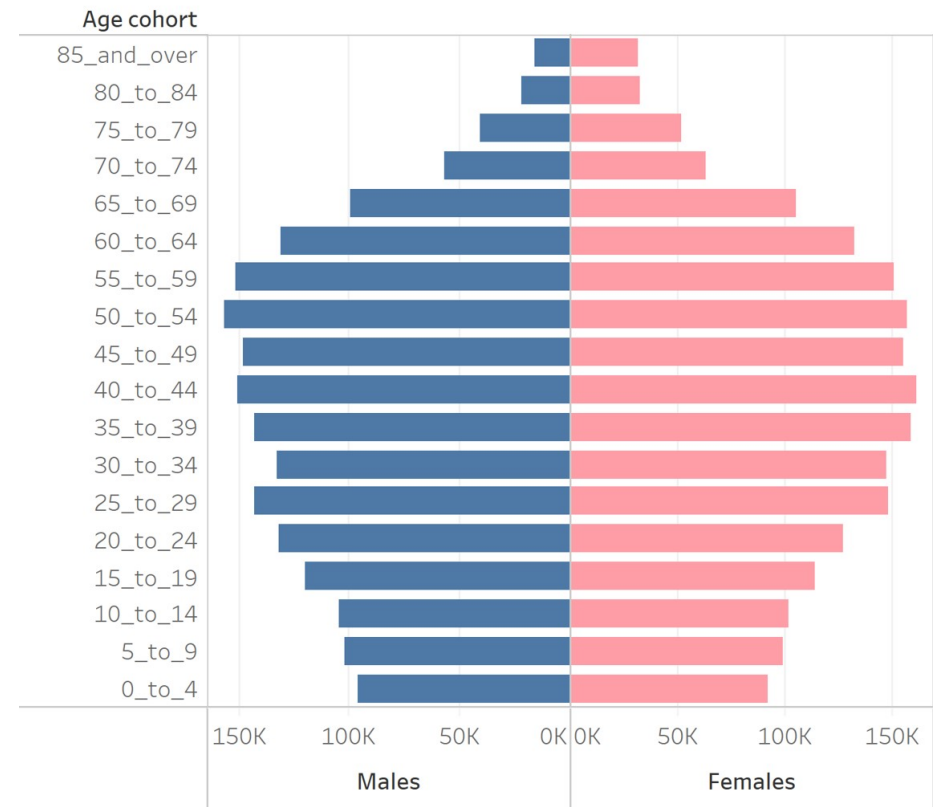


# Comparing Proportion

## Age-sex pyramid

- An age-sex pyramid, also popularly known as population pyramid, breaks down a country's or location's population into male and female genders and age cohorts.
- Usually, you'll find the left side of the pyramid graphing the male population and the right side of the pyramid displaying the female population.

Age-sex pyramid of Singapore, 2017

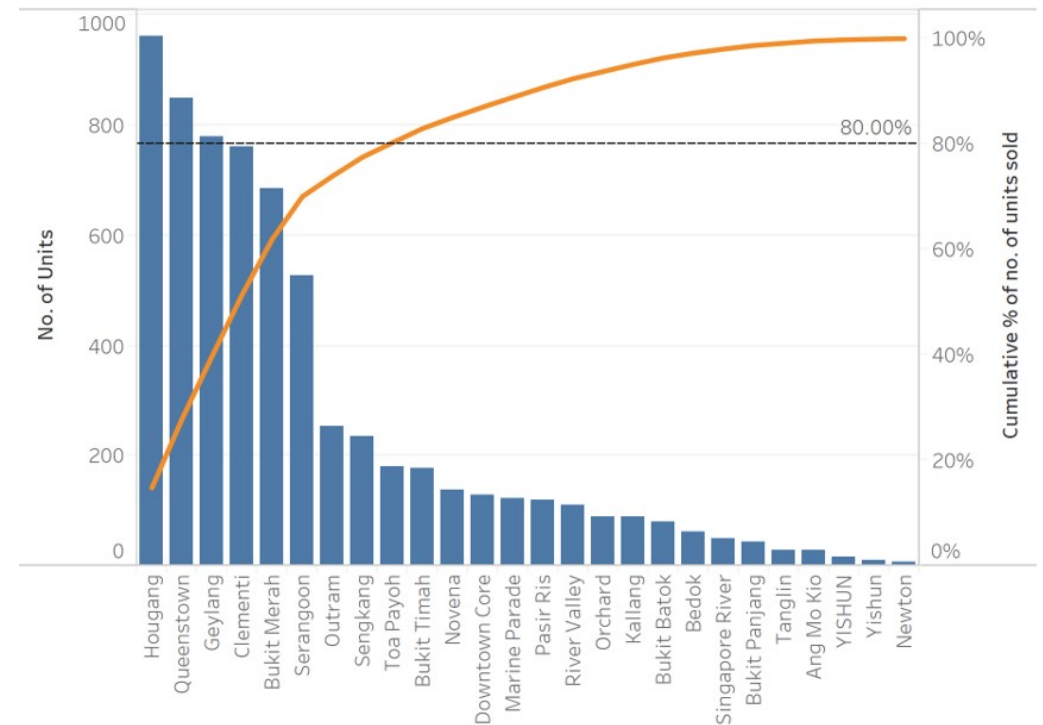


# Part-to-Whole and Ranking Analysis

## Pareto Chart

- A Pareto chart is a special type of bar chart where the values being plotted are arranged in descending order.
- Pareto chart was developed to illustrate the 80-20 Rule - that 80 percent of the problems stem from 20 percent of the various causes.
- In Pareto chart there are two y-axes. The primary y-axis is used to display the frequency counts of the sub-types and the secondary axis is used to display the cumulative frequency of the subtype.
- The frequency count usually is represented as bar chart and the cumulative frequency is represented as line chart.

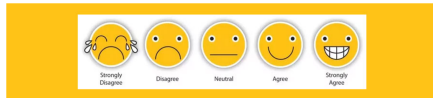
Frequency distribution of number of new apartments sold, 2019



# Visualising Likert Scale Data

## Diverging stacked bar chart

- What is likert scale?



Reference:

- [https://en.wikipedia.org/wiki/Likert\\_scale](https://en.wikipedia.org/wiki/Likert_scale)
- Dwight Barry (2017) Do not use averages with Likert scale data.
- Heiberger RM, Robbins NB. Design of diverging stacked bar charts for Likert scales and other applications. Journal of Statistical Software. 2014;57(5): 1-32.

Monthly Meal Service Satisfaction Survey Report, Oct 2016

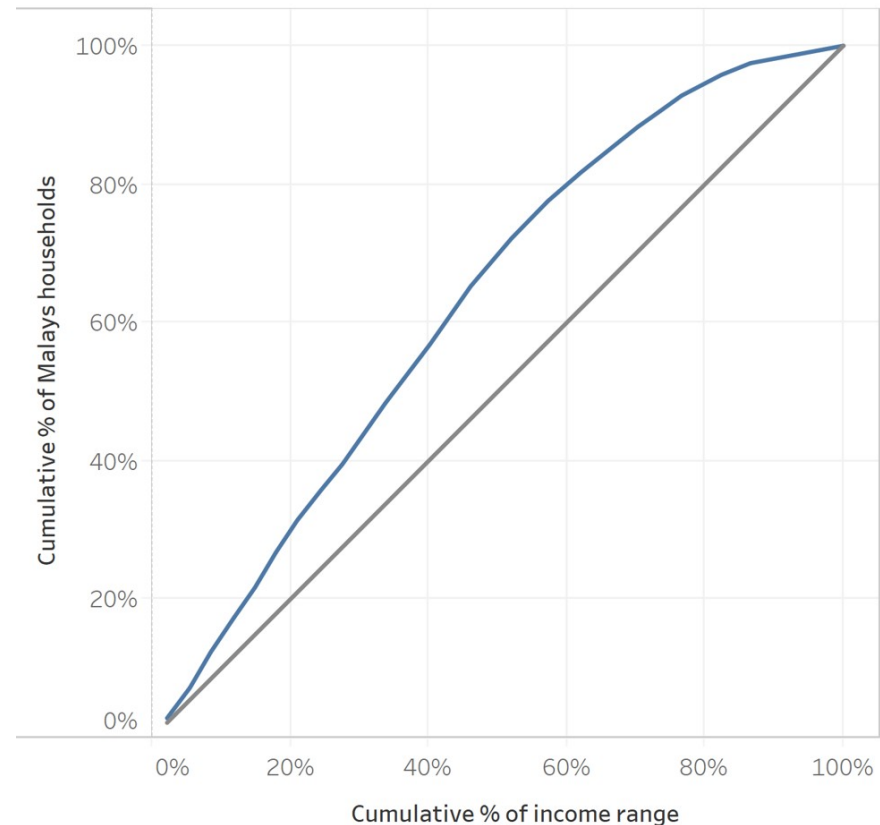


# What about line graph?

## Lorenz curve

- A graphical representation of the distribution of income or of wealth.

Lorenz curve Malays

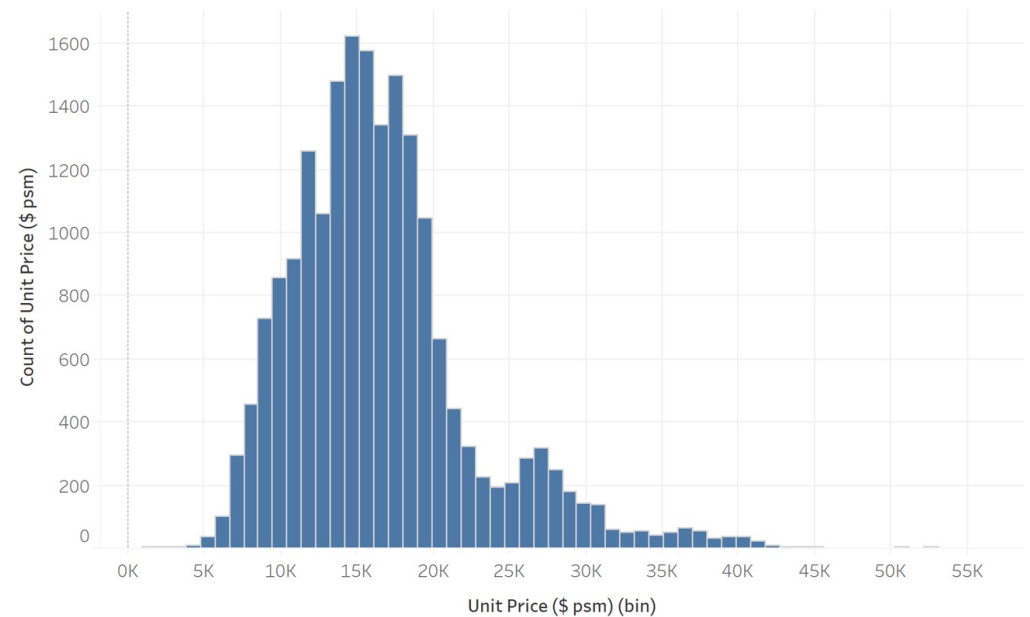


# Visualising Distribution

## Histogram

- A histogram is a graphical display of tabular frequencies, shown as adjacent rectangles.
- Each rectangle is erected over an interval, with an area equal to the frequency of the interval.
- The height of a rectangle is also equal to the frequency density of the interval, i.e. the frequency divided by the width of the interval.
- The total area of the histogram is equal to the number of data.

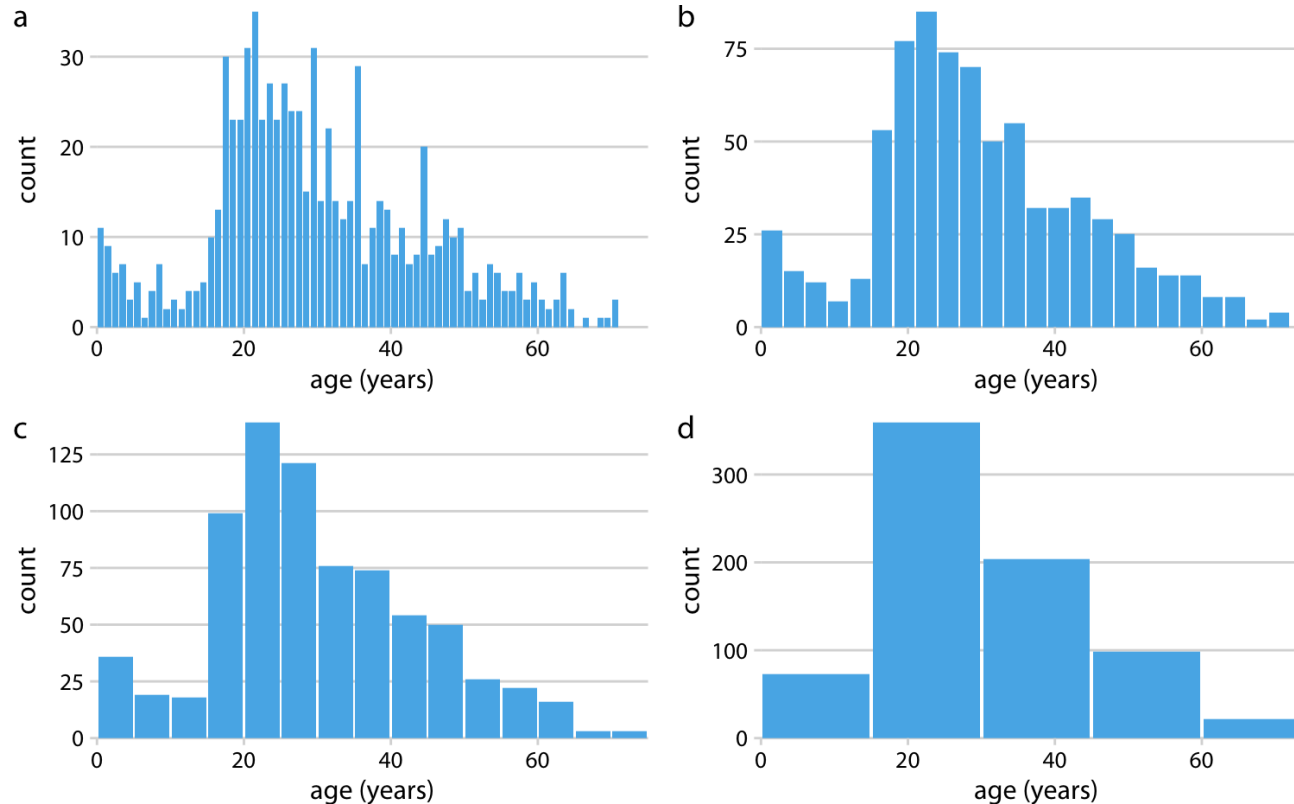
Distribution of unit selling price of private properties, 2019



# Visualising Distribution

## Histogram

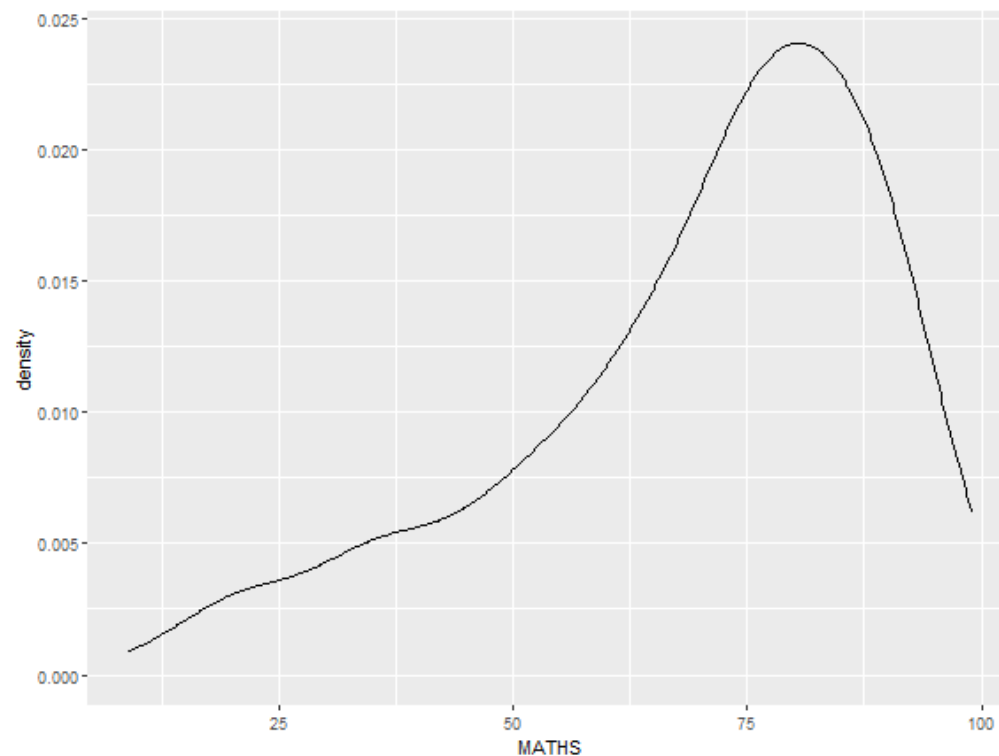
- It is important to note that the shape of a histogram can be affected by the number of bins or/and classification methods used.



# Visualising Distribution

## Density plot

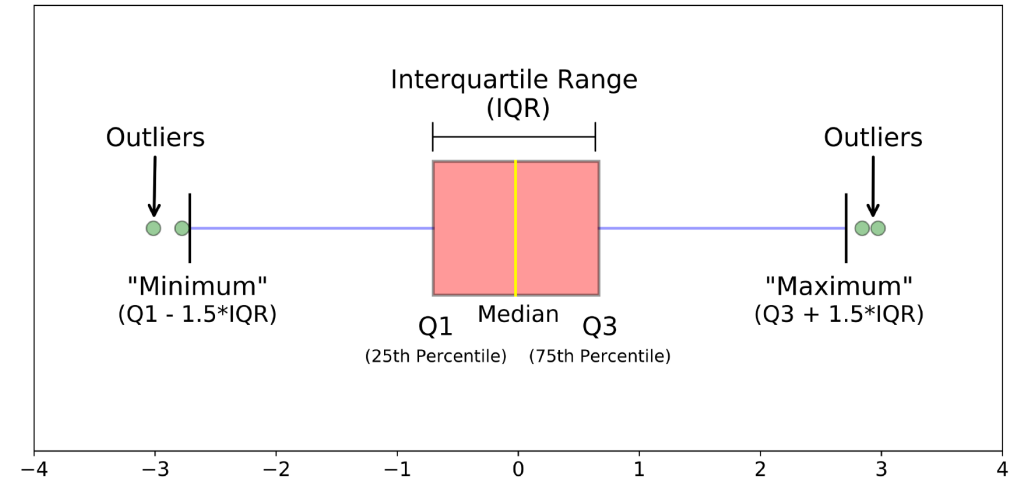
- To visualise the underlying probability distribution of the data by drawing an appropriate continuous curve.



# Deviation Analysis

## Boxplot

- A convenient way of graphically depicting groups of numerical data through their five-number summaries (the smallest observation, lower quartile (Q1), median (Q2), upper quartile (Q3), and largest observation).
- A box plot may also indicate which observations, if any, might be considered outliers.



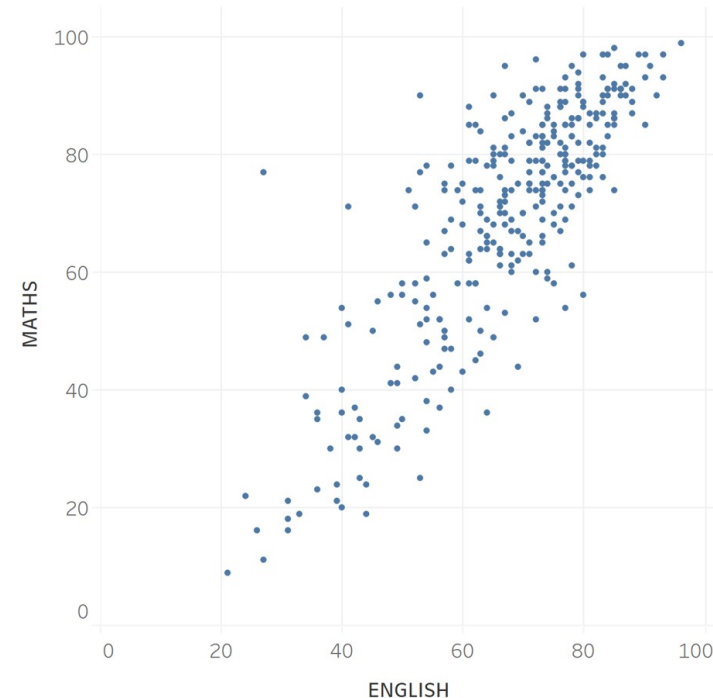


# Visualising Relationship Between Two Continuous Variables

## Scatterplot

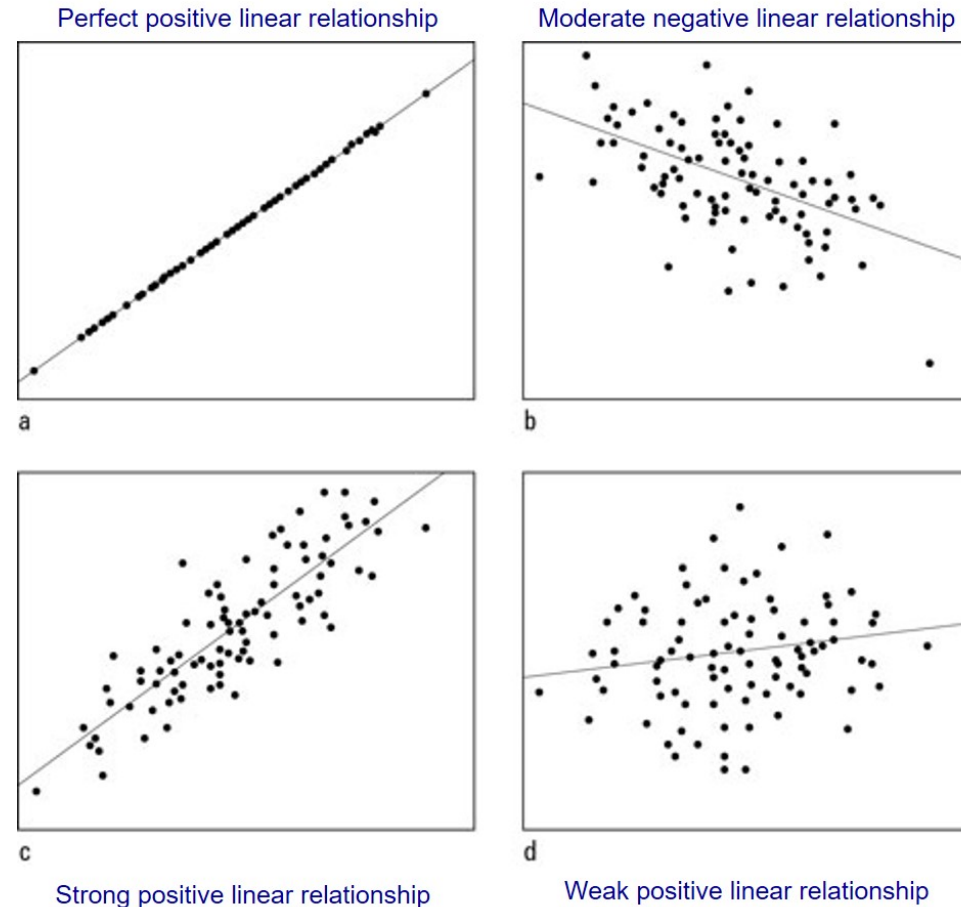
- A scatter plot or scattergraph is a type of mathematical diagram using Cartesian coordinates to display values for two variables for a set of data.
- The data is displayed as a collection of points, each having the value of one variable determining the position on the horizontal axis and the value of the other variable determining the position on the vertical axis.
- Also known as scatter chart, scattergram, scatter diagram or scatter graph.

Relationship between pupils' English and Maths grades



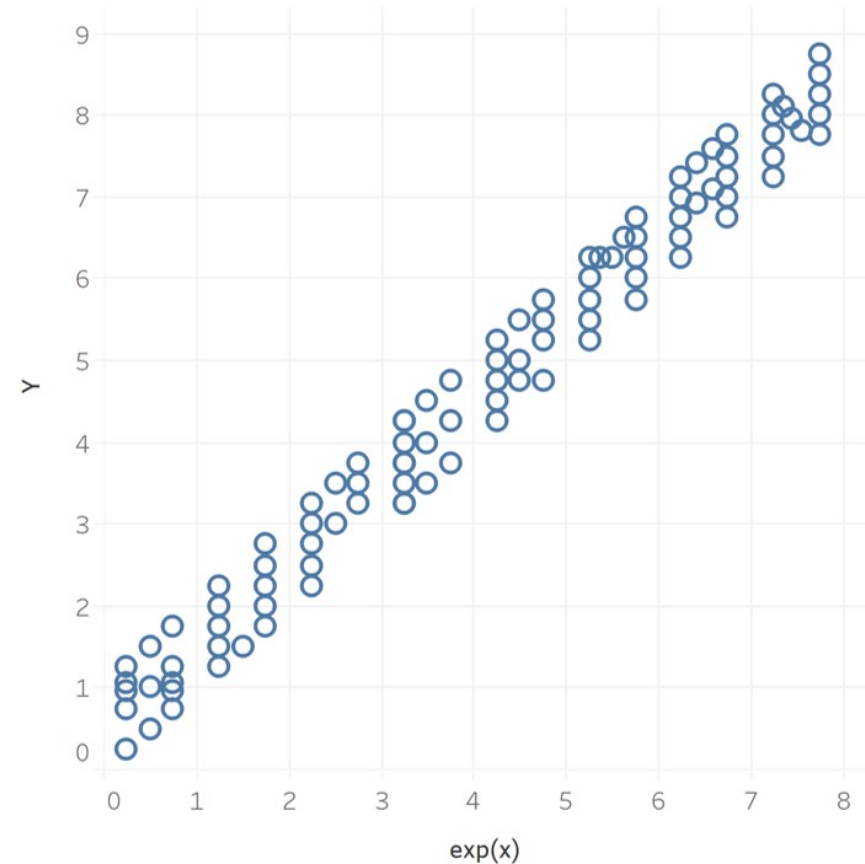
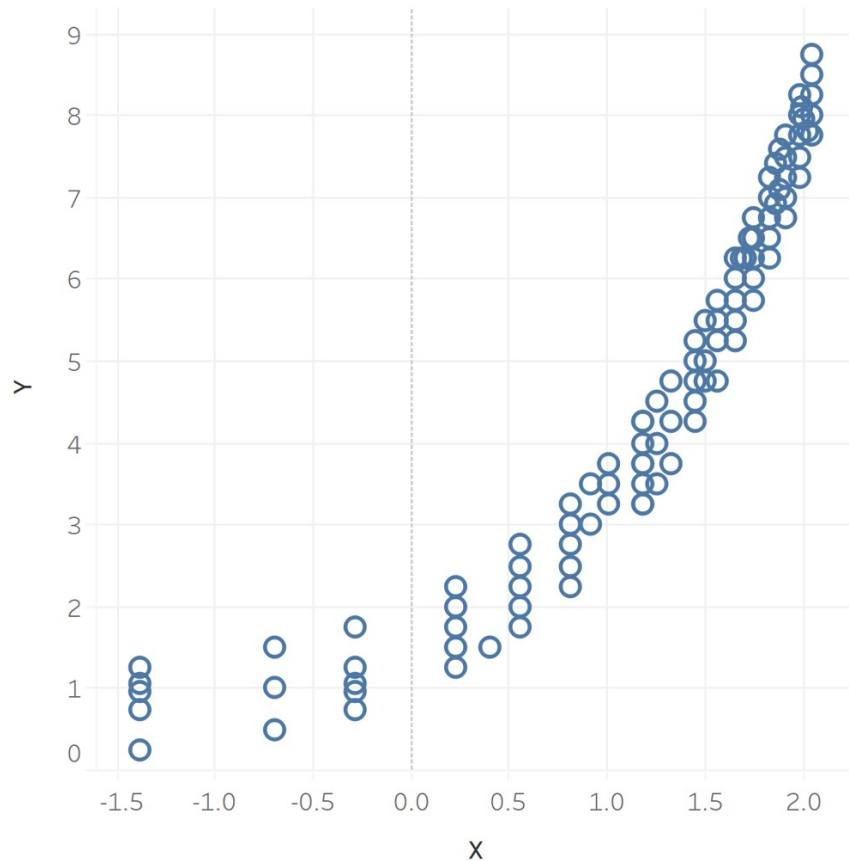
# Visualising Relationship Between Two Continuous Variables

## Interpreting scatterplot



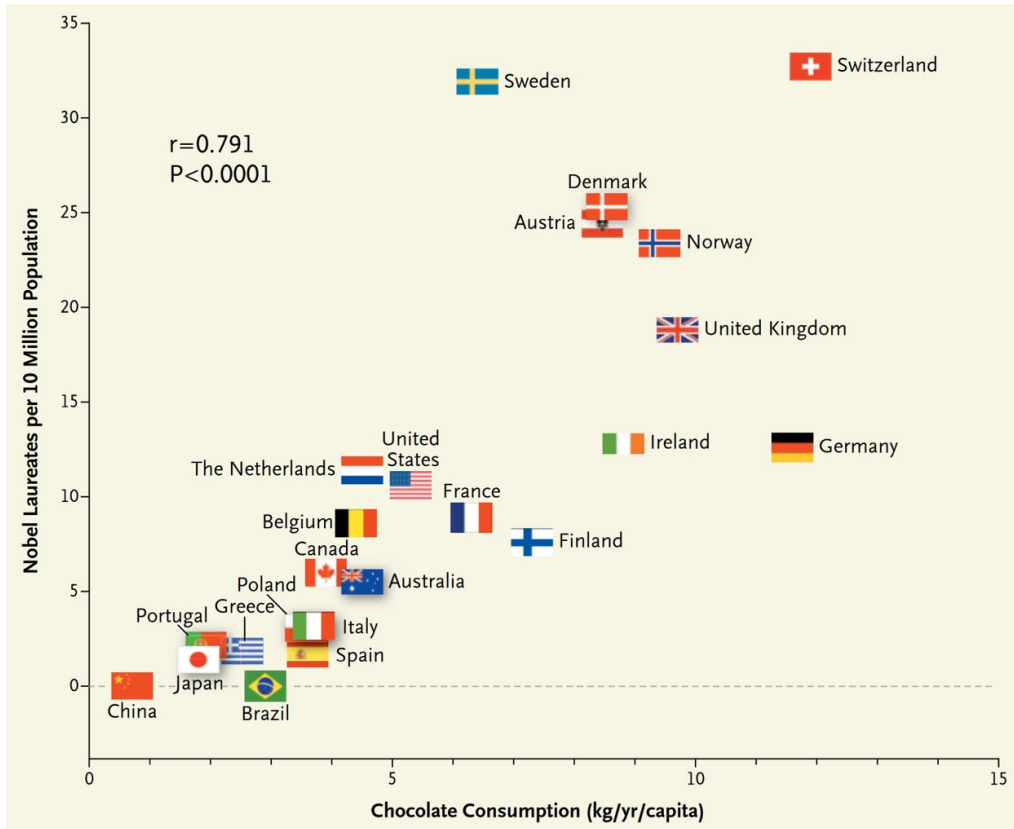
# Visualising Relationships

Caution: Not all relationships are linear



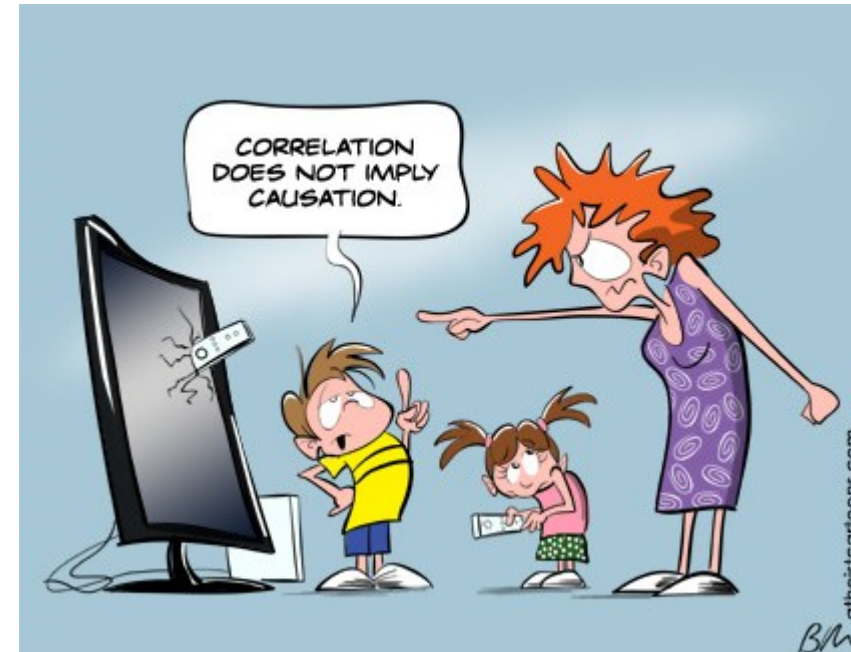
# Visualising Relationships

Warning!



Source: Messerli (2012) "Chocolate Consumption, Cognitive Function, and Nobel Laureates", [The New England Journal of Medicine](#).pdf)

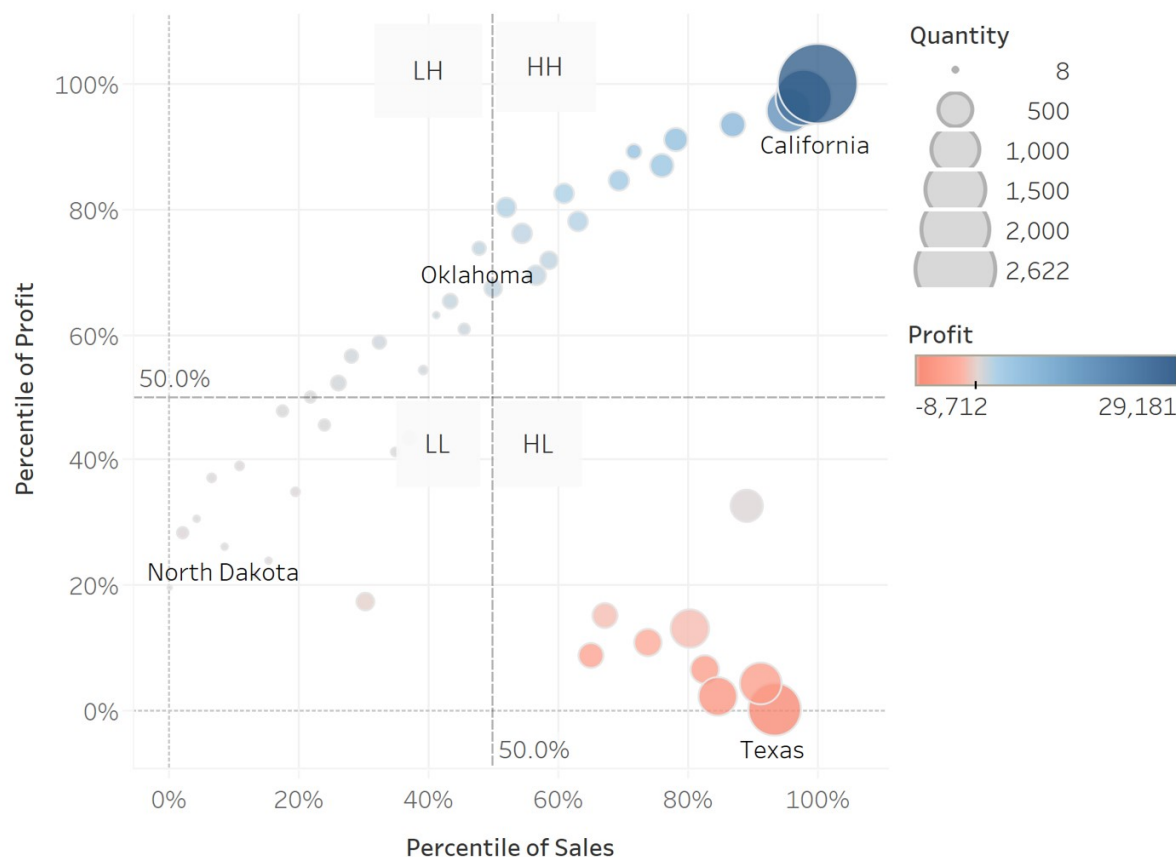
Correlation does not imply causation



# Visualising Relationship

## Quadrat analysis

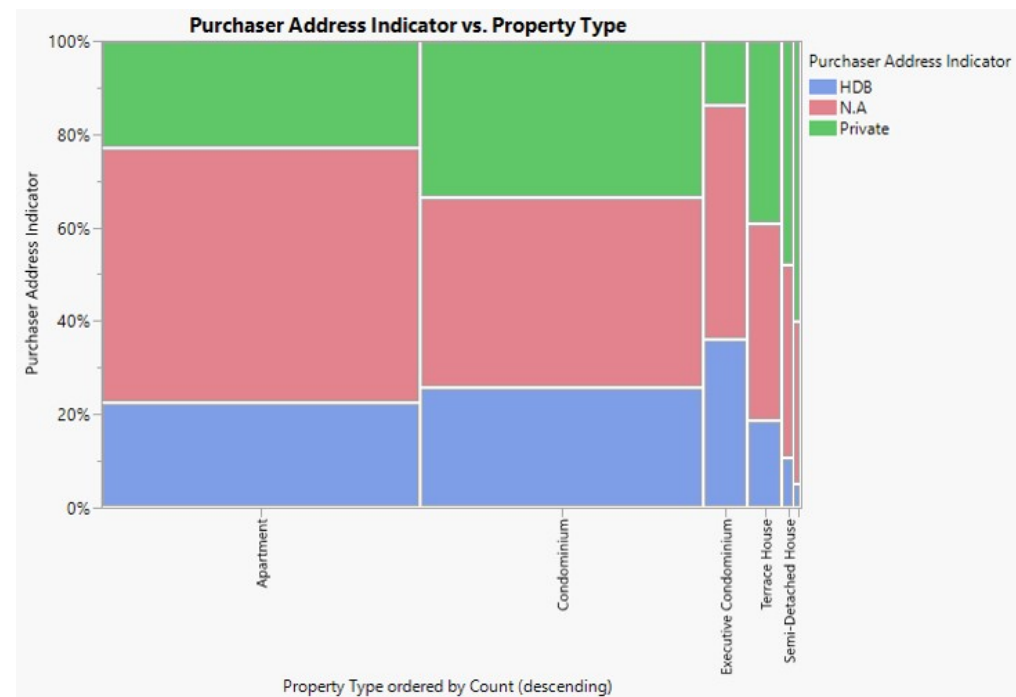
Sales versus profit by states, 2018



# Visualising Relationship Between Two Categorical Variables

## Mosaic Plot

- A mosaic plot is a graphical display that allows you to examine the relationship among two or more categorical variables.



# Visualising Relationship Between Sub-groups

## Trellis

- Trellised visualizations enable you to quickly recognize similarities or differences between different categories in the data.
- Each individual panel in a trellis visualization displays a subset of the original data table, where the subsets are defined by the categories available in a column or hierarchy.

Distribution of English grades by gender

