

Lesson 1 (Supplement): Choosing the Right Visualisation

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2020-01-20 (updated: 2022-04-16)

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

Choosing the Right Visualisation

MAJOR CHART TYPE CATEGORIES FOR BUSINESS PROFESSIONALS

Comparison



Bar & Column



Slopegraph

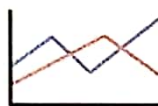


Dumbbell

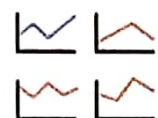


Table

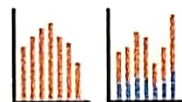
Trend



Line



Small Multiple (Line)



Column and Stacked Column

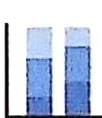


Stacked Area

Composition



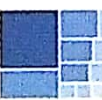
Waffle



100% Stacked Column



Pie and Donut



Treemap

Relationship



Scatterplot



Bubble



XY Heatmap

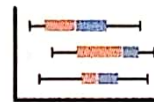
Distribution



Histogram



Pyramid



Box plot



Cloud

Spatial



Choropleth



Dot Density



Proportional Symbol



Heatmap

Flow



Funnel



Waterfall



Sankey



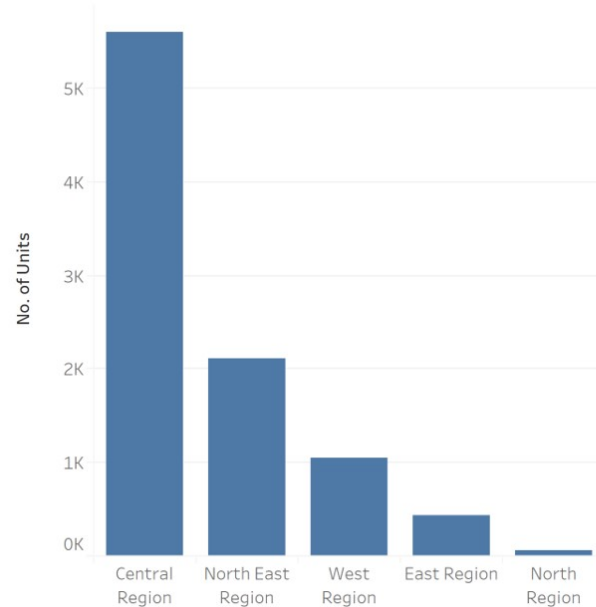
Chord

Visualising Count

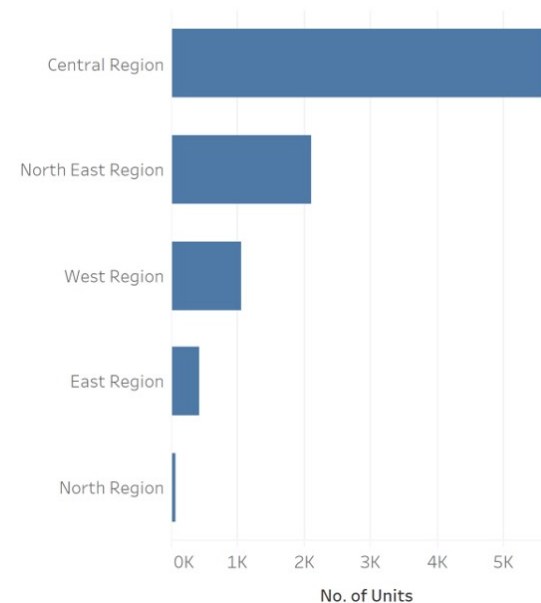
Bar Chart

- 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



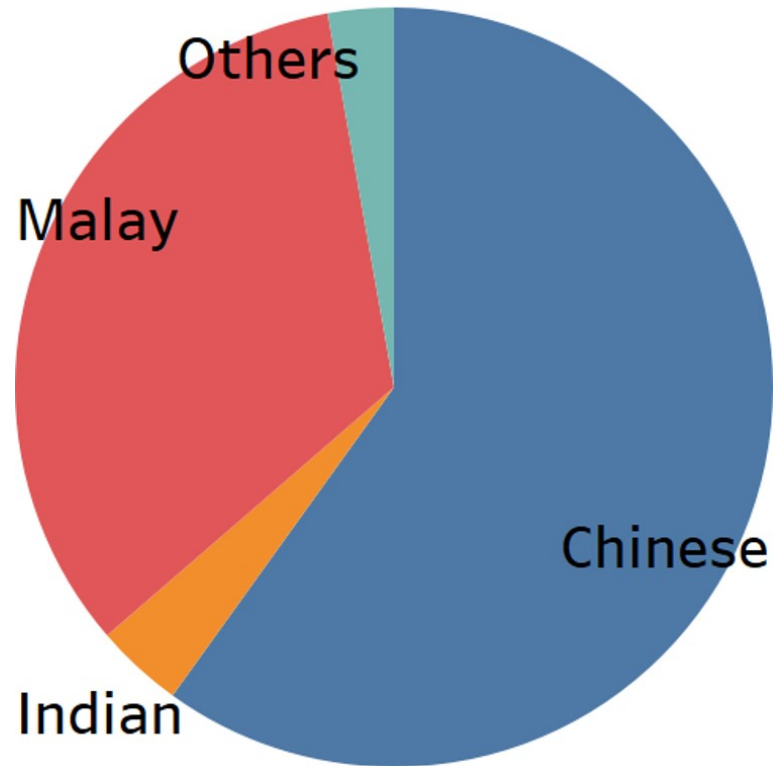
No. of apartment units sold by region, 2019



Visualising Proportion

A case for pie chart

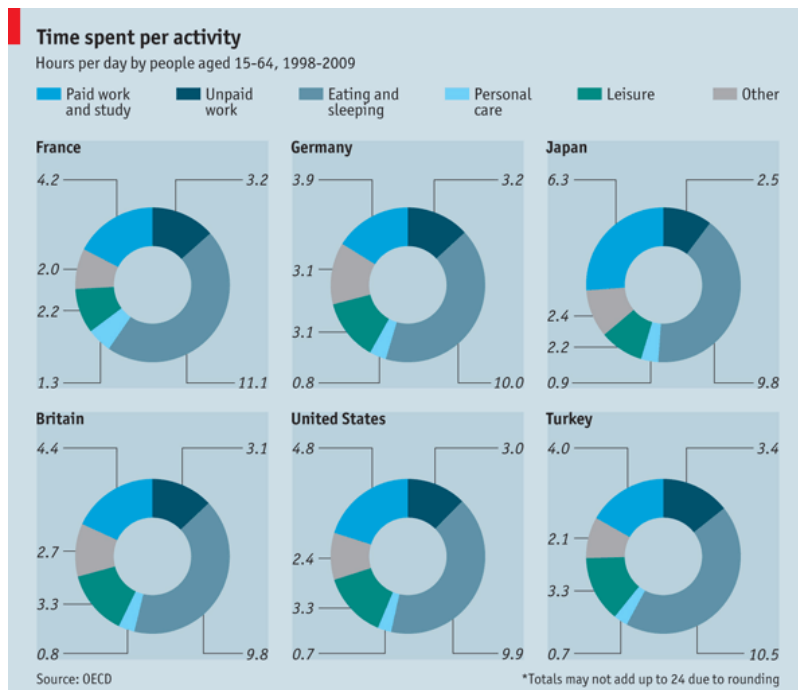
Proportion of students by race



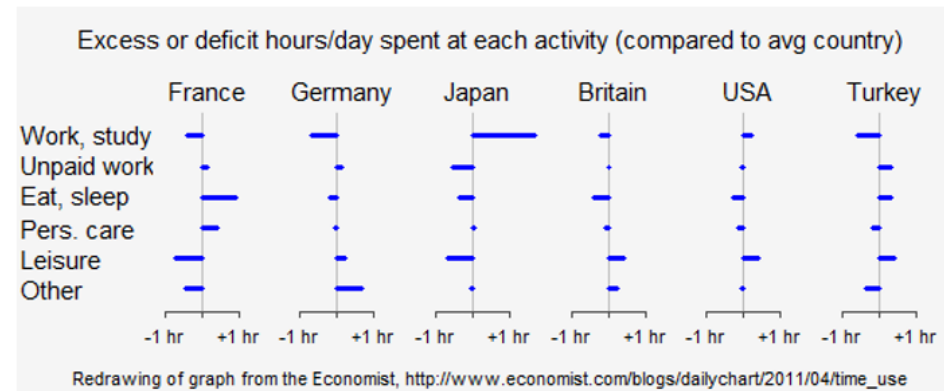
Visualising Proportion

A case against pie chart

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



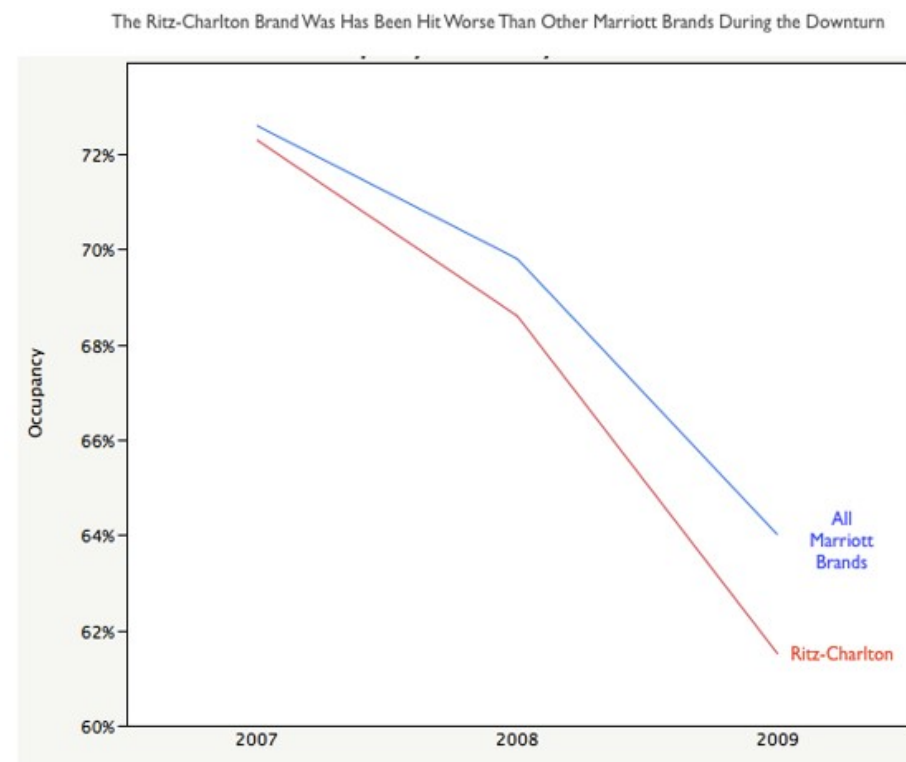
Source: Time use: A day in the life,
Apr 19th 2011, 15:00 by The Economist online



Visualising Proportion

A case against pie chart

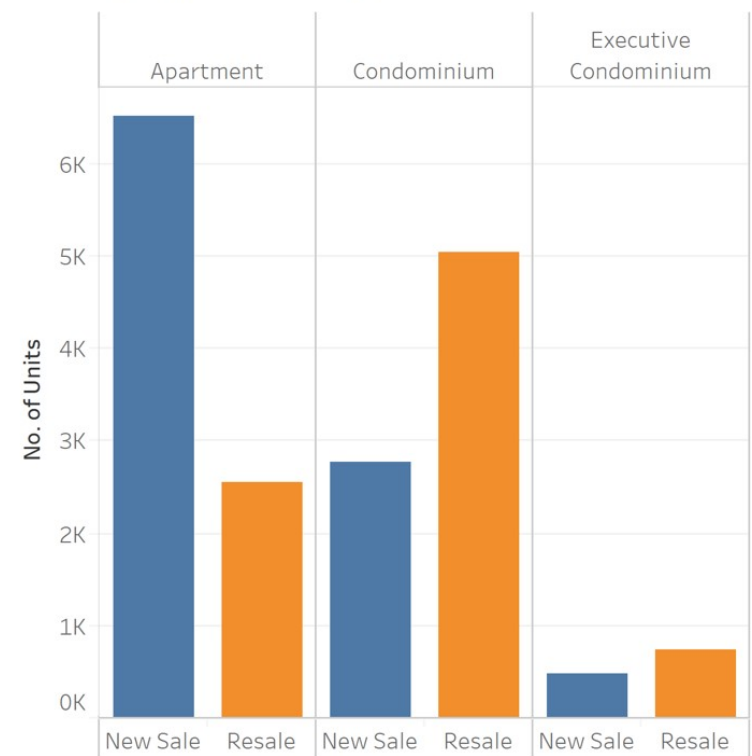
- Avoid pie chart if you are comparing changes over time



Visualising Proportion

Side-by-side bar chart

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



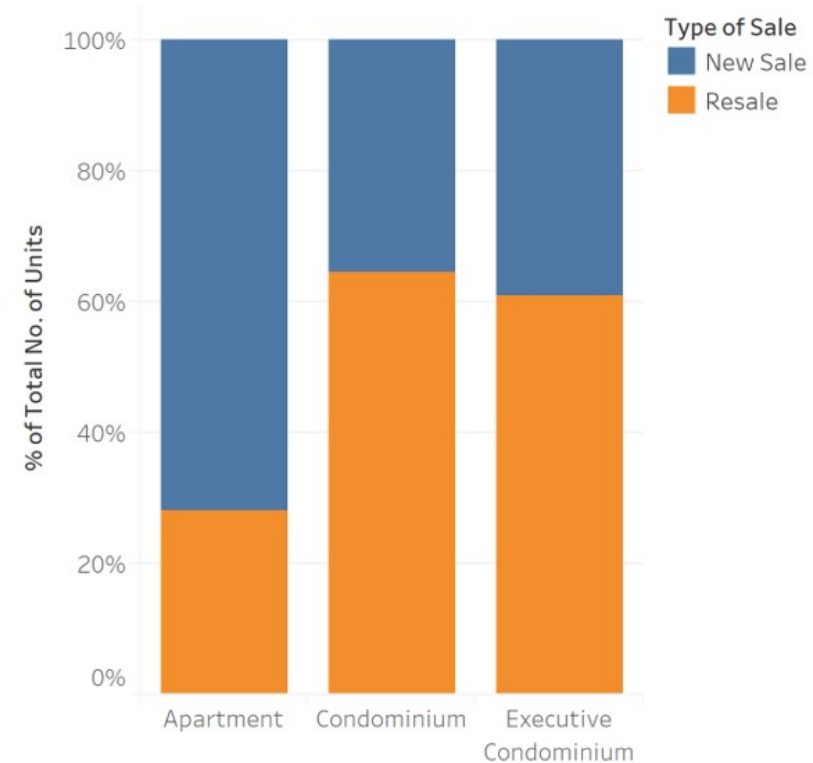
Visualising Proportion

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

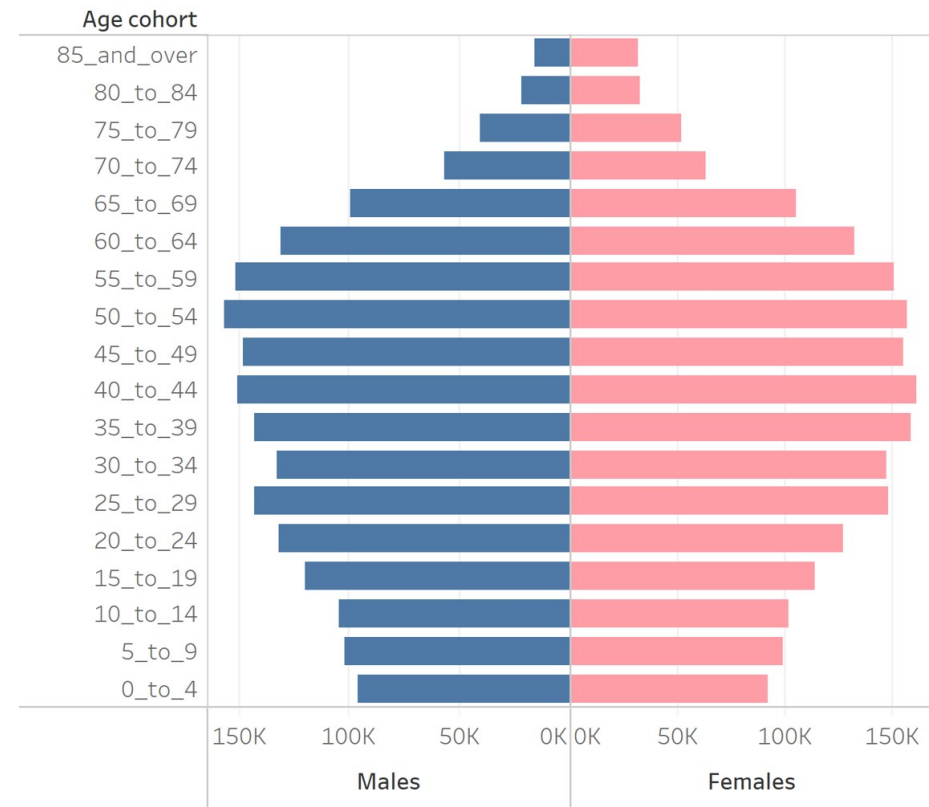


Comparing Proportion

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

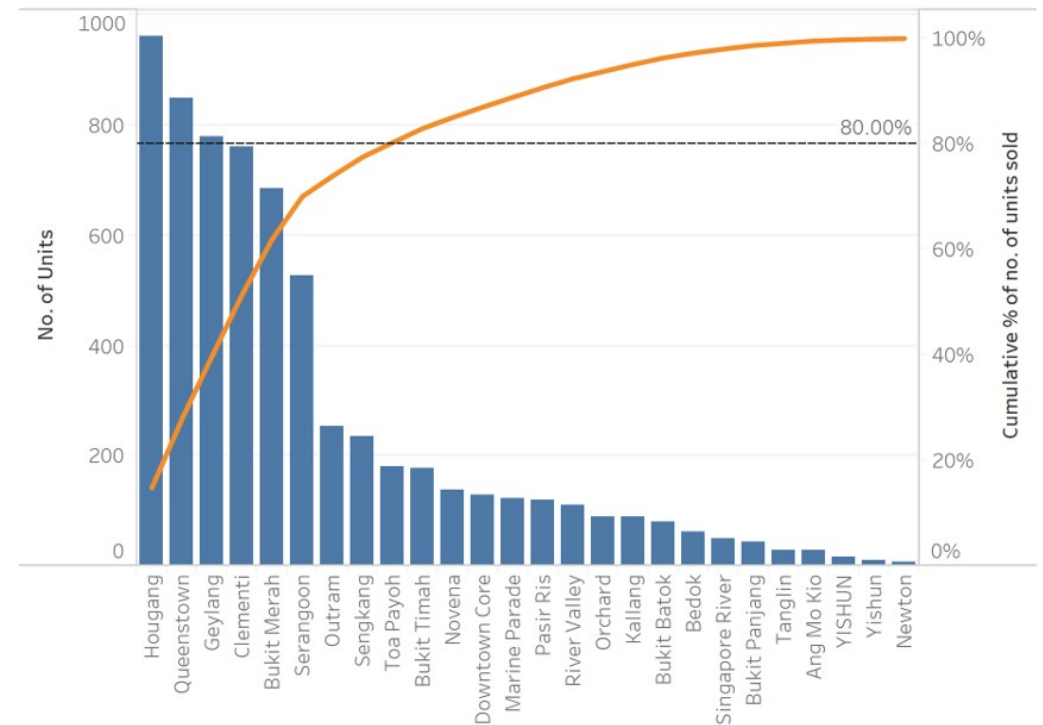


Part-to-Whole and Ranking Analysis

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.

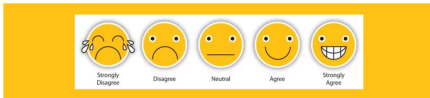
Frequency distribution of number of new apartments sold, 2019



Visualising Likert Scale Data

Diverging stacked bar chart

- What is likert scale?



Reference:

- <https://en.wikipedia.org/wiki/Likert>
- 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

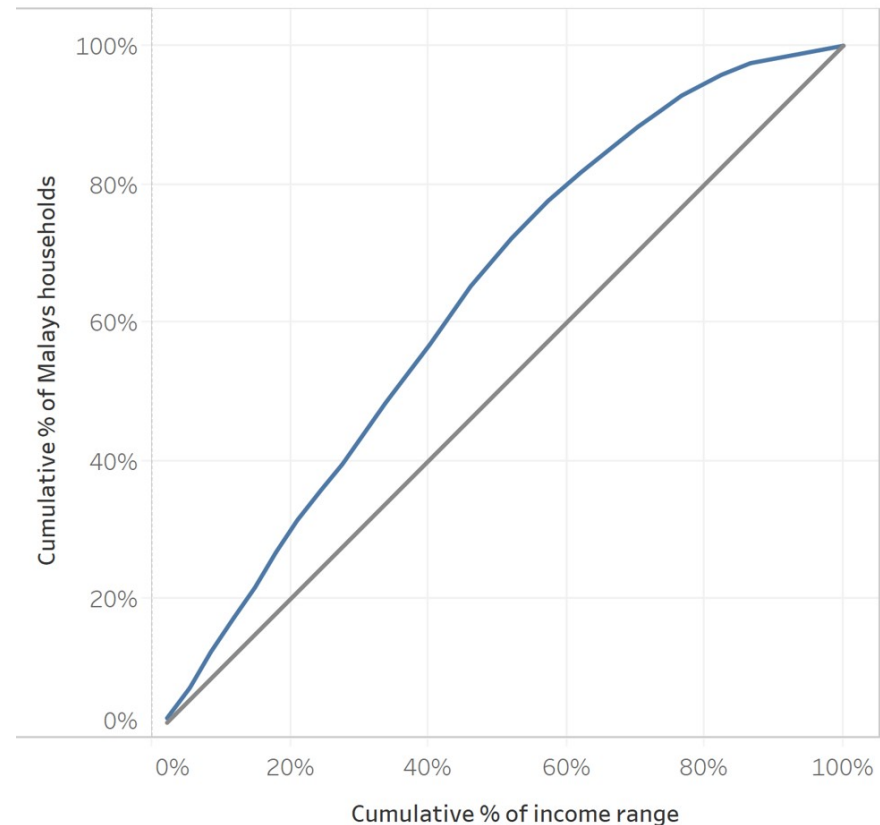


What about line graph?

Lorenz curve

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

Lorenz curve Malays

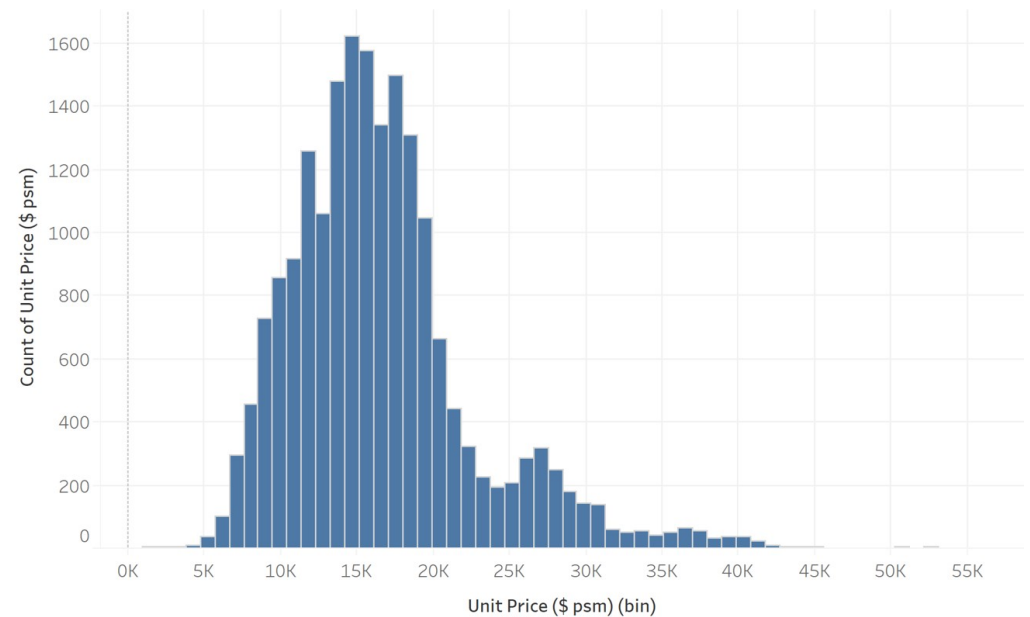


Visualising Distribution

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.

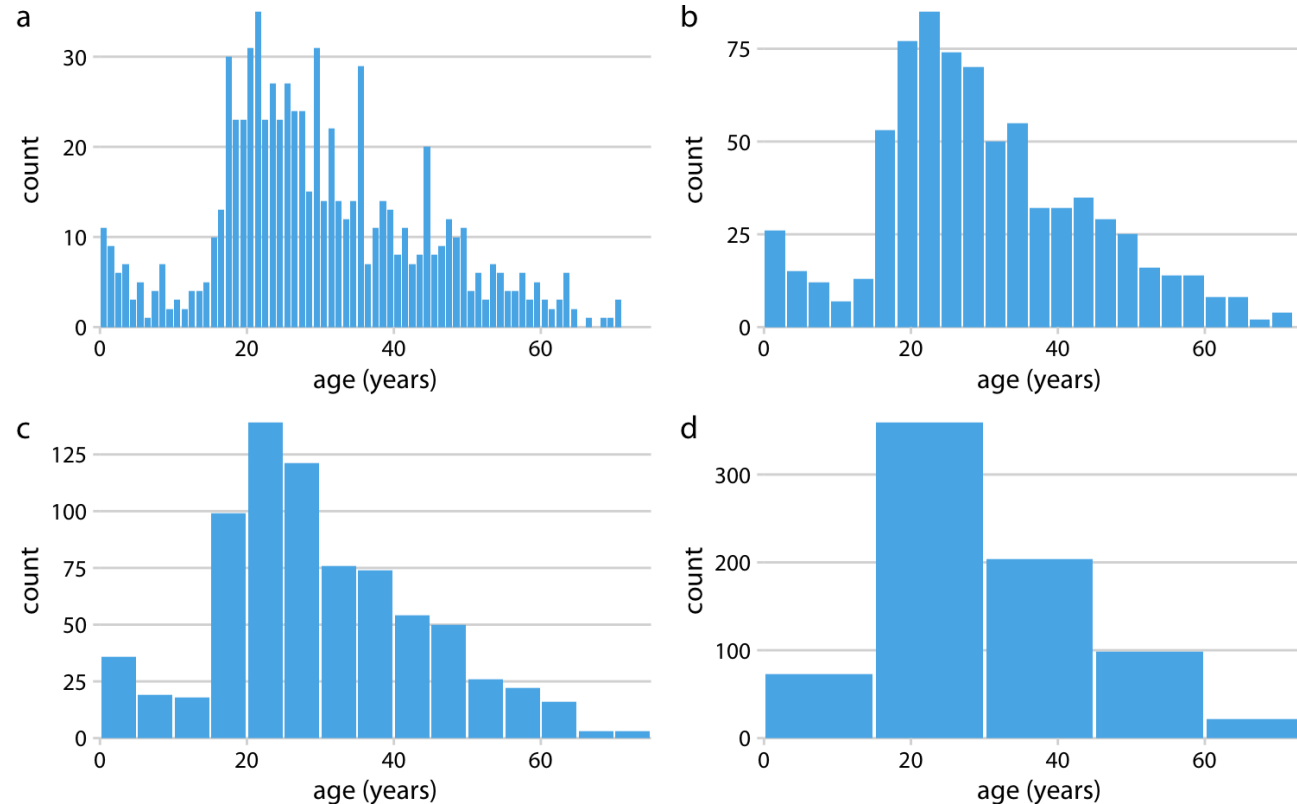
Distribution of unit selling price of private properties, 2019



Visualising Distribution

Histogram

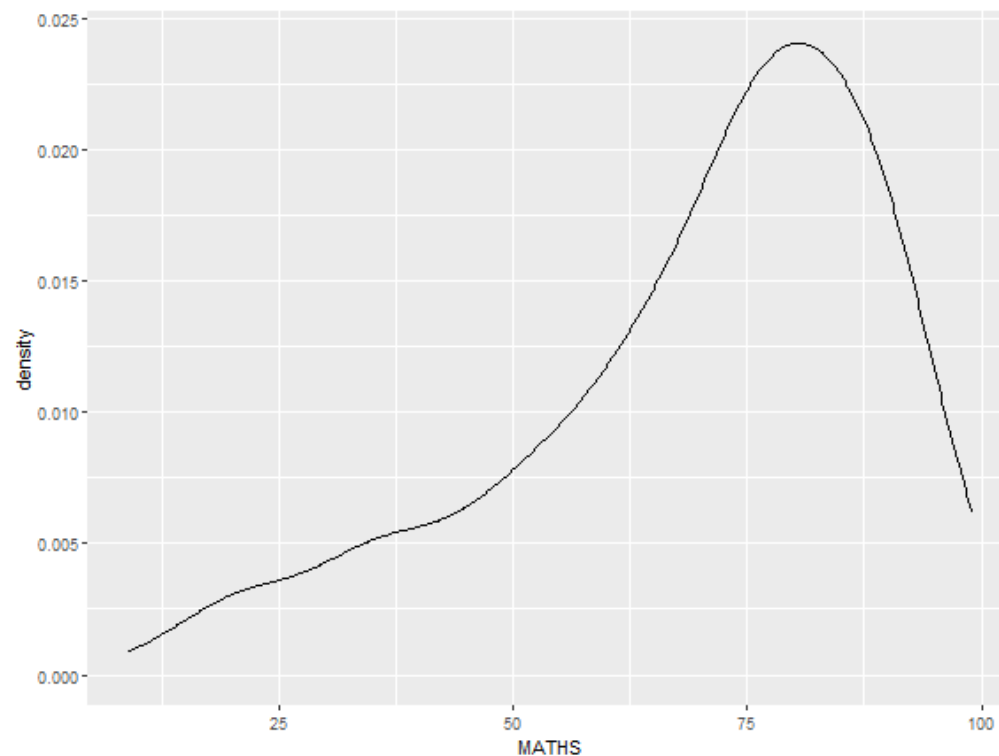
- It is important to note that the shape of a histogram can be affected by the number of bins or/and classification methods used.



Visualising Distribution

Density plot

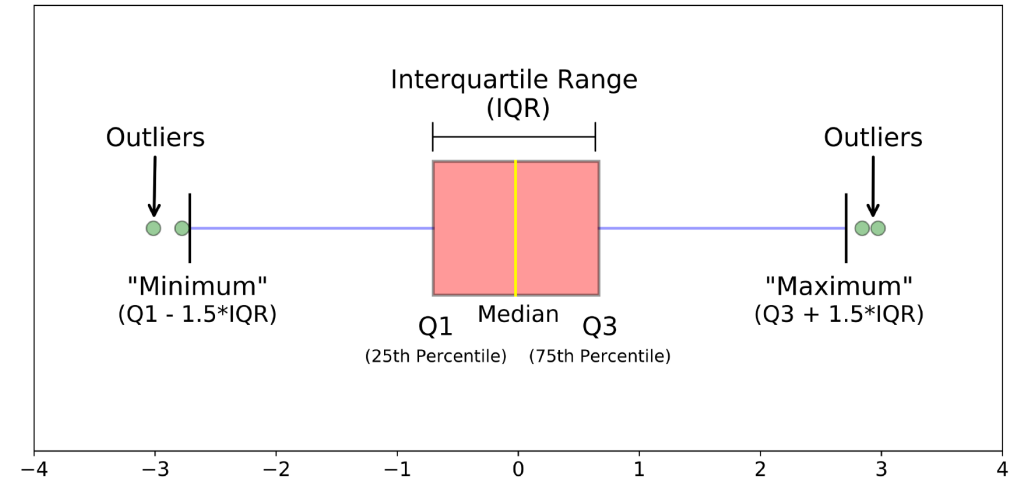
- To visualise the underlying probability distribution of the data by drawing an appropriate continuous curve.



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.

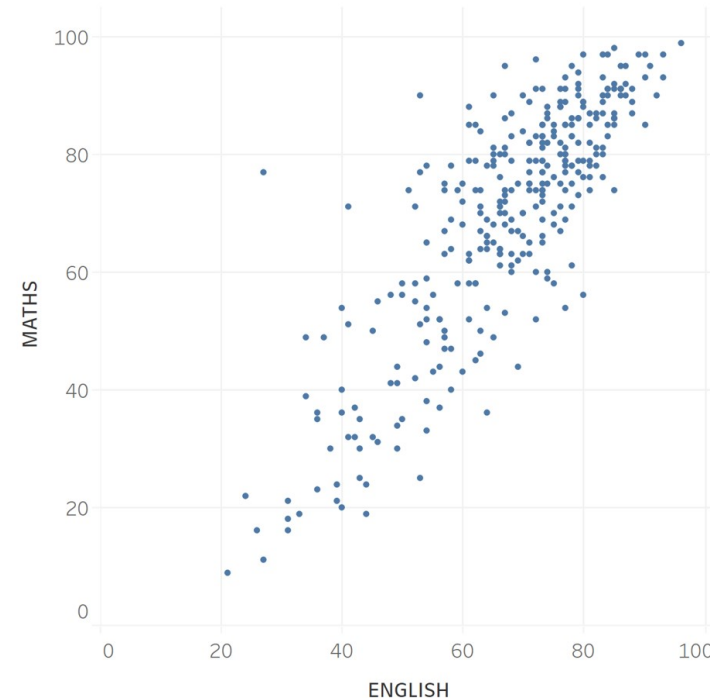


Visualising Relationship Between Two Continuous Variables

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.

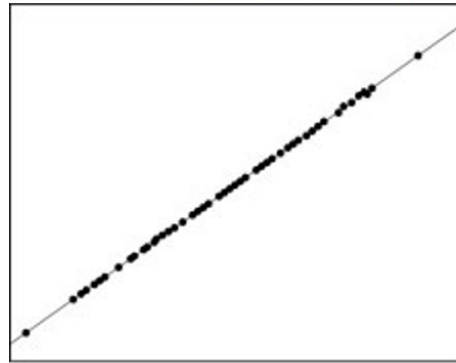
Relationship between pupils' English and Maths grades



Visualising Relationship Between Two Continuous Variables

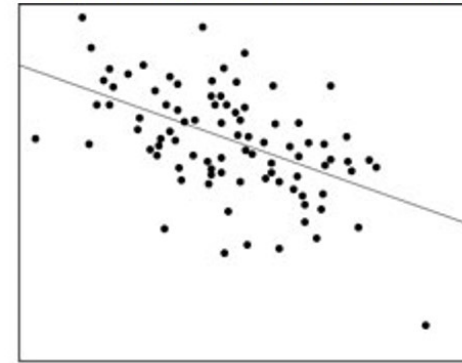
Interpreting scatterplot

Perfect positive linear relationship

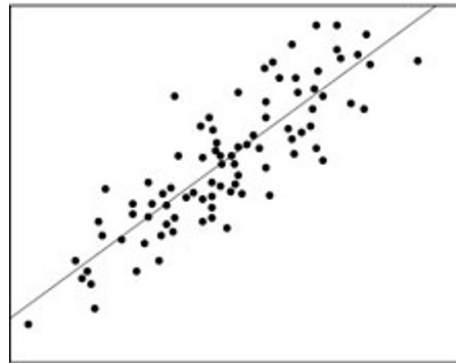


a

Moderate negative linear relationship

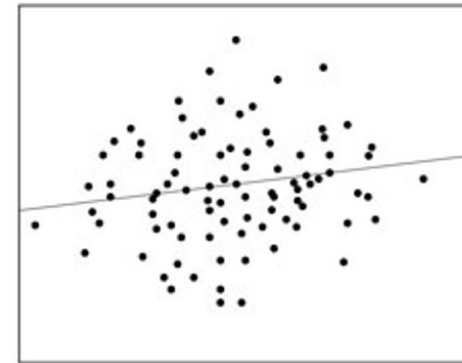


b



c

Strong positive linear relationship

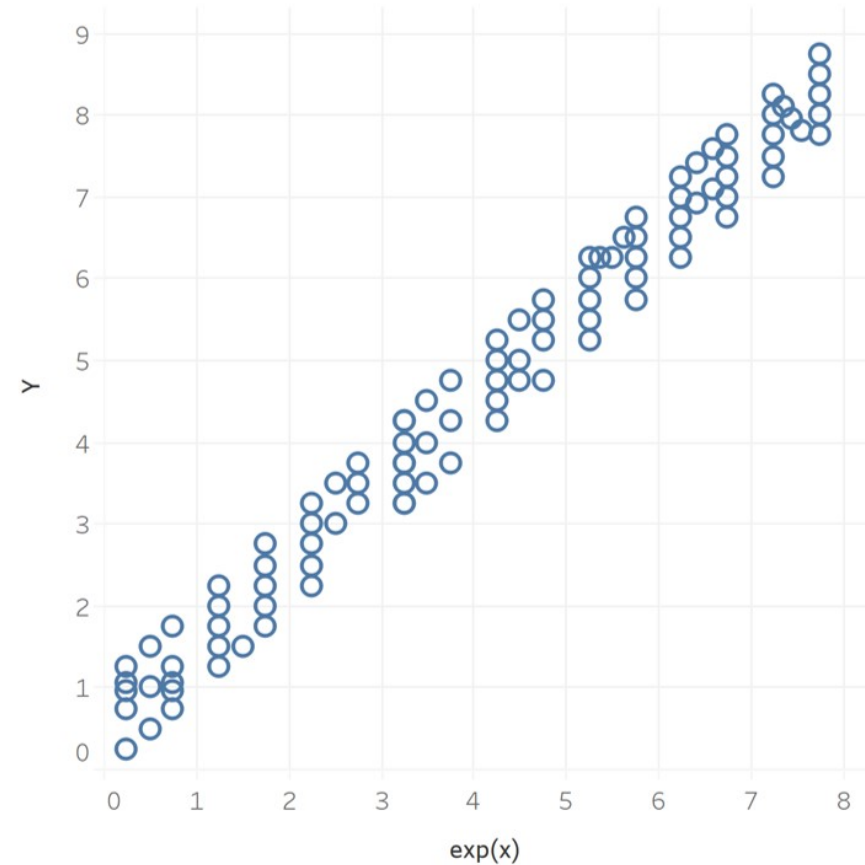
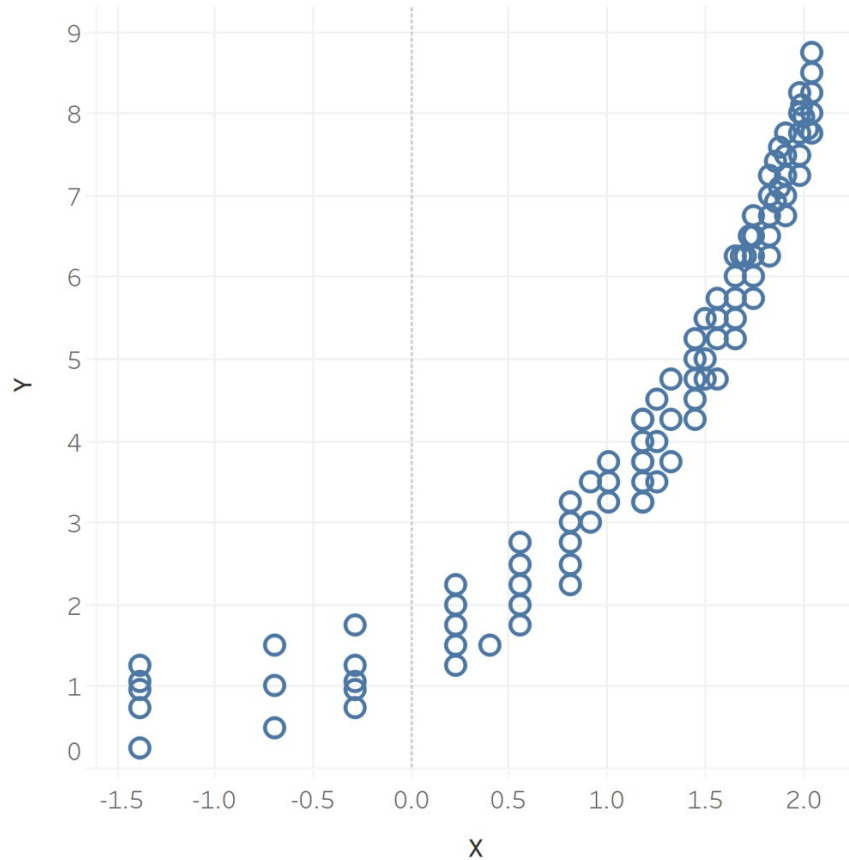


d

Weak positive linear relationship

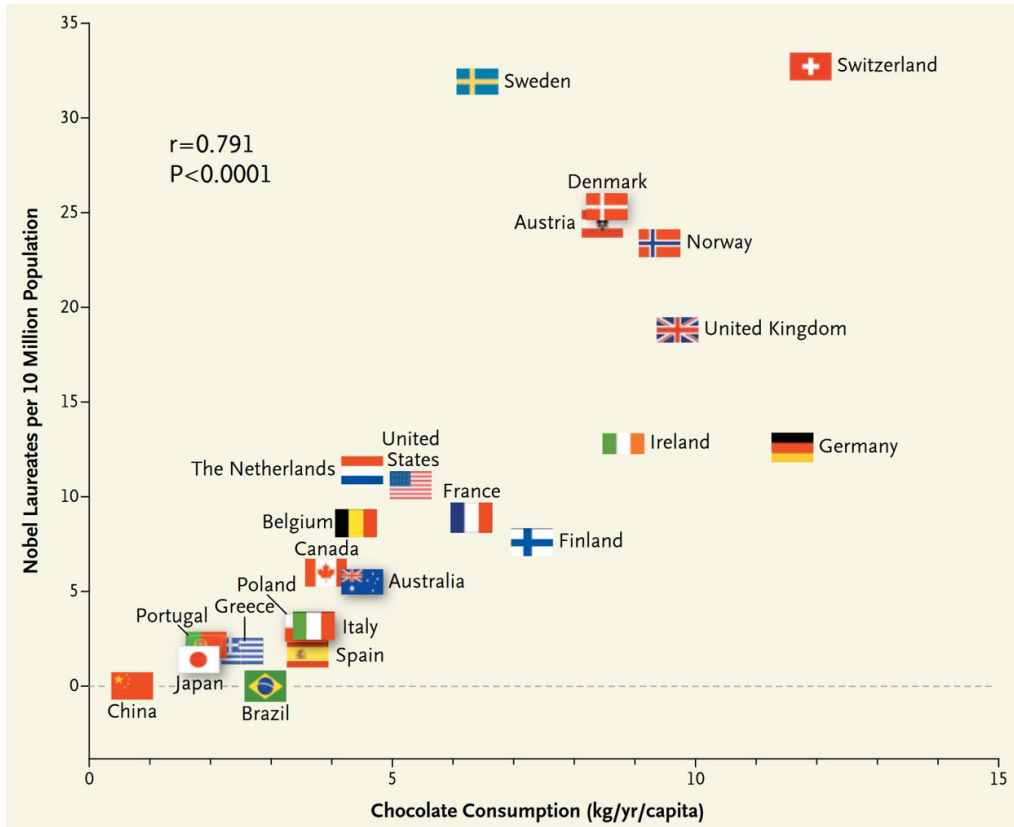
Visualising Relationships

Caution: Not all relationships are linear



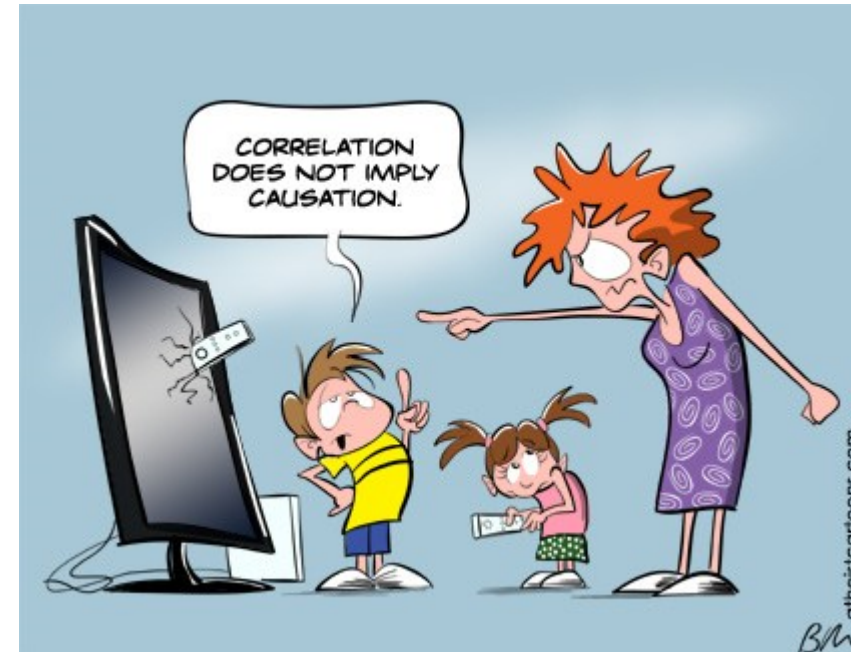
Visualising Relationships

Warning!



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

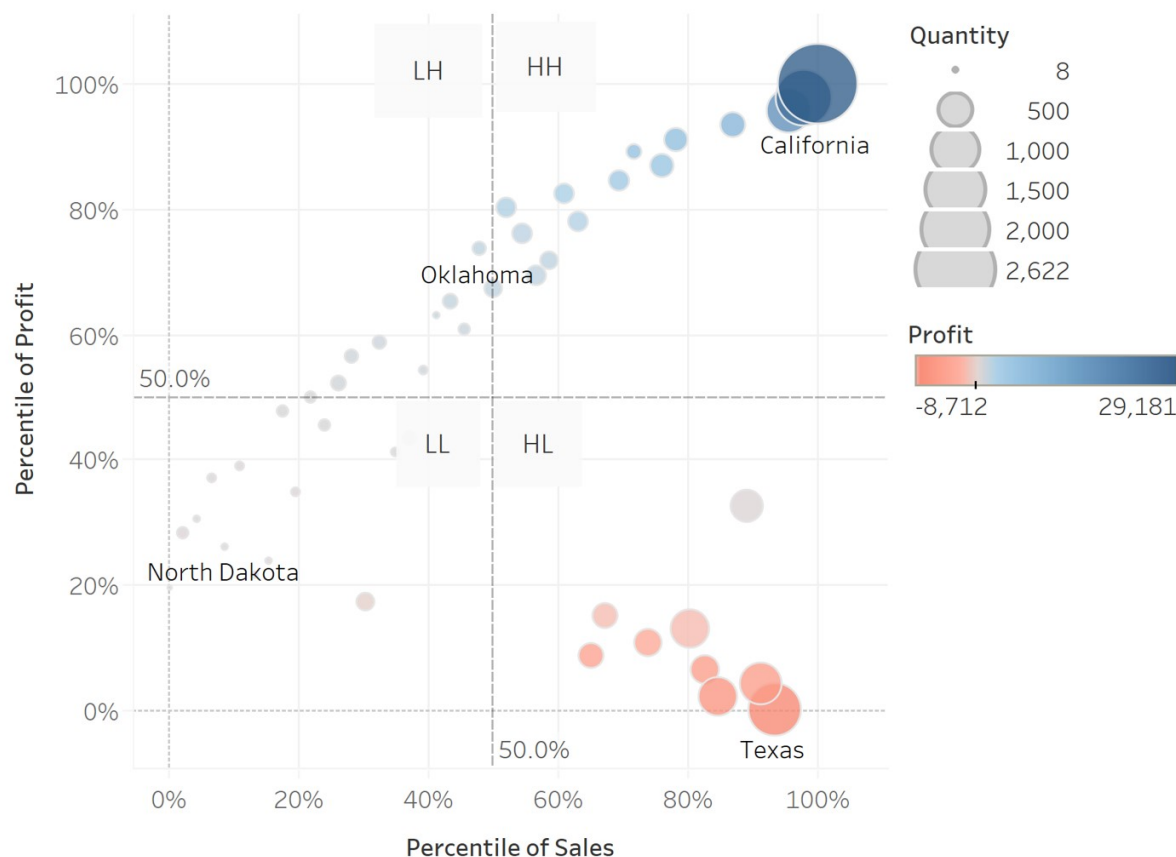
Correlation does not imply causation



Visualising Relationship

Quadrat analysis

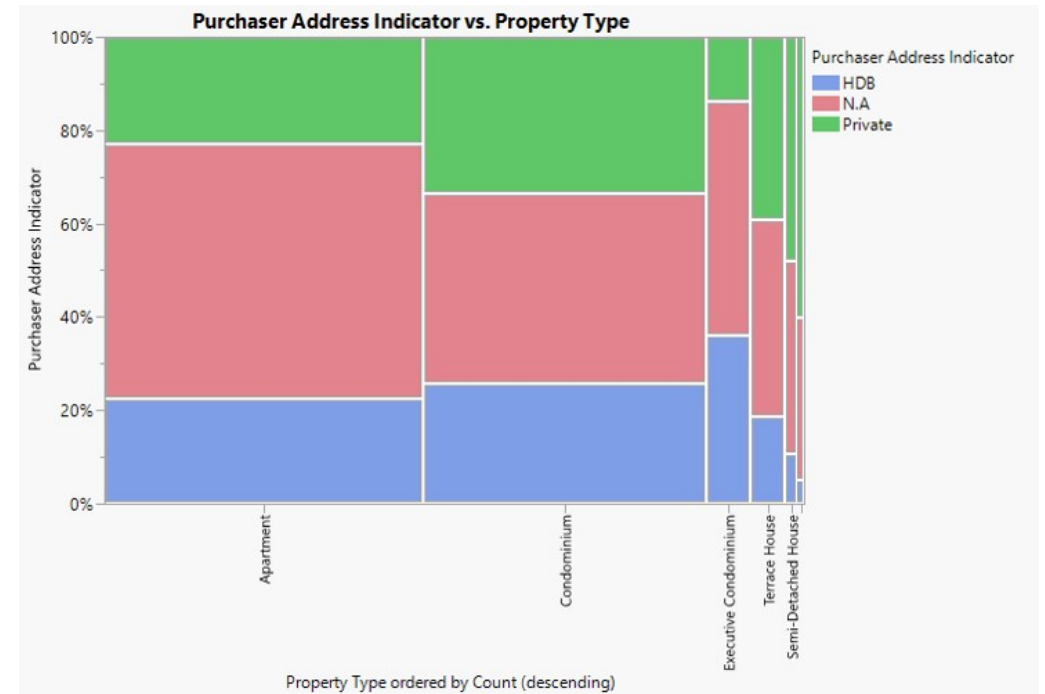
Sales versus profit by states, 2018



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

