

Data Visualization

Introduction

Data is everywhere

- We are surrounded by data in a variety of forms
- Organizations try to be data-driven → Most decision-makers want to depend on data rather than intuition
- However, leveraging data to gain insights becomes critical
- **Data visualization** can be an effective tool to **both make sense of data as well as communicate the gleaned insights to the audience**

Data Visualization

- Graphical representation of data and information using charts, graphs, and maps

Examples

- Weather map
- Seating chart of an airplane
- Car dashboard
- Fitness tracker
- Chart displaying performance of stock market index

Data Visualization

- **Data Visualization** (charts and graphs) works at an intuitive level
- Can take a set of seemingly meaningless numbers and **convert them into a meaningful insight**
- A good graph may convey more insight than a table of numbers

Why visualize data?

- Visualization is used in various contexts and scenarios
- **Helpful** in detecting the patterns, trends, and correlations that are not usually apparent from raw data
 - If not in visual form, trends and patterns in the data may not be recognized and may go undetected
- Exploring data [**Exploration**]
- Communicating / explaining a message or an insight [**Explanation**]

Data Visualization for Exploration

- Visual data exploration is a critical aspect of descriptive analytics
- By visualizing data, we can
 - Identify patterns easily
 - Recognize anomalies / irregularities in data
 - Better understand relationships between variables
- DV can help monitor **KPIs** (key performance indicators) – measure how well an organization is doing relative to its goals → **Data Dashboard**

Anscombe's quartet

I		II		III		IV	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

DV for Explanation

- Explaining relationships found in the data
- Explaining the results of predictive and prescriptive models

- Communicating effectively with the audience – ensure that your intended audience understands your intended message

Data Visualization is a
double-edged sword

Ineffective and misleading visuals

- Visualization is just a tool that needs to be used effectively
- Relatively easy to create **misleading visuals**, meant to **massage** the data and **convey incorrect insights**
- Not all graphs are intentionally misleading
- Further, some are just ineffective in conveying the intended message

Basic Chart Types

Introduction

- Many different types of charts are available
- Each chart is designed for a specific purpose and / or context
- Hence, we need to understand
 - What are the different types of charts available?
 - Why are some charts more appropriate for a certain purpose?

Common goals for charts

- **Composition** – what makes up the whole of an entity under consideration (ex – bar chart)
- **Ranking** – relative order of items (ex – sorting by bar length, with length proportional to the amounts allocated)
- **Correlation / Relationship** – how two variables are related to one another (ex – scatter plot)
- **Distribution** – how items are dispersed (ex – distribution of calls coming in to a call center on a given day)

Six common chart categories

- Comparison / Ranking
- Trends
- Correlation
- Distribution
- Hierarchy
- Composition

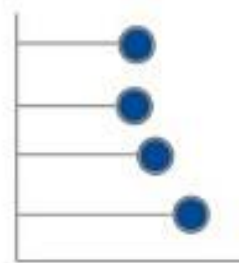
Ranking/Comparison



Column



Bar

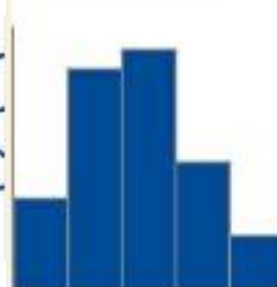


Lollipop

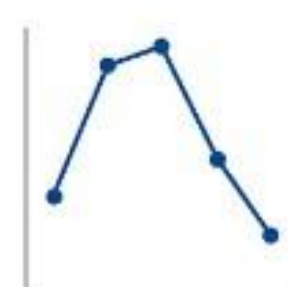


Slope

Distribution



Histogram



Frequency polygon



Box plot



Strip plot

Trend



Line

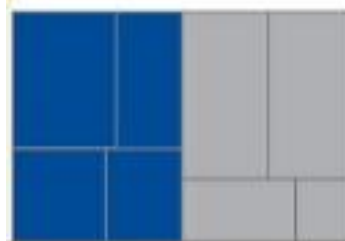


Area



Connected scatterplot

Hierarchy



Tree map

Correlation

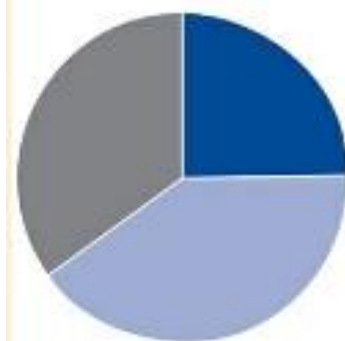


Scatterplot



Bubble

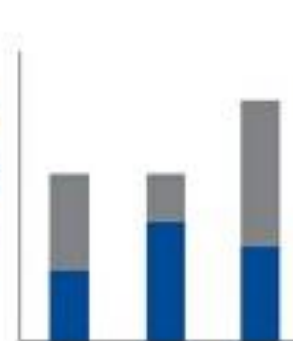
Composition



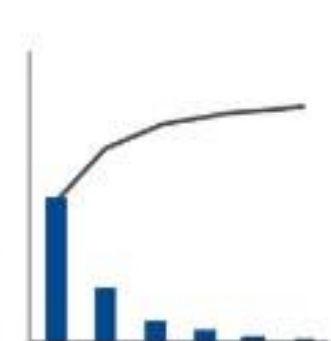
Pie



Donut



Stacked bar



Pareto

Chart Suggestions—A Thought-Starter

