UNIT:1
INTRODUCTION TO DATA VISUALIZATION AND PERCEPTION

INTRODUCTION

Data visualization is a graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

DATA VISUALIZATION TECHNIQUES:

The type of data visualization technique you leverage will vary based on the type of data you're working with.

Here are some important data visualization techniques to know:

- Pie Chart
- Bar Chart
- Histogram
- Gantt Chart
- Heat Map
- Box and Whisker Plot
- Waterfall Chart
- Area Chart
- Scatter Plot
- Pictogram Chart
- Timeline
- Highlight Table
- Bullet Graph
- Choropleth Map
- Word Cloud
- Network Diagram
- Correlation Matrices

Advantages:

- Easily sharing information.
- Interactively explore opportunities.
- Visualize patterns and relationships.

Disadvantages: when viewing a visualization with many different data points, it's easy to make an inaccurate assumption. Or sometimes the visualization is just designed wrong so that it's biased or confusing.

- Biased or inaccurate information.
- Correlation doesn't always mean causation.
- Core messages can get lost in translation.

INTRODUCTION TO VISUAL PERCEPTION:

Definition:

How our brain perceives and interprets visuals

visual perception is the ability to interpret the surrounding environment by processing information that is contained in visible light. The resulting perception is also known as eyesight, sight, or vision.

The visual perception process is how the eyes and brain interpret information viewed on a screen.

Visual perception processing categories:

1.visual discrimination

2.visual memory

3.visual spatial relationships

4.visual form constancy

5.Visual sequential memory

6.visual figure/ground

7.visual closure

1.Visual discrimination

The ability to distinguish one shape from another.

2.Visual memory

The ability to remember a specific form when removed from your visual field.

3.Visual-spatial relationships

The ability to recognize forms that are the same but may be in a different spatial orientation.

4.Visual form constancy

The ability to discern similar forms that may be different in size, colour, or spatial orientation and to consistently match the similar forms.

5.Visual sequential memory

The ability to recall two to seven items in sequence with vision occluded.

6.Visual figure/ground

The ability to discern discrete forms when camouflaged or partially hidden.

7.Visual closure

The ability to recognize familiar forms that are only partially completed.

Our visual perceptual process occurs in three quick steps:

1. **Visual perception is selective**. As you can imagine, if we tune our awareness to everything, we will be very soon overwhelmed. So we selectively pay attention to things that catch our attention.
2. **Our eyes are drawn to familiar patterns**. We see what we expect to see. Hence visualization must take into account what people know and expect.
3. **Our working memory is very limited**. We will go in depth about memory in a bit, but just understand that we can hold a very limited amount of information in our memory when looking at a visual.

VISUAL REPRESENTATION OF DATA:

Data visualization is the process of creating graphical representations of information. This process helps the presenter communicate data in a way that's easy for the viewer to interpret and draw conclusions. There are many different techniques and tools you can leverage to visualize data, so you want to know which ones to use and when.

Importance of visual representation:

1. Comprehend information quickly.

2. Identify relationships and patterns.

3. Communicate the story to others.

4. Visual data help us to think and communicate.

5. A picture tells a story better than a thousand words could.

Visualization goals:

1.Understand the data you're trying to visualize,including its size.

2.Determine what you are trying to visualize and what kind of information you want to communicate.

3.Know your audience and understand how it process visual information.

4.Use a visual that conveys the information in the best and simplest form to the audience.

Data visualization Tools:

1.Tableau

2.JupyteR

3.Google charts

4.Visual.ly

5.Power BI

General Types of Visualizations:

- **Chart:** Information presented in a tabular, graphical form with data displayed along two axes. Can be in the form of a graph, diagram, or map.
- **Table:** A set of figures displayed in rows and columns.
- **Graph:** A diagram of points, lines, segments, curves, or areas that represents certain variables in comparison to each other, usually along two axes at a right angle.
- **Geospatial:** A visualization that shows data in map form using different shapes and colors to show the relationship between pieces of data and specific locations.
- **Infographic:** A combination of visuals and words that represent data. Usually uses charts or diagrams.
- **Dashboards:** A collection of visualizations and data displayed in one place to help with analyzing and presenting data.