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STEAM WITH A PURPOSE

Free Resource: Data Visualization Decision-Making Handout

The Data Visualization Decision Table is a practical reference tool designed to help researchers, educators, analysts, and students choose the most effective type of visualization based on the structure and purpose of their data. The table organizes visualization types by goal, data type, appropriate chart types, and when to use them, allowing users to quickly match their data characteristics with suitable visual formats.

Goal / Question	Data Type	Best Visualization Type(s)	Notes / When to Use
Show distribution of one variable	Quantitative (continuous or discrete)	Histogram, Box Plot, Density Plot	Use histogram for raw frequency, box plot for quartiles and outliers, density for shape
Compare categories	Categorical vs. Quantitative	Bar, Column, Dot Plot	Good for comparing values across groups or categories
Compare part-to-whole	Categorical (parts) vs. Whole	Pie, Donut, Stacked Bar	Use when total is meaningful and categories are few (≤5 for pie charts)
Show relationship / correlation	Quantitative vs. Quantitative	Scatter Plot, Bubble, Heat Map	Add trend lines to show patterns; bubbles add a 3rd variable
Show change over time	Time Series	Line, Area Chart, Slope Graph	Use line/area for continuous time, slope for before-after with few time points
Show ranking or order	Ordinal or Categorical	Bar (sorted), Lollipop	Use when showing best to worst or top N items
Visualize geographic data	Location-based	Map (Choropleth, Symbol, Heat Map)	Use for regional comparisons, point locations, or intensity on a map
Show composition over time	Categories across Time	Stacked Area, Stacked Bar Chart	Use to show how part-to-whole changes with time

Show distribution across groups	Quantitative by Category	Box Plot, Violin Plot, Beeswarm Plot	Good for comparing distributions side-by-side
Highlight outliers or anomalies	Any (especially numeric)	Box Plot, Scatter Plot, Control	Useful in quality control or when spotting unexpected values
Visualize a process or flow	Sequential / Procedural Data	Flow Chart, Sankey Diagram, Funnel	Use for systems, decision trees, conversions
Show network or connections	Nodes and Relationships	Network Diagram, Force-Directed Graph	Use for social networks, links, connected systems
Summarize a lot of data compactly	Mixed Variables or Many Dimensions	Heat Map, Treemap, Parallel Coordinates	Good for dashboards or overviews