

# Executive Summary: Business Visualization Suite

- This project delivers a comprehensive suite of twelve advanced data visualizations tailored for executive-level insight across business operations, performance metrics, and simulation outputs. Built using Python, pandas, and Plotly, the suite combines aesthetic clarity with analytical depth, enabling rapid assessment and strategic decision-making.

# About Me

- David Coulson, MBA, US ARMY Veteran
  - Senior Business Analyst with deep experience in data visualization, forecasting, and automation. I've led analytics initiatives at PG&E, Workday, and Gilead Sciences—translating complex data into clear, actionable insights.
  - Tools: Power BI, Tableau, SQL, Python, Alteryx
  - Systems: SAP MRP, Oracle EBS
  - Focus: Scenario modeling, dashboard design, process optimization
  - I build tools that help teams see clearly, act faster, and make smarter decisions.

# Technical Highlights & Chart Types

- **Chart Diversity:** Includes radial, hierarchical, flow-based, comparative, and animated formats—each optimized for a specific analytical lens.
  - **Customization:** All charts feature white backgrounds, visible legends, and consistent styling for presentation-grade clarity.
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- **Simulation-Ready:** Visuals are designed to integrate seamlessly with Monte Carlo outputs, cost models, and inventory logic.
  - **Automation-Friendly:** Modular code structure supports batch execution, error handling, and output verification.

# Chart Types & Strategic Value

- **Chart Types Delivered**

- Circular Bar Plot
- Dumbbell Chart
- Sunburst Chart
- Tree map
- Marimekko Chart
- Calendar Heatmap
- Streamgraph
- Animated & Static Scatter Plot
- Polar Area Plot (with legend)
- Bullet Chart (KPI tracking)
- Sankey Flow Diagram
- Chord Diagram (simulated via network graph)

- **This visualization suite empowers stakeholders to:**

- Compare departmental performance against targets
- Trace operational flows and resource allocation
- Identify trends, bottlenecks, and cost drivers
- Communicate insights with clarity and impact

# 1. Radar Matrix Chart

## Definition

**A Radar Matrix Chart** is a grid of mini radar (spider) charts — one per entity — displaying metrics radially. Each mini-chart acts as a profile card showing strengths and weaknesses across a common scale (0–100). Using a matrix layout allows quick comparison of multiple entities at once.

## • Use Cases

- Department KPI profiles (Sales, Marketing, Operations, HR, R&D, Finance).
- Product feature comparison dashboards (usability, reliability, cost-efficiency).
- Player or athlete stat cards in sports analytics dashboards.
- Executive dashboards showing multiple business units simultaneously.

# Radar Matrix Chart Python Code

Radar Matrix — KPI Profiles (2x3)



## 2. Circular Bar Plot

### Definition

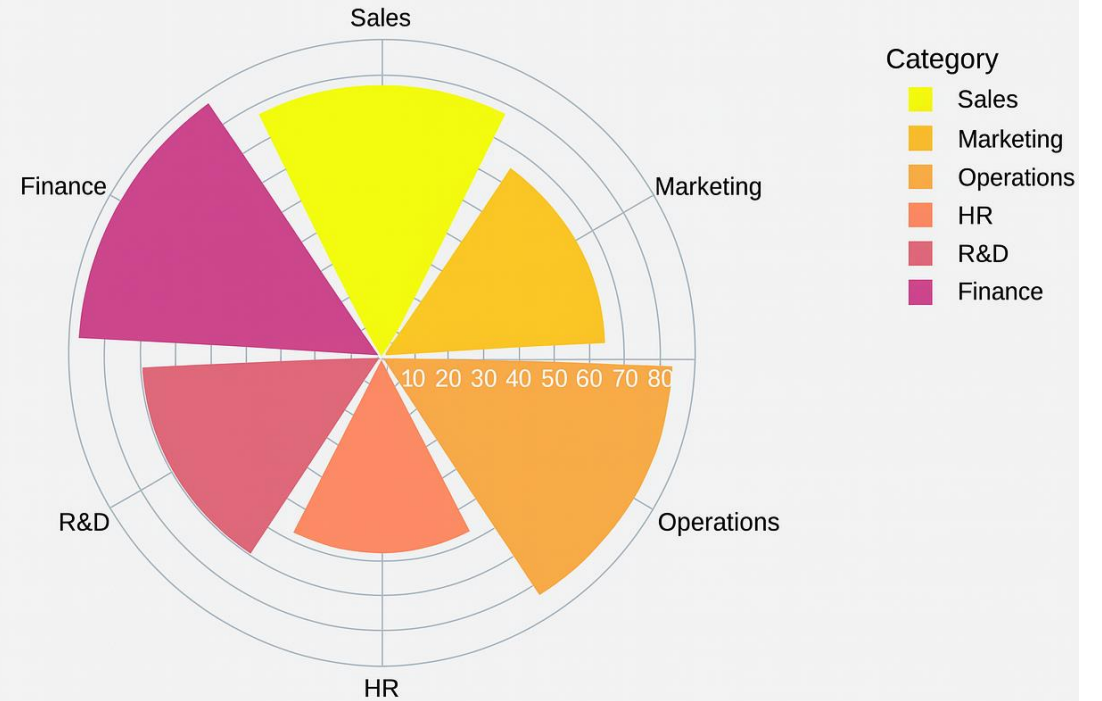
**A Circular Bar Plot** is a bar chart wrapped around a circle (polar coordinates). Each category occupies an angular slice of the circle, and the bar length represents the value. It's visually dramatic, eye-catching, and works well when you want to emphasize the relative magnitude of categories in a circular layout.

### • Use Cases

- Highlighting ranked KPIs (Sales, Marketing, Operations, etc.) in a visually engaging way.
- Showing magnitude of categories for dashboards where “visual punch” is desired.
- Any report or presentation where you want a standard bar chart but with more impact.
- Marketing, performance, or product dashboards.

## 2. Circular Bar Plot

Polar Area Chart of Business Categories





### 3. Dumbbell (Lollipop) Chart

- **Definition**

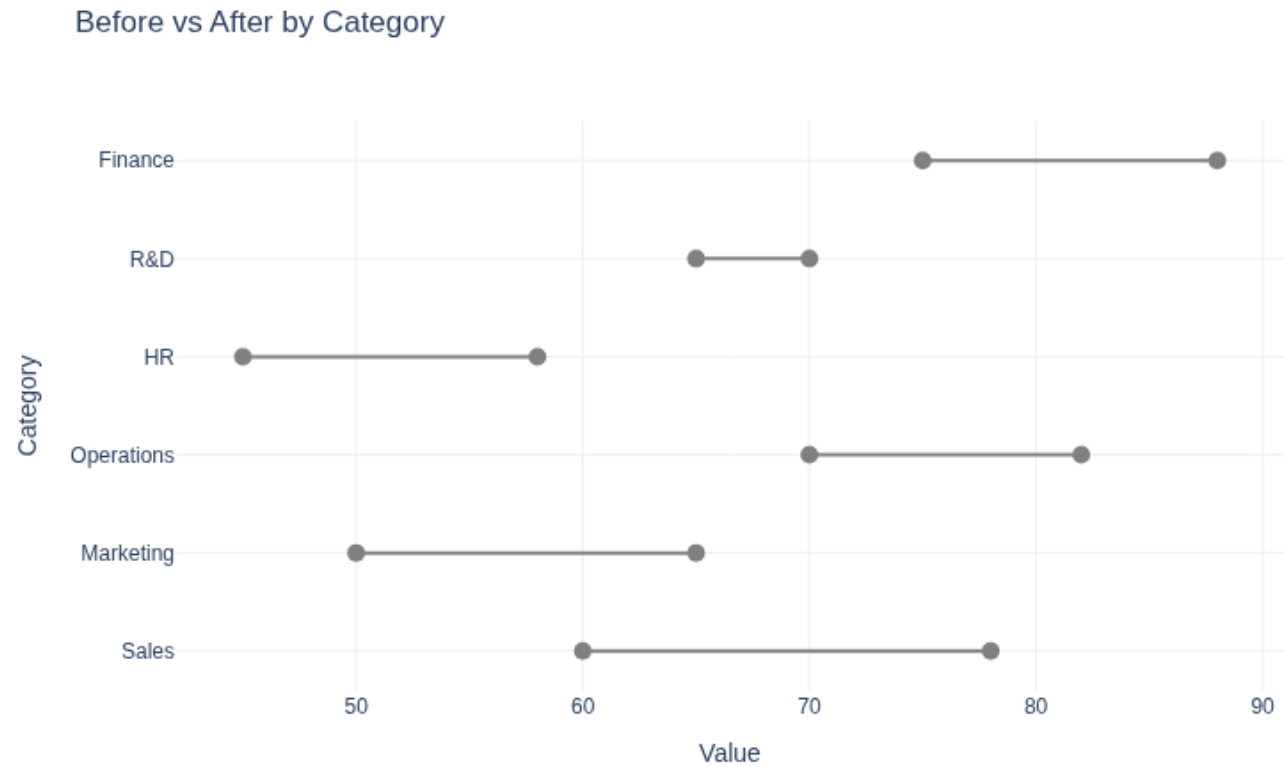
- **A Dumbbell (or Lollipop)**

- **Chart** visualizes the difference between two values across categories, showing “before vs after” or two related metrics for comparison. It’s essentially two points connected by a line, which emphasizes change or gaps.

- **Use Cases**

- Performance tracking: current vs target metrics.
  - Comparing KPIs across time periods (e.g., last quarter vs this quarter).
  - Highlighting progress or regression across departments or products.

### 3. Dumbbell (Lollipop) Chart



## 4. Sunburst with Drill Effects

- **Definition**

**A Sunburst Chart** is a radial, hierarchical visualization where categories are nested as concentric rings. Drill-down interactivity allows users to explore detailed levels of the hierarchy.

- **Use Cases**

- Organizational structure visualization.
- Spend analysis: category → subcategory → item.
- Product feature breakdowns or multi-level metrics.

## 4. Sunburst with Drill Effects

Organizational Breakdown by Department and Region



## 5. Animated Scatter / Bubble Trail

- **Definition**

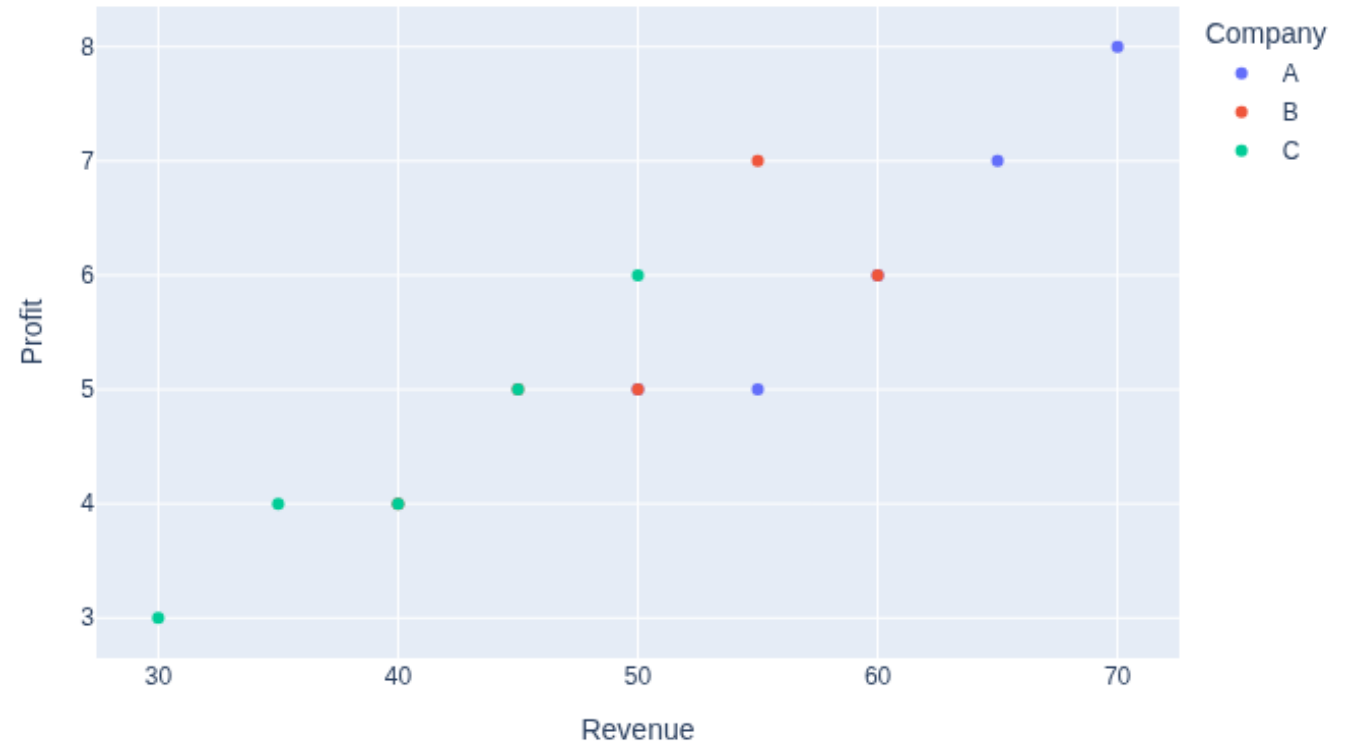
**An Animated Scatter or Bubble Trail Chart** shows the movement of data points over time, typically with x, y, and bubble size encoding additional dimensions. Animation reveals temporal trends and dynamics.

- **Use Cases**

- Gapminder-style economic indicators over years.
- Population growth, revenue growth, or performance over time.
- Any dataset where temporal evolution is key to storytelling.

## 5. Animated Scatter / Bubble Trail

Revenue vs Profit by Company (Static View)



## 6. Polar Area Plot

- **Definition**

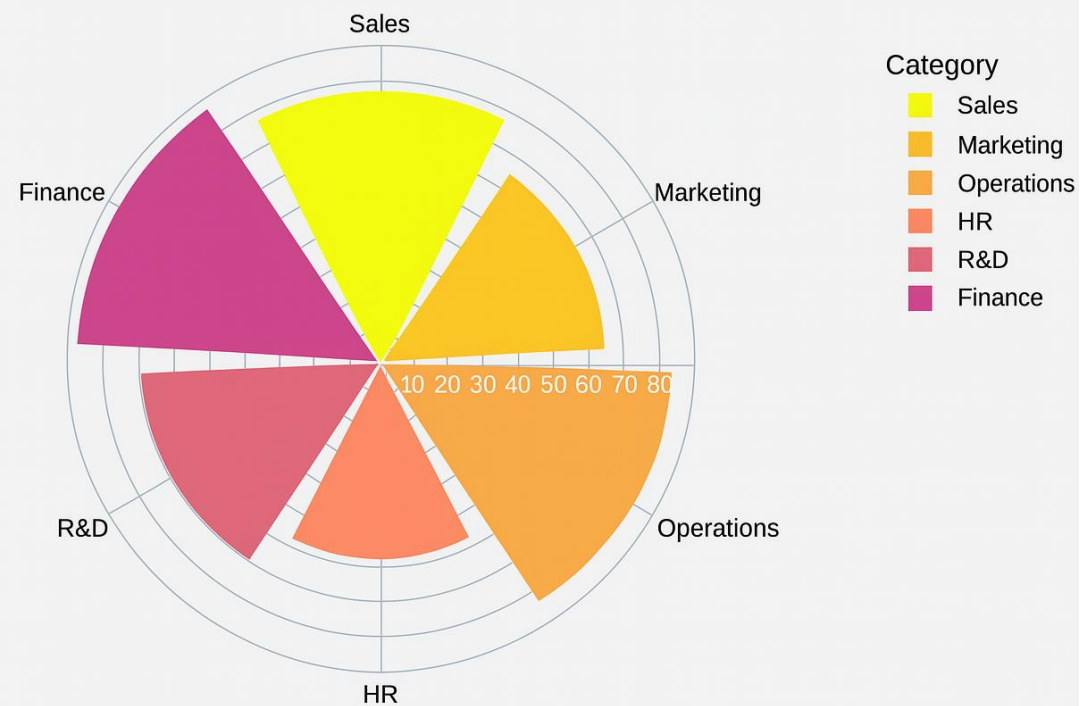
**A Polar Area Plot** (aka Nightingale Rose Chart) represents data in a circular layout with areas proportional to values. Each segment can be color-coded for categories.

- **Use Cases**

- Showing intensity or cyclical patterns (e.g., monthly sales, seasonal metrics).
- Survey or rating data with multiple categories.
- Any cyclical data where magnitude and directionality matter.

## 6. Polar Area Plot

Polar Area Chart of Business Categories





## 7. Bullet Chart (KPI Focused)

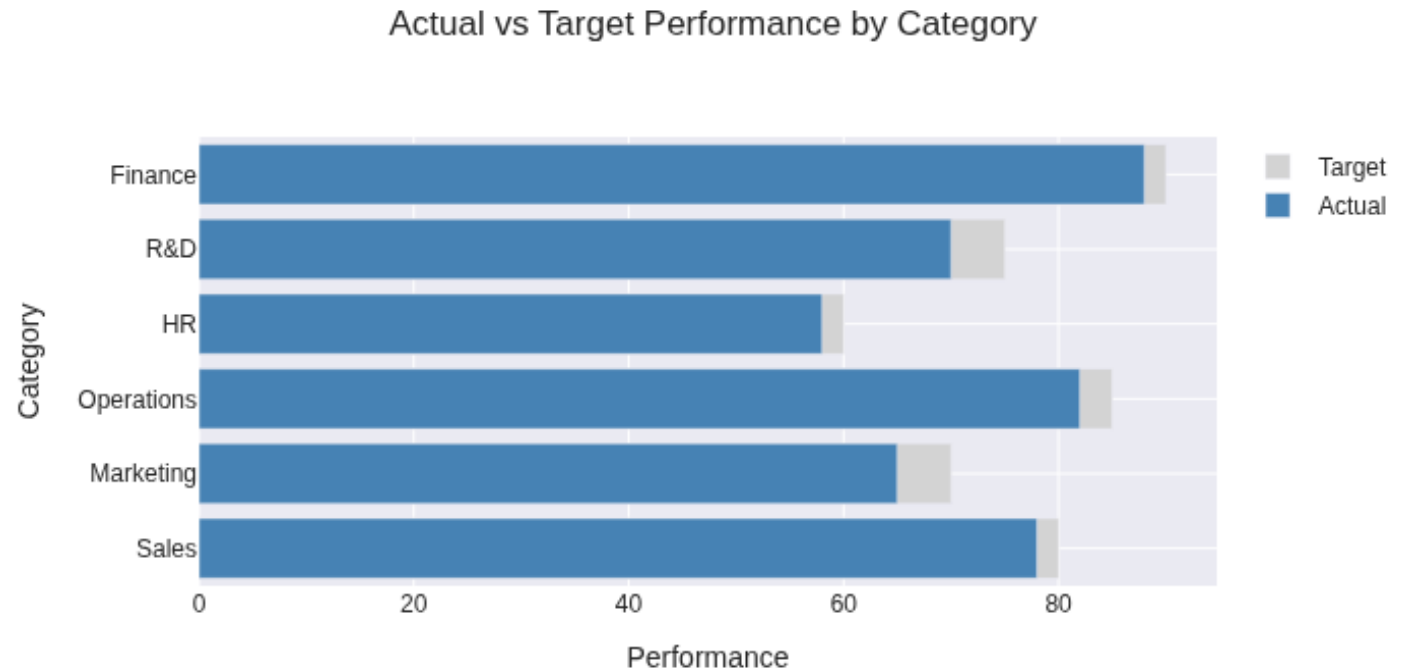
- **Definition**

**A Bullet Chart** is a compact visualization comparing a primary measure (e.g., actual performance) to a target and qualitative ranges (poor, satisfactory, good). It's highly dashboard-friendly.

- **Use Cases**

- KPI tracking against benchmarks.
- Performance reporting for business units or products.
- Executive dashboards requiring concise comparisons.

## 7. Bullet Chart (KPI Focused)



## 8. Tree map with Value Blocks

- **Definition**

**A Treemap** displays hierarchical data as nested rectangles sized according to value. It's space-efficient and allows for quick proportional comparisons.

- **Use Cases**

- Financial or spend analysis by category.
- Product or inventory composition.
- Any scenario where hierarchical proportional insight is valuable.

## 8. Tree map with Value Blocks

Department Value Distribution



# 9. Sankey Flow Chart

- **Definition**

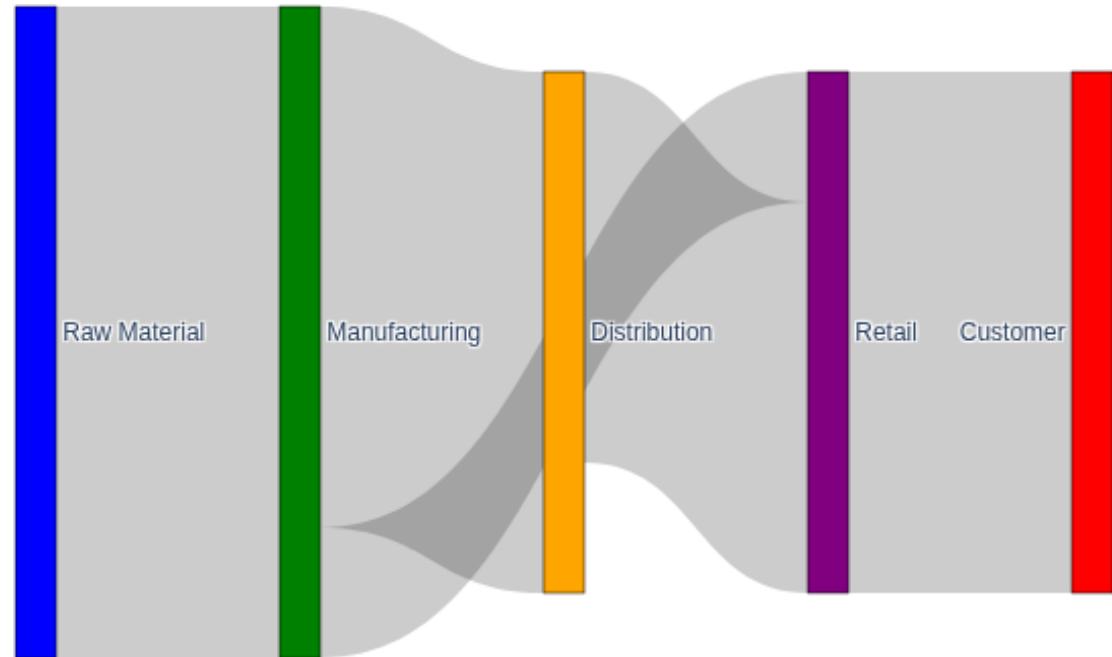
**A Sankey Chart** visualizes flow between categories. The width of the lines corresponds to quantity, illustrating movement or transformation across stages.

- **Use Cases**

- Supply chain or logistics flow visualization.
- Process tracking (e.g., conversion rates between funnel stages).
- Energy or data flow storytelling.

## 9. Sankey Flow Chart

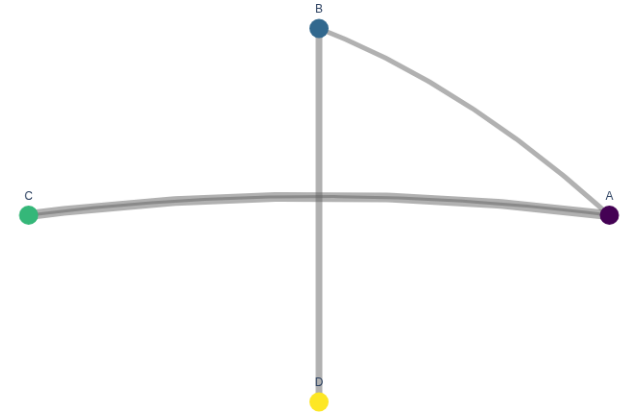
Supply Chain Flow: Raw Material to Customer



# Bonus Formats

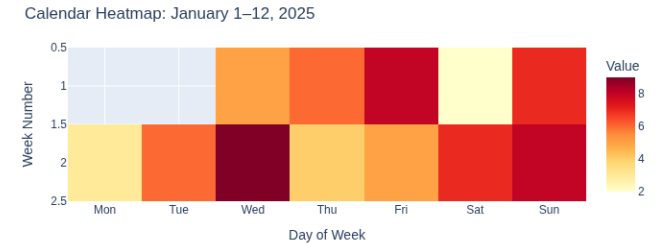
- **Chord Diagram**
  - **Definition:** Shows relationships and interconnections between entities as arcs connecting nodes.
  - **Use Cases:** Influence mapping, network dependencies, social or communication networks.

Chord Diagram Simulation



# Bonus Formats

- **Calendar Heatmap**
  - **Definition:** Visualizes time-based activity with color intensity representing magnitude per day or week.
  - **Use Cases:** Website traffic, daily sales, employee attendance, or user engagement over time.

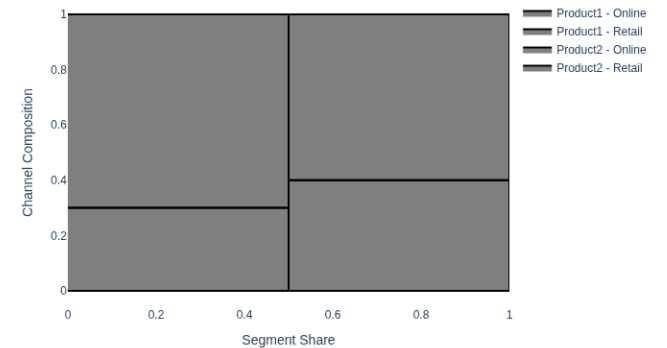




# Bonus Formats

- **Marimekko Chart**
  - **Definition:** Displays dual-category composition with bar widths representing one dimension and heights representing another.
  - **Use Cases:** Market share vs volume, revenue by segment and channel, proportional comparisons.

Marimekko Chart: Segment vs Channel



# Bonus Formats

- **Streamgraph**
  - **Definition:** Shows trends over time as flowing, organic layers emphasizing relative proportions.
  - **Use Cases:** Genre popularity, market trends, social media mentions, or category growth over time.

