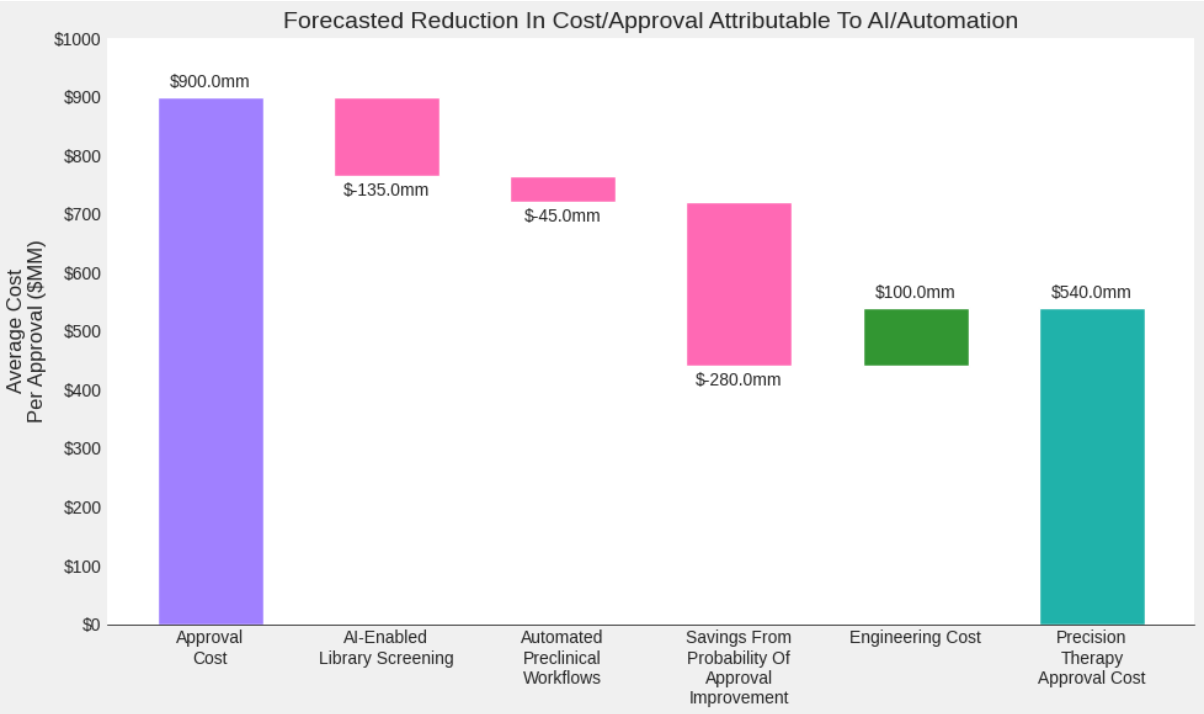
How to interpret waterfall chart for multivariate analysis?



A. Understanding the Components of a Waterfall Chart:

- **Horizontal Axis (X-axis):** Represents the different stages or factors influencing the cost per approval, such as "Approval Cost," "AI-Enabled Library Screening," "Automated Preclinical Workflows," "Savings from Probability Of Approval Improvement," "Engineering Cost," and "Precision Therapy Approval Cost."
- **Vertical Axis (Y-axis):** Represents the "Average Cost Per Approval ($MM)," ranging from $0 to $1000 million.
- **Starting Bar (Purple):** The first bar represents the initial value or starting point, which is the "Approval Cost" of $900.0 million.
- **Floating Bars (Pink and Green):** These bars represent the incremental increases or decreases in cost at each stage.
    - **Pink Bars:** Typically represent a decrease (negative change) or a cost reduction. The labels above these bars show the amount of the reduction with a negative sign (e.g., –135.0mm).

    - **Green Bars:** Typically represent an increase (positive change) or an added cost. The labels above these bars show the amount of the increase with a positive sign (e.g., +100.0mm).

- **Connecting Lines (Implicit):** Although not explicitly drawn, there's an implied connection from the end of one bar to the start of the next, visually showing the cumulative effect of each change.
- **Ending Bar (Teal):** The final bar represents the cumulative effect of all the changes, leading to the final value, which is the "Precision Therapy Approval Cost" of $540.0 million.

B. Interpreting the Forecasted Reduction in Cost/Approval:

The waterfall chart illustrates how AI and automation are projected to impact the cost of precision therapy approval:

- **Initial Approval Cost:** Starts at a high of $900.0 million.
- **AI-Enabled Library Screening:** Implementing AI for library screening is expected to reduce the cost by $135.0 million.
- **Automated Preclinical Workflows:** Automating preclinical workflows is projected to further reduce the cost by $45.0 million.
- **Savings From Probability Of Approval Improvement:** Improvements in the probability of approval due to AI and automation are anticipated to yield significant savings of $280.0 million.
- **Engineering Cost:** Implementing these AI and automation technologies will incur an additional engineering cost of $100.0 million.
- **Precision Therapy Approval Cost:** After considering all these reductions and the added engineering cost, the final forecasted average cost per approval for precision therapy is $540.0 million.

Overall Interpretation:

The waterfall chart effectively demonstrates the net impact of various AI and automation initiatives on the cost of precision therapy approval. Despite an initial high approval cost, the projected savings from AI-enabled screening, automated workflows, and improved approval probability significantly outweigh the engineering costs, resulting in a substantial overall reduction in the average cost per approval, down to $540.0 million.

Waterfall charts are the best choice when you want to:

- Show how an initial value is increased or decreased by a series of intermediate values, leading to a final value. This is the primary purpose of a waterfall chart.
- Illustrate the cumulative effect of sequential positive and negative changes.
- Identify the individual contributions of different factors to the final outcome. We can clearly see the magnitude of cost reduction from each AI/automation step and the added engineering cost.
- Provide a clear and intuitive way to understand the drivers of a change or a final result.
- Analyze financial data, such as revenue changes, profit and loss statements, and cost breakdowns.
- Track project budgets and the impact of various factors on the final budget.
- Demonstrate the impact of different stages in a process.

In summary, waterfall charts are excellent for visualizing the step-by-step progression from a starting value to an end value, highlighting the magnitude and direction (positive or negative) of each contributing factor along the way. They are particularly effective for communicating financial and process-related changes.