

Data Visualization

Assignment - 6

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Question : Find or create a chart demonstrating each of the eight gestalt principles of data visualization

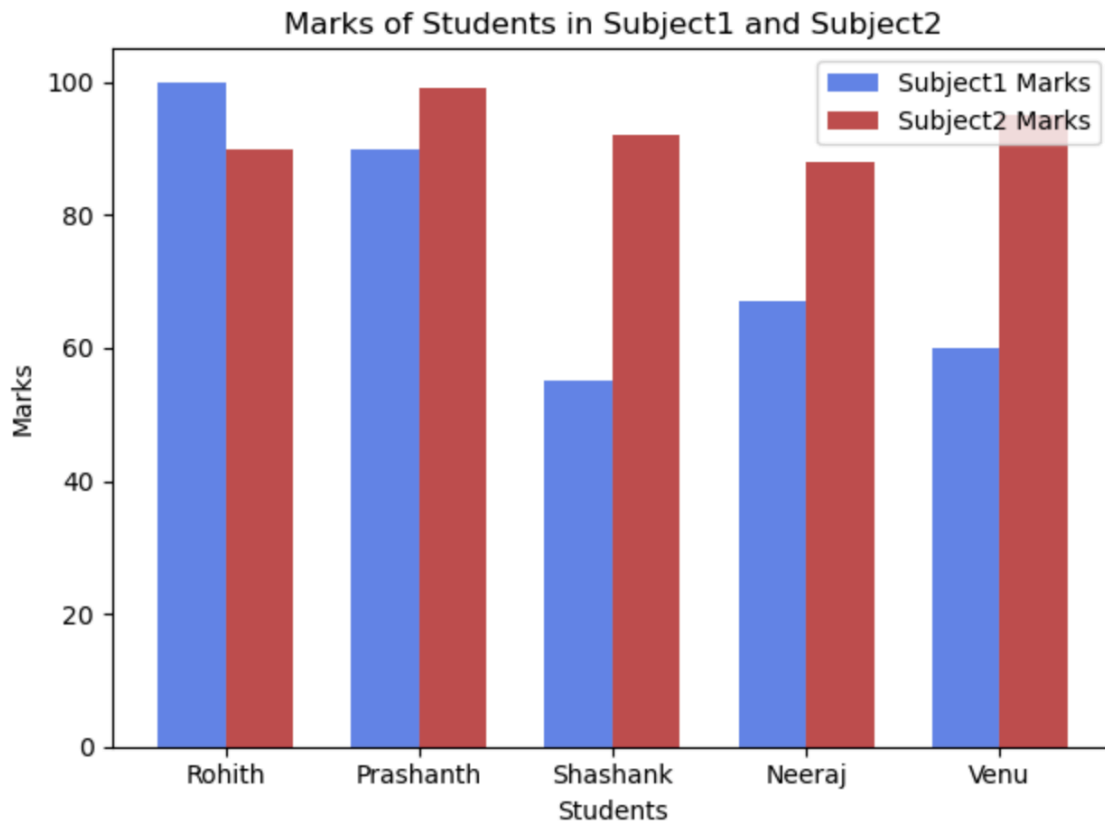
Solution :

For Demonstrating each of the eight gestalt principles I am using python, below students and marks data.

```
students = ['Rohith', 'Prashanth', 'Shashank', 'Neeraj', 'Venu']  
subject1_marks = [100, 90, 55, 67, 60]  
subject2_marks = [90, 99, 92, 88, 95]
```

1. Proximity

The Law of Proximity, also known as the Gestalt principle of proximity, states that objects that are closer to each other tend to be perceived as a group or a single unit. In the Below Visualization, the bars that are closer to each other (i.e., the bars for Subject1 and Subject2 marks for the same student) are perceived as belonging to the same group or category, visually associating the marks of each student in both subjects. This helps in comparing the marks of each student in Subject1 and Subject2 more effectively, as they are grouped together based on their proximity on the x-axis.

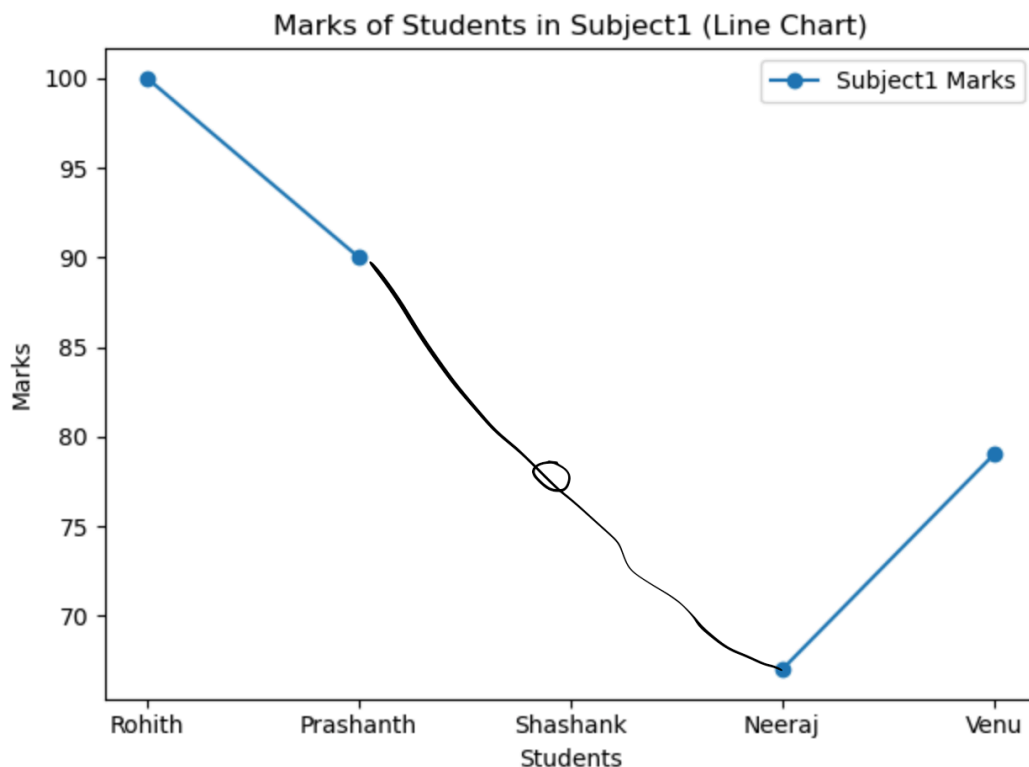
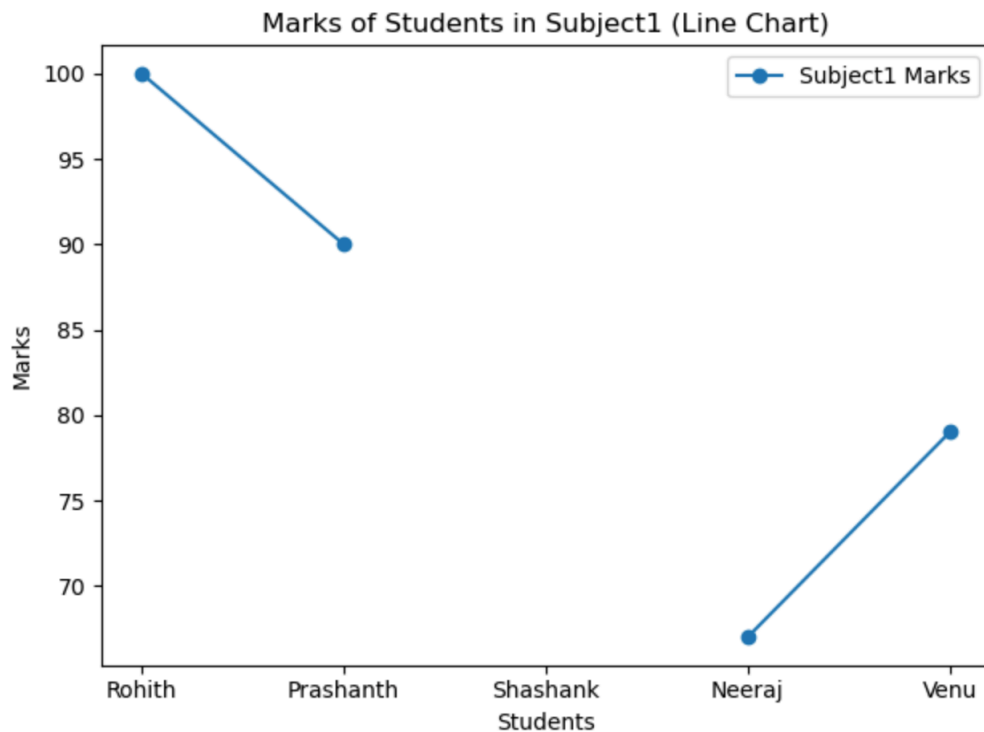


2. Closure

The Law of Closure, also known as the Gestalt principle of closure, states that the human brain tends to perceive incomplete or fragmented visual elements as complete objects or shapes. In the given visualization below, the Law of Closure can be observed in how the line chart is plotted with incomplete data for the marks of students in Subject1.

This is an example of how the Law of Closure comes into play. Despite the gap in the line, the human brain tends to perceive the line as a complete shape, connecting the available data points with an imaginary line segment, and mentally "closing" the shape(ref to fig-2). This makes it easy to perceive the trend of the marks of students in Subject1, even though the data is incomplete for one student.

The Law of Closure helps in completing the visual information and forming meaningful perceptions, allowing us to perceive the line chart as a whole and make interpretations about the trend of marks for the students in Subject1, even though there is missing data for one student(Shashank).



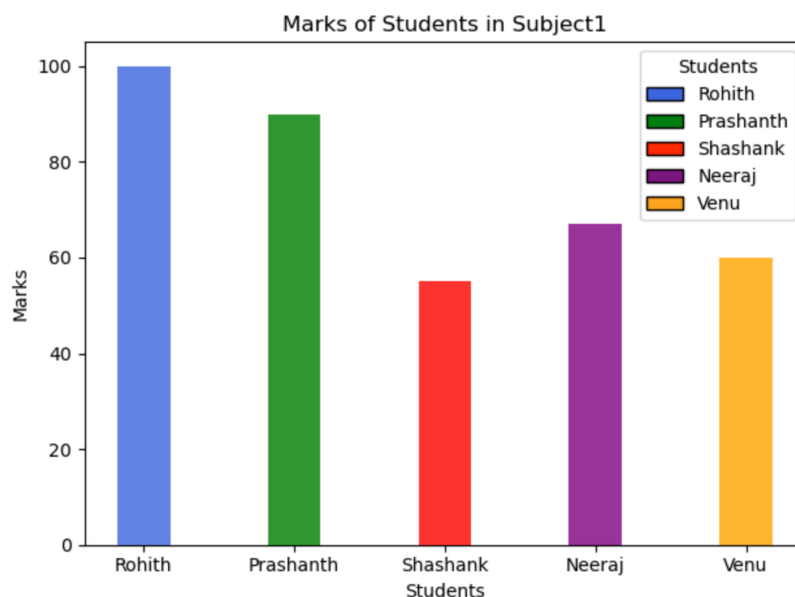
3. Similarity

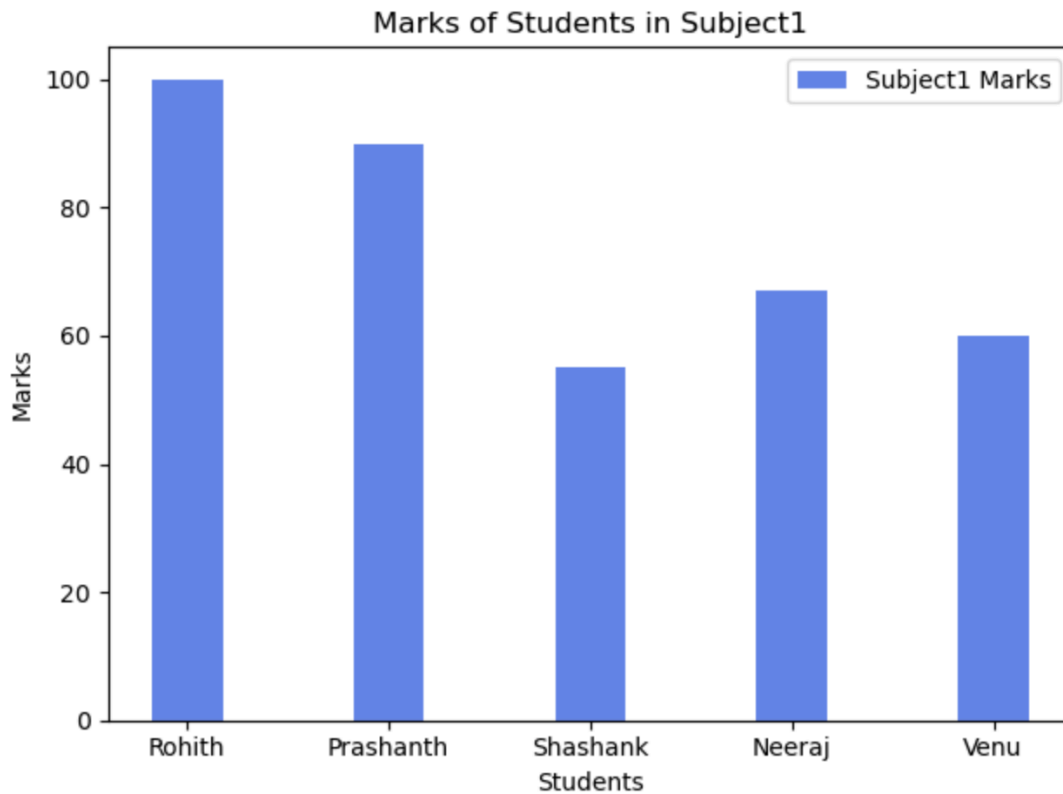
The Law of Similarity, a principle of Gestalt psychology, states that objects that are similar in visual characteristics, such as color, shape, or size, tend to be perceived as belonging to the same group or category.

In the first Visualization, the bar chart for Subject1 marks is plotted with custom colors for each bar using the subject1_color list, which contains different colors for each student's bar. This creates a visual distinction among the bars, with each bar having a unique color.

In the second Visualization, the custom color for Subject1 bars is changed to a single color, for all the bars. This makes all the bars in the chart visually similar in color, creating a uniform appearance.

By making all the bars the same color in the second visualization, the Law of Similarity is applied as the visual similarity in color of the bars suggests that they belong to the same group (i.e., the same category of Subject1 marks), even though they represent different students. This creates a unified visual perception, making it easier for viewers to compare the bars and interpret the data.

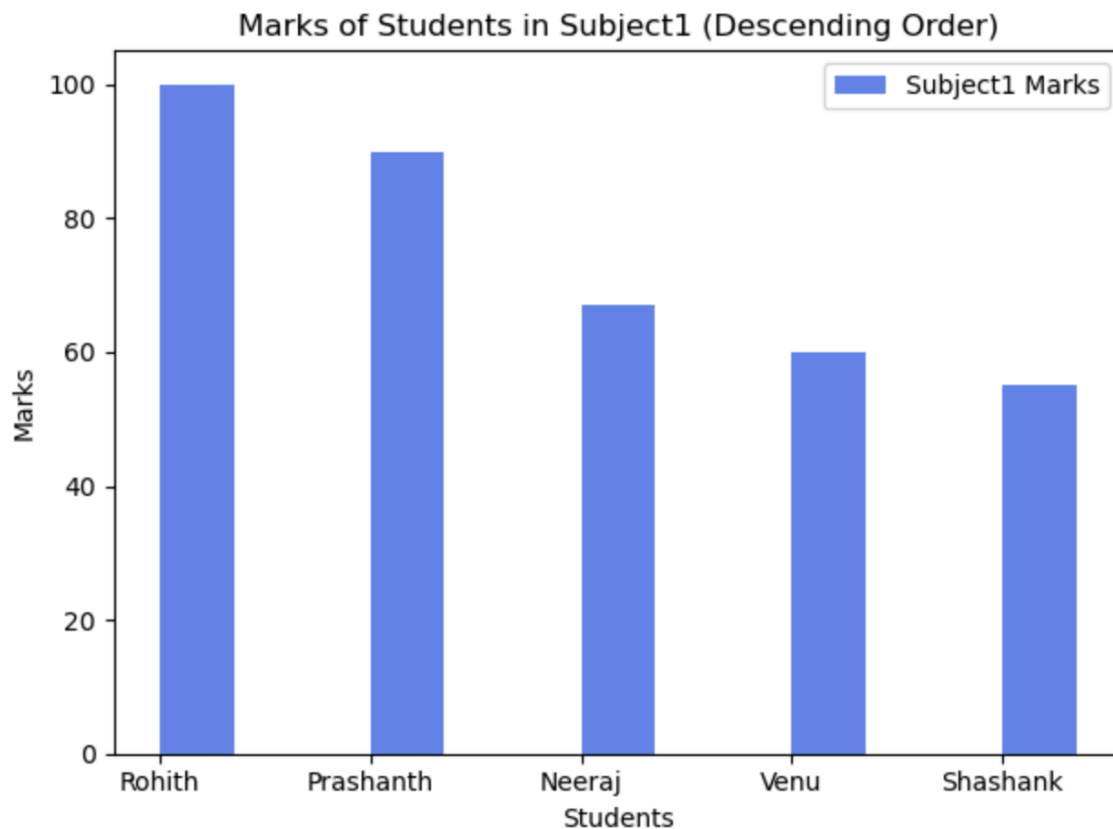




4. Continuity

The Law of Continuity states that elements that are arranged in a continuous, smooth, or flowing manner are perceived as belonging to the same group or category. In the below visualization, the Law of Continuity is applied in how the bars in the bar chart are aligned in a continuous and smooth manner, resulting in a visual perception of a continuous flow of data.

In the below visualization, the bars are sorted based on the values of `subject1_marks` in descending order. This sorting changes the order of the bars in the chart, so that the bars representing students with higher marks are plotted first and the bars representing students with lower marks are plotted last, adhering to the law of continuity.

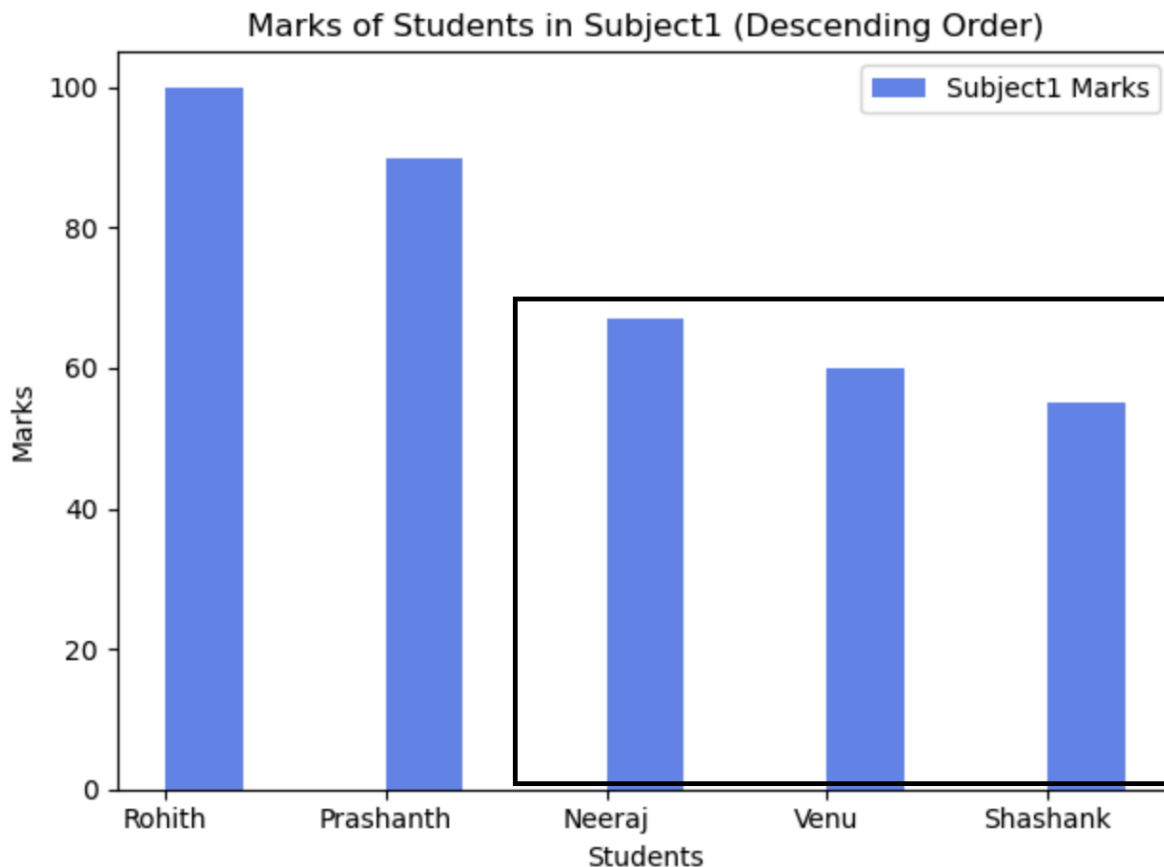


5. Enclosure

The "law of enclosure" is a design principle in data visualization that involves using visual cues, such as lines, borders, colors, or patterns, to enclose or group related data elements together. The purpose of this principle is to visually convey the relationship or association between the enclosed data elements, making it easier for viewers to interpret the data and understand the underlying message or pattern.

Here, I am enclosing the bars of students with marks less than 70 using a black rectangle and applying of the law of enclosure. By visually separating this group of students from the rest of the bars, the enclosure creates a clear visual boundary around the low-performing students, highlighting their performance and indicating their distinctness from the higher-performing students. This can aid in data interpretation and draw attention to a

specific subset of data, reinforcing the message or pattern related to the low-performing students in Subject1.

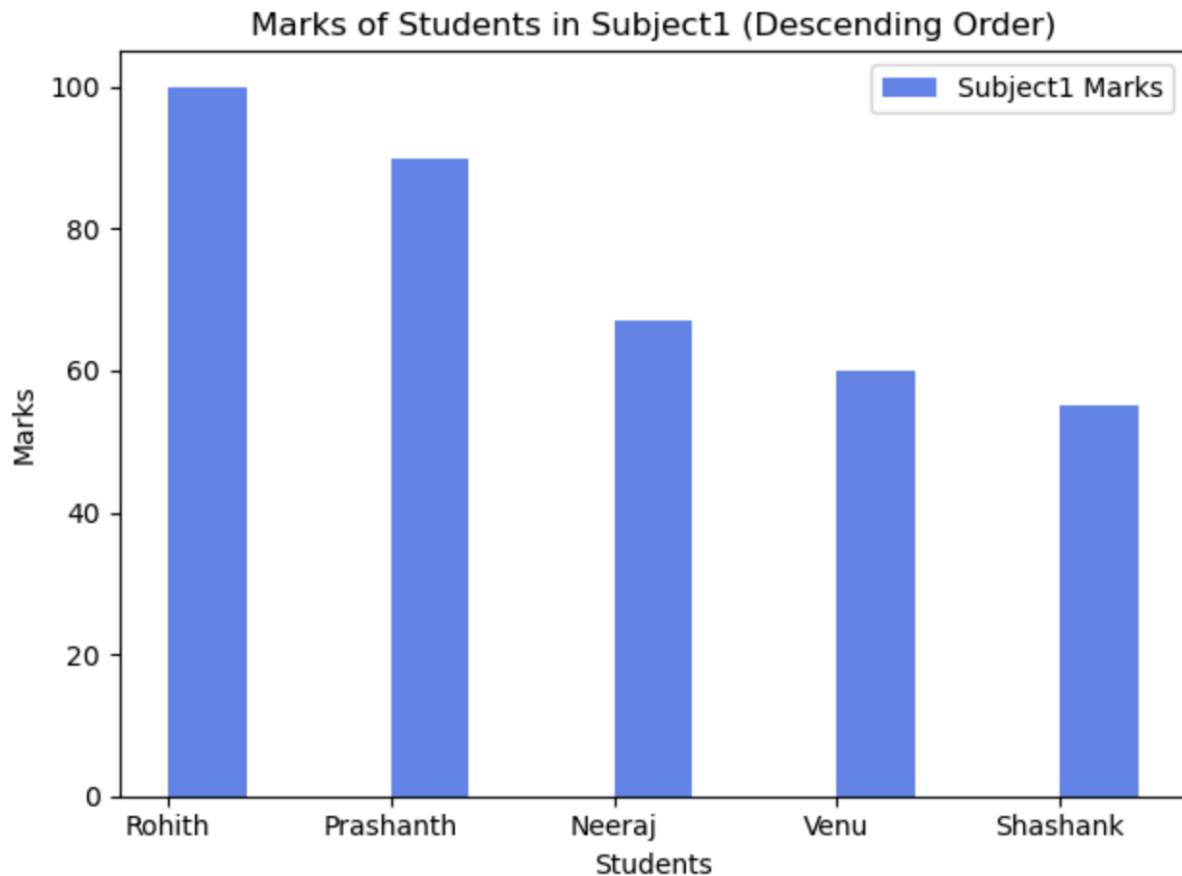


6. Figure and Ground

The "law of figure and ground" is a design principle in data visualization that involves creating a clear distinction between the main data elements (the "figure") and the background or surrounding elements (the "ground"). This contrast helps to focus the viewer's attention on the main data being presented, making it easier to interpret and understand.

the below is presented against the default background color of the plotting area, which is typically white. the figure is clearly visible due to the use of a contrasting color (royalblue) for the bars, which helps them stand out against the background.

So the output effectively convey the main data (students' marks) as the figure, and the surrounding elements (plotting area, axes, labels, etc.) as the ground, adhering to the law of figure and ground in data visualization.

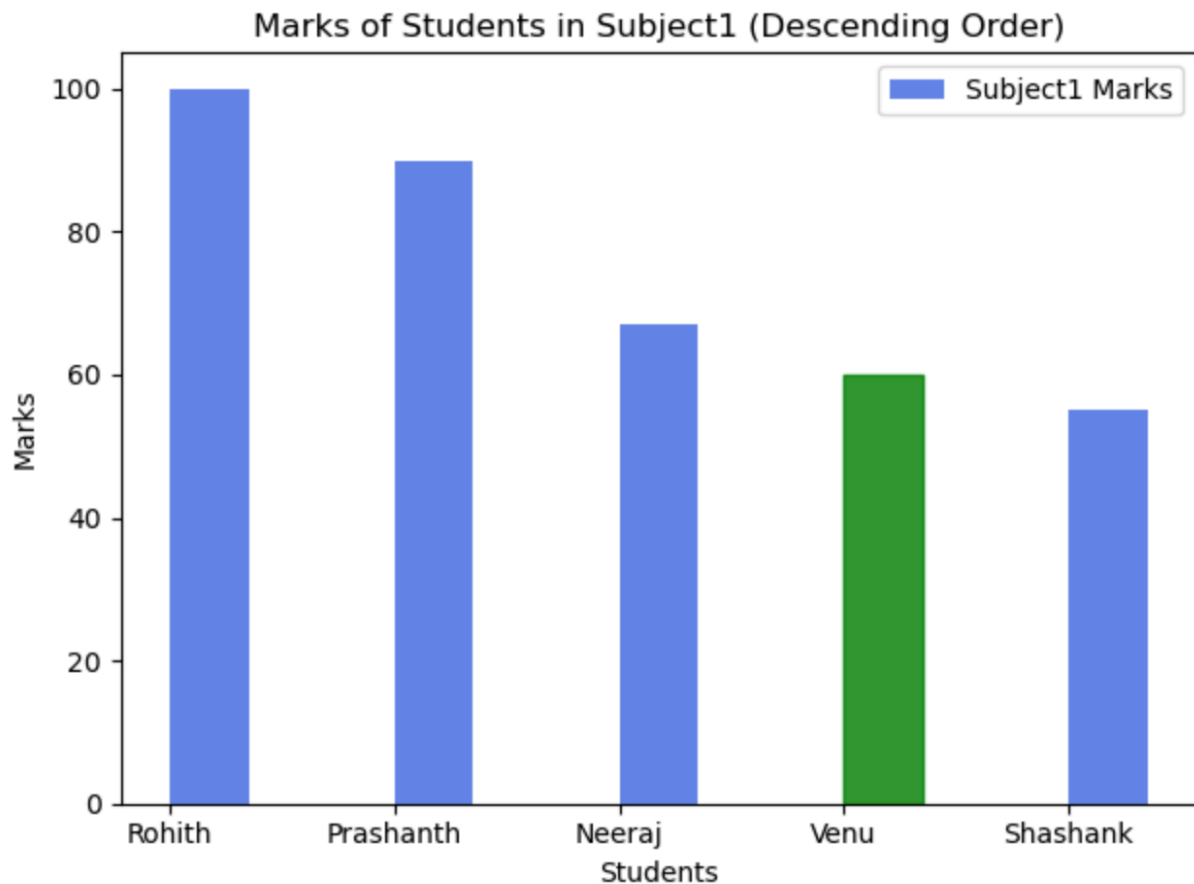


7. Focal Point

The "law of focal point" is a design principle in data visualization that involves using visual cues to draw attention to a specific area or element in a chart or graph. This can help guide the viewer's focus and emphasize important information.

In the below visualization , the law of focal point is used to highlight the marks of venu in the bar chart by setting a different color (green) compared to the other bars (which are colored in

royal blue). This creates a visual cue that draws attention to that bar, making it a focal point in the chart. The use of a different color for the that bar creates a contrast with the other bars, making it stand out and capturing the viewer's attention.

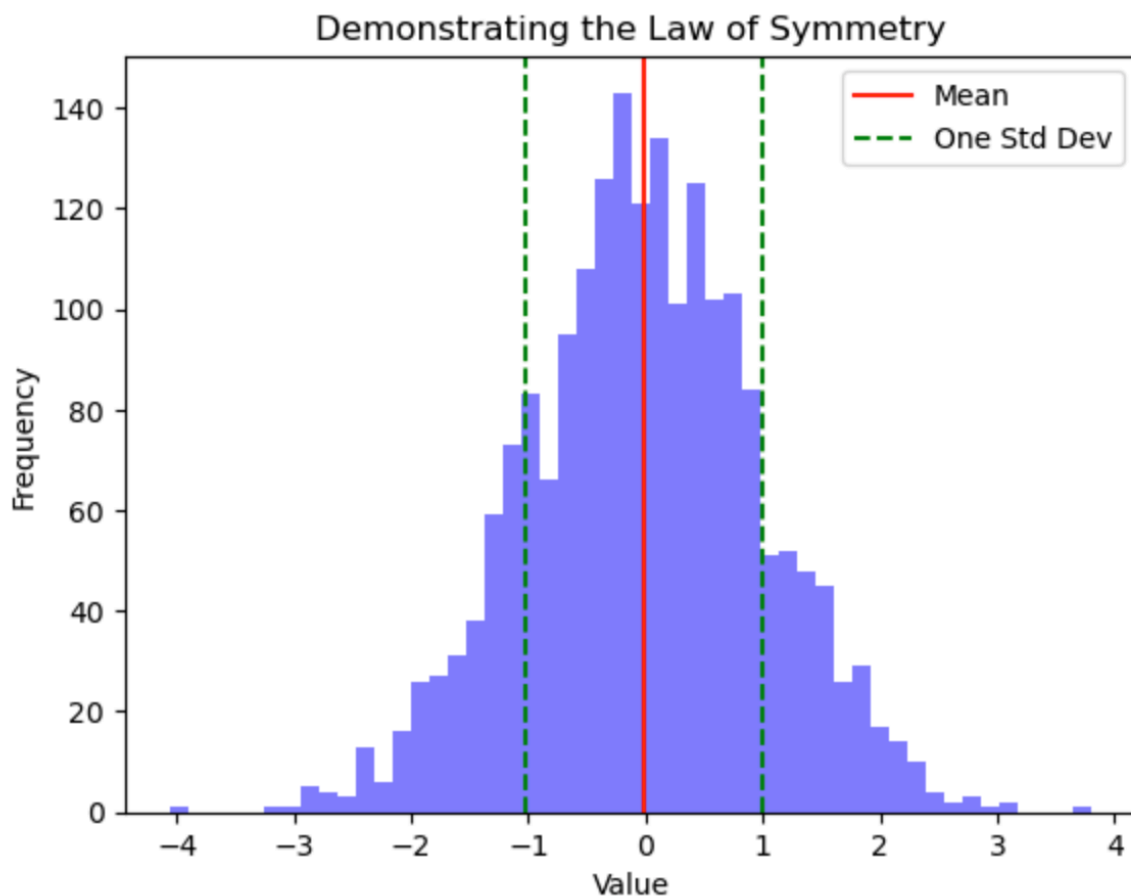


8. Symmetry

The Law of Symmetry is a principle of Gestalt psychology that suggests that the human mind tends to perceive objects or scenes as more visually pleasing and organized when they exhibit symmetry or balance. Symmetry refers to a balanced arrangement of visual elements or forms, where they are identical or similar on both sides of an axis, plane, or center.

By combining vertical lines at the mean (shown in red) and one standard deviation from the mean, the Law of Symmetry is produced. (depicted in green, with dashed lines). The histogram is built using symmetric data, which is generated by concatenating two sets of normally distributed random numbers with opposite signs

The below visualization illustrates the Law of Symmetry by displaying a balanced and harmonious arrangement of vertical lines, resulting in mirror symmetry about the vertical line at the mean. This highlights the data's central tendency, represented by the mean, and offers extra information about the data's distribution via the standard deviation lines. The legend, labels, and title all contribute to a better understanding of the plot.



The End