Table of Contents

Complete Plot Description Guide with Visuals and Plot Selection**

This document includes: - Enhanced explanations for each plot type - What to describe - Sentences you can use - Plot visuals (placeholders) - A full guide on which plot to use for each variable type

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1. Histogram

Plot Visual:

Dummy Histogram *(Insert your histogram image here)*

What to Describe:

- Overall distribution shape (symmetric, skewed, uniform, multimodal)
- Central location (mean/median)
- Spread (range, standard deviation)
- Tails (long or short)
- Clusters or gaps
- Outliers

Sentences to Use:

- “The distribution shows a clear (right-skewed/left-skewed/symmetric) pattern.”
- “Most observations fall between X and Y, indicating moderate spread.”
- “The right tail is longer, suggesting positive skewness.”
- “The distribution appears unimodal with one strong peak.”

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2. Histogram with Normal Curve Overlay

Plot Visual:

Dummy Normal Curve *(Insert your histogram + curve image here)*

What to Describe:

- Alignment between observed data and the theoretical curve
- Fit in the central region
- Differences in tails
- Deviations indicating skewness or kurtosis

Sentences to Use:

- "The histogram aligns closely with the normal curve, suggesting approximate normality."
- "Tail deviations indicate skewness."
- "The center fits well but tails diverge, showing non-normality."

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3. Density Plot

Plot Visual:

Density Plot *(Insert your density plot image)*

What to Describe:

- Smoothness and shape
- Peak location
- Spread and flatness
- Tail behavior
- Uni- or multi-modality

Sentences to Use:

- "The density curve shows a concentrated peak around X."
- "The tail extends to the right, indicating positive skewness."

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4. Boxplot

Plot Visual:

Dummy Boxplot *(Insert your boxplot)*

What to Describe:

- Median placement
- IQR (box size)
- Whisker length
- Outliers
- Symmetry or skewness

Sentences to Use:

- “The median sits closer to the lower quartile, indicating right-skewness.”
- “Outliers beyond the whiskers indicate extreme values.”

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5. Q–Q Plot

Plot Visual:

QQ Plot *(Insert your QQ plot)*

What to Describe:

- Alignment of points to diagonal
- Curvature
- Tail behavior

Sentences to Use:

- “Points follow the diagonal, suggesting approximate normality.”
- “Upward curvature shows right-skewness.”

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6. Scatter Plot

Plot Visual:

Dummy Scatter Plot *(Insert your scatter plot)*

What to Describe:

- Trend direction (positive/negative)
- Relationship strength
- Linearity
- Clusters
- Outliers

Sentences to Use:

- “A positive linear relationship is observed.”
- “Weak association indicated by wide spread.”

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7. Regression Scatter Plot

Plot Visual:

Age vs Monthly Income with Regression Line *(Insert your scatter + regression line)*

What to Describe:

- Fit of line
- Residual spread
- Strength of correlation

Sentences to Use:

- “The regression line fits closely, showing strong linearity.”

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8. Bar Chart

Plot Visual:

Bar Chart of Attrition *(Insert your bar chart)*

What to Describe:

- Highest and lowest bars
- Differences between categories
- Variability across groups

Sentences to Use:

- “Category A has the highest value, indicating dominance.”

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9. Violin Plot

Plot Visual:

Violin Plot *(Insert your violin plot)*

What to Describe:

- Density variations across range
- Symmetry or skewness
- Spread and concentration

Sentences to Use:

- “The width of the violin indicates high concentration in the lower range.”

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10. Correlation Heatmap

Plot Visual:

Correlation Heatmap *(Insert your heatmap image)*

What to Describe:

- Strong vs weak correlations
- Positive vs negative associations
- Clusters of related variables

Sentences to Use:

- “Strong positive correlations appear in the top-right cluster.”

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11. Pair Plot

Plot Visual:

Pairplot *(Insert your pairplot)*

What to Describe:

- Relationship patterns
- Clusters
- Outliers
- Strength of associations

Sentences to Use:

- “Some variable pairs show linear trends while others appear unrelated.”

▨ WHICH PLOT TO USE FOR WHICH VARIABLE TYPE**

1. One Continuous Numeric Variable

Use: - Histogram - Density Plot - Boxplot - Violin Plot - Q–Q Plot - Normal Curve Overlay

Purpose: Describe distribution, shape, skewness, and normality.

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2. Two Continuous Numeric Variables

Use: - Scatter Plot - Regression Line Plot - Correlation Heatmap - Pair Plot

Purpose: Assess correlation strength, direction, and linearity.

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3. One Categorical + One Numeric Variable

Use: - Boxplot - Violin Plot - Bar Chart - Strip Plot

Purpose: Compare group differences.

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4. Two Categorical Variables

Use: - Grouped Bar Chart - Stacked Bar Chart - Mosaic Plot - Heatmap (counts)

Purpose: Compare category frequencies.

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5. Time Series (Time + Numeric Variable)

Use: - Line Chart - Area Chart - Trend Line Plot

Purpose: Show changes over time, patterns, cycles.

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6. Many Variables (Exploratory Analysis)

Use: - Pair Plot - Correlation Heatmap - Parallel Coordinates

Purpose: Multi-dimensional pattern discovery.

▨ Interpretation Table for All Plot Types

▨ How to Write Plot Interpretations (Mini-Guide)

When writing a plot interpretation in statistics, always include these **four core elements**:

1. Identify the Plot Type

State what type of visualization you are interpreting. - *Example phrase:* "The histogram shows the distribution of…"

2. Describe the Main Pattern

Focus on: shape, trends, peaks, spread, skewness, or clusters. - *Example phrase:* "The distribution is right-skewed with most values between…"

3. Highlight Key Numerical Features

Mention mean, median, standard deviation, quartiles, or correlation (when relevant). - *Example phrase:* "The median lies near the lower quartile, suggesting skewness."

4. Provide a Clear Interpretation or Insight

Explain what the pattern *means* in context. - *Example phrase:* "This indicates most employees are new, with only a few long-tenured individuals."

☆ Interpretation Writing Templates

Use these academic templates to quickly describe plots:

Histogram / Density / Distribution Plot

> "The distribution appears (symmetric/skewed), with most observations centered around (value). The spread is (narrow/moderate/wide), and the tail behavior suggests (interpretation)."

Boxplot

"The median is positioned (high/low/centered), the IQR is (small/broad), and the whiskers indicate (balanced/skewed) spread. Outliers suggest (extreme values/potential anomalies)."

Scatter Plot / Regression

"There is a (weak/moderate/strong), (positive/negative) relationship. The regression line indicates a general trend of (increase/decrease), although the scatter shows (tight/loose) variability."

Heatmap

"The heatmap reveals (strong/weak) correlations between variables, with notable clusters suggesting (relationships/patterns)."

Interpretation Table for All Plot Types

Plot Type	What the Plot Shows	How to Interpret It (Simple)	How to Interpret It (Advanced)
Histogram	Frequency distribution of a numeric variable	Shows where most values fall (high bars)	Evaluate skewness, modality, spread, tail behavior
Histogram + Normal Curve	Fit between real data and theoretical normal distribution	If bars match curve, data is normal-like	Compare central peak and tails to detect deviations from normality
Density Plot	Smoothed distribution shape	Shows where data is concentrated	Evaluate shape, multimodality, skewness, peak smoothness
Boxplot	Median, quartiles, outliers	Quick summary of spread and skewness	Analyze IQR width, whisker symmetry, and extreme outliers
Q–Q Plot	Normality assessment	Points close to line → normal	Curvature reveals skewness, heavy/light tails
Scatter Plot	Relationship between two numeric variables	Shows positive/negative/no trend	Assess linearity, clustering, heteroscedasticity
Regression Scatter Plot	Linear trend fit	Line shows average direction	Strength of fit shown by residual spread
Bar Chart	Categorical comparisons	Identify highest/lowest groups	Detect category imbalance and distribution patterns
Violin Plot	Distribution + density by category	Shows thickness = concentration	Compare shapes to detect distribution differences
Correlation Heatmap	Strength of relationships between variables	Darker colors = stronger correlation	Identify variable clusters or multicollinearity
Pair Plot	Multiple scatterplots across variables	Quick visual relationships	Shows linearity, spread, clusters, cross-variable outliers