



Matplotlib Chart Types

Chart Name	When to Use This Chart (Purpose / Use Case)	Example
Line Plot	Plot trends in continuous data (often time series); plots y versus x as lines and/or markers.	Finance: closing stock price over time. Healthcare: patient blood pressure vs. time.
Scatter Plot	Show relationship between two variables; a scatter plot of y vs. x (points may vary in size/color).	Health: systolic vs diastolic blood pressure across patients. Finance: risk vs return of assets.
Vertical Bar Chart	Compare categorical values; makes a vertical bar plot (bars at each x location).	Retail: sales by product category. Healthcare: number of patients per diagnosis.
Horizontal Bar Chart	Compare categories with long labels; makes a horizontal bar plot.	Demographics: population by country. Education: enrollment by department.
Stem Plot	Show discrete or impulse data; creates a stem plot (markers on "stems" from baseline).	Signal Processing: neural spike times. Finance: dividends (amount vs. date).
Step Plot	Display piecewise-constant or event data; makes a step plot.	Finance: stock price (staircase) changes intraday. Survival Analysis: stepwise survival rates.
Fill Between (Area Chart)	Shade area between curves; fills area between two curves or series.	Forecasting: confidence interval bands (upper vs lower forecast). Healthcare: range of lab values over time.
Stacked Area Plot (Stackplot)	Show cumulative totals over a dimension; draws a stacked area plot.	Finance: portfolio asset allocations over time. Demographics: population by age groups over years.
Heatmap (Image Plot)	Visualize a 2D data matrix; displays an image of data on a 2D grid.	Research: correlation matrix heatmap of financial indicators. Genetics: heatmap of gene expression.
Pseudocolor (pcolormesh)	Plot irregular grid data; creates a pseudocolor plot on a non-regular grid.	Geoscience: elevation map over irregular mesh. Physics: finite-element stress heatmap.
Contour Plot	Show level curves of 3D data; plots contour lines of constant z (height).	Geography: altitude contours on a map. Statistics: density contours of bivariate distribution.

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Filled Contour	Show filled regions between contour levels; plots filled contours.	Meteorology: temperature bands on weather map. Engineering: stress intensity regions on surface.
Quiver Plot	Visualize vector fields with arrows; plots a 2D field of arrows (from U,V components).	Meteorology: wind direction/speed on a map. Physics: electric field vectors in space.
Barbs	Specialized for wind data; plots a 2D field of wind barbs.	Weather: wind speed/direction at weather stations.
Streamplot	Visualize continuous flow fields; draws streamlines of a vector flow.	Fluid Dynamics: streamlines of airflow over a wing. Oceanography: ocean current flows.
Histogram	Show data distribution; compute and plot frequency histogram of one-dimensional data.	Demographics: age distribution of a population. Finance: distribution of daily returns.
Box Plot	Summarize distribution by quartiles (median, IQR, outliers); Matplotlib's boxplot shows these (official doc has no summary sentence).	Clinical: lab test results by patient group. Quality Control: variation in defect counts.
Violin Plot	Show distribution and density per category; creates a violin plot (KDE + box).	Economics: income distribution by profession. Medicine: BMI distribution by treatment group.
Pie Chart	Show composition of categories; plots a pie chart where wedge size = fraction of total.	Market Analysis: market share of companies. Public Health: percentage of disease cases.
Error Bar Chart	Plot values with uncertainty; plot points with attached error bars.	Science: measurement results with standard deviation. Finance: returns with confidence intervals.
2D Histogram	Show joint distribution of two variables; makes a 2D histogram (counts in bins).	Statistics: density of (height, weight) pairs. Climate: occurrence of events in bivariate bins.
Hexbin Plot	Show binned scatter density; makes a hexagonal binning plot.	Astronomy: star count density on sky coordinates. Data Analysis: scatter density of large datasets.
Event Plot (Raster)	Plot timing of events; plots identical parallel lines at event positions (also called spike or raster plot).	Neuroscience: neural spike raster. Operations: arrival times of patients each day.
TriContour (Triangular Contour)	Contour for unstructured data; draws contour lines on an irregular triangular grid.	Survey: contour of irregular terrain samples.

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TriContourf (Triangular Filled Contour)	Filled contour for unstructured data; draws filled contour regions on triangular grid.	Geoscience: interpolated concentration levels from scattered samples.
Tripcolor (Triangular Pseudocolor)	Pseudocolor for triangular mesh; creates a pseudocolor plot of unstructured triangular grid.	Engineering: finite-element value heatmap on mesh.
Triplot (Triangular Mesh)	Plot triangular mesh lines; draws an unstructured triangular grid as lines/markers.	Geometry: Delaunay triangulation of point cloud.
3D Scatter Plot	Plot points in 3D space; creates a 3D scatter in a 3D Axes.	Astronomy: 3D positions of stars. Manufacturing: (x,y,z) defect coordinates in a block.
3D Surface Plot	Show 3D surface of grid data; creates a surface plot.	Terrain: 3D elevation surface. Modeling: response surface over two inputs (e.g., risk over time).
3D Wireframe Plot	Outline 3D surfaces; plots a 3D wireframe (edges only).	Engineering: mesh outline of an object. Mathematics: wireframe of a function mesh.
3D Triangular Surface Plot	Show 3D surface from triangular mesh; plots a triangulated surface.	Architecture: geodesic dome surface. Geology: tetrahedral mesh of rock formation.
3D Voxel (Volumetric) Plot	Visualize 3D volume blocks; plots a set of filled voxels.	Medical Imaging: 3D CT scan volume. 3D Modeling: occupied voxels in a 3D grid.

Seaborn Chart Types

Chart Name	When to Use This Chart (Purpose / Use Case)	Example
Scatter Plot	Plot relationship between two variables (with optional semantic groups); draws a scatter plot.	Health: scatter of age vs cholesterol. Economics: GDP vs life expectancy.
Line Plot	Show trends or patterns over an interval; draws a line plot.	Finance: stock price over time with trend line. Climate: temperature change by year.
Relational Plot (relplot)	Figure-level interface for scatter/line plots on facets; draws relational plots on a FacetGrid.	Finance: multiple regions' sales vs time on separate panels.

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Histogram (histplot)	Plot distribution (1D/2D); plots univariate or bivariate histograms.	Survey: histogram of income distribution. Data Science: histogram of model errors.
KDE Plot (kdeplot)	Estimate smooth distribution; plots kernel density estimate of 1D/2D data.	Physics: distribution of particle speeds. Economics: density of loan amounts.
ECDF Plot (ecdfplot)	Plot empirical cumulative distribution; draws ECDF curves.	Marketing: cumulative fraction of customers by spend. Quality Control: fraction below defect threshold.
Rug Plot	Show individual data points on axis; draws tick marks (rug) for each observation.	Statistics: show raw data points along histogram axis. Healthcare: patient BMI distribution ticks.
Distribution Plot (displot)	Figure-level interface for distribution (hist/KDE); interface for distribution plots on a FacetGrid.	Education: combined histogram+KDE of scores by class.
Categorical Plot (catplot)	Figure-level interface for categorical plots on a FacetGrid.	Business: bar plot of sales by product category, faceted by quarter.
Strip Plot	Jittered scatter for categories; draws categorical scatter with jitter.	Sales: revenue of individual salespeople by region (jitter to avoid overlap).
Swarm Plot	Non-overlapping scatter for categories; draws categorical points without overlap.	Biology: jitter-free scatter of animal weight by species.
Box Plot	Show distribution by category; draws box plot of medians/quartiles.	Academia: test score distributions by teaching method.
Violin Plot	Show distribution by category with density; draws violin (KDE + box).	Economics: income distribution by industry.
Boxen Plot	Enhanced box plot for large datasets; draws letter-value plot.	Real Estate: prices distribution by neighborhood (many data).
Point Plot	Show point estimates + CI; shows mean with error bars connected by lines.	Sales: average monthly sales by quarter with 95% CI.
Bar Plot	Show categorical estimate + CI; bars indicate central tendency and error.	Healthcare: average waiting time by department with error bars.
Count Plot	Show counts of categories; bars represent frequency of categories.	Retail: count of customers by membership tier.

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Linear Model Plot (Implot)	Faceted regression analysis; plots data and regression line on a FacetGrid.	Social Science: salary vs experience with best-fit line by gender facets.
Regression Plot (regplot)	Simple regression analysis; plots scatter + fitted linear model.	Biology: enzyme activity vs concentration with linear fit.
Residual Plot (residplot)	Diagnose regression; plots residuals of a linear fit.	Machine Learning: residuals of predicted vs actual values.
Heatmap	Color-coded matrix; plots rectangular data as a matrix.	Finance: correlation matrix of asset returns.
Clustermap	Clustered heatmap; hierarchically cluster rows/columns and plot heatmap.	Genomics: clustered gene expression heatmap.
Joint Plot	Bivariate analysis with marginals; combined scatter/hist for two variables.	Health: joint scatter of BMI vs blood pressure with histograms on axes.
Pair Plot	Pairwise relationships; plots all variable pairs in dataset.	Classic: iris dataset pairplot (sepal/petal relations).

Sources: Official Matplotlib and Seaborn documentation.
