Contour Plot

A contour plot is a graphical technique used to visualize a 3D surface in two dimensions. It works by representing slices of the surface at constant values of a specific dimension (usually denoted by z) with contour lines.

- **Data:** The plot is based on a function that takes two variables, often denoted by x and y, and outputs a single value, typically represented by z. This function essentially describes a 3D surface.

- **Contour Lines:** These are the key elements of the plot. They connect points on the x-y plane where the function has the same z value. Imagine taking horizontal slices of the 3D surface at different z levels. The lines where these slices intersect the surface are traced onto the x-y plane, resulting in the contour lines.

- **Interpretation:** By looking at the density and spacing of the contour lines, you can gain insights about the shape and behavior of the 3D surface. Closely spaced lines indicate steeper changes in the z value, while sparse lines represent areas with a more gradual change.

Types of Contour Plot:

- **Rectangular Contour plot**: A projection of 2D-plot in 2D-rectangular canvas. It is the most common form of the contour plot.

- **Polar contour plot***: Polar contour plot is plotted by using the polar coordinates *r* and *theta*. The response variable here is the collection of values generated while passing r and theta into the given function, where r is the distance from origin and theta is the angle from the positive x axis.

- **Ternary contour plot**: Ternary contour plot is used to represent the relationship between 3 explanatory variables and the response variable in the form of a filled triangle.

Example:

$$f(x, y) = sin(x)^2 + cos(y)^2$$

Contour plot: