

How to Create Empirical Cumulative Distribution Functions in R with `ecdf()`

Authored by
stats writer

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The `ecdf()` function in R is used for constructing empirical cumulative distribution functions, which represent the cumulative probability distribution of a dataset. It takes a numerical vector as an input and outputs a step function that plots the cumulative proportion of data points below each unique value in the vector. This can be useful for visualizing the distribution of a dataset and comparing it to a theoretical distribution. The `ecdf()` function can also be used to calculate and plot the quantiles of a dataset, making it a useful tool for descriptive statistics and data analysis.

You can use the **ecdf** function in R to calculate and plot an empirical cumulative distribution function.

Here is the most common way to use this function:

```
#calculate empirical cumulative distribution function of data  
p = ecdf(data)
```

```
#plot empirical cumulative distribution function  
plot(p)
```

The following example shows how to use this function in practice.

Example: How to Use `ecdf()` Function in R

For this example, let's create a vector of 1,000 random values that follow a :

```
#make this example reproducible  
set.seed(1)
```

```
#create vector of 1,000 random values that follow standard normal distribution  
data = rnorm(1000)
```

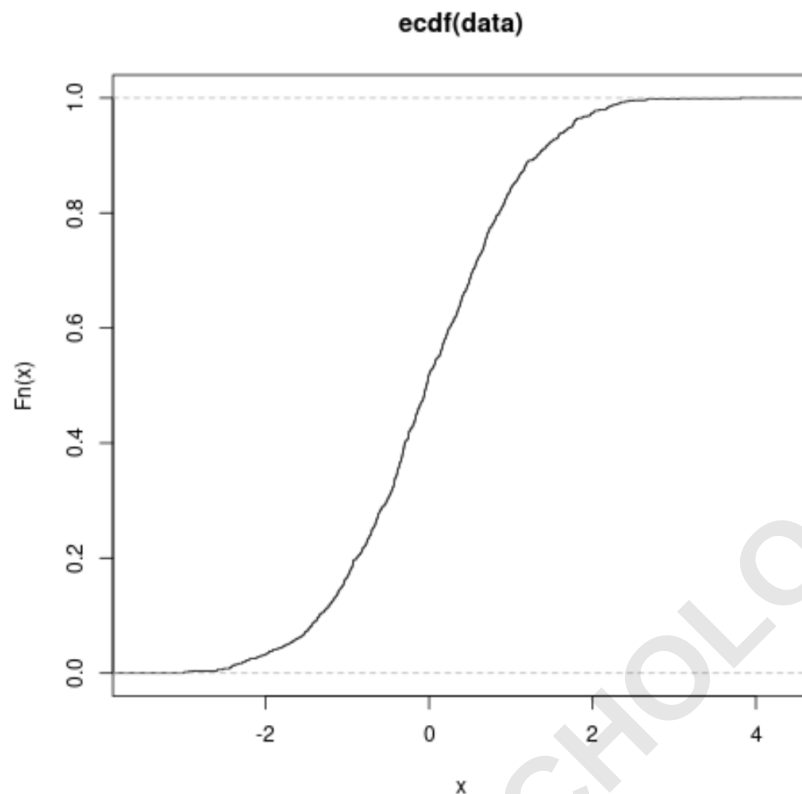
```
#view first six values in vector  
head(data)
```

```
-0.6264538 0.1836433 -0.8356286 1.5952808 0.3295078 -0.8204684
```

We can use the **ecdf** function to calculate the empirical cumulative distribution function of this dataset and then use the **plot** function to visualize it:

```
#calculate empirical cumulative distribution function of data  
p = ecdf(data)
```

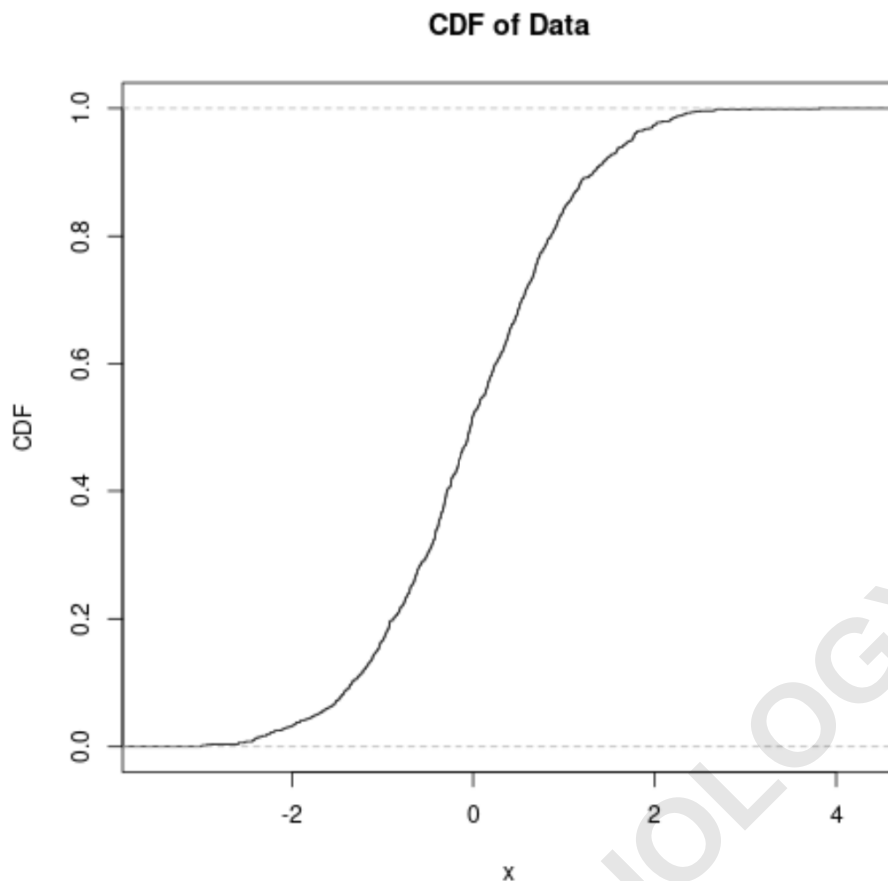
```
#plot empirical cumulative distribution function  
plot(p)
```



Note that you can also use the **xlab**, **ylab** and **main** arguments within the plot function to add an x-axis label, y-axis label and title to the plot, respectively:

```
#calculate empirical cumulative distribution function of data  
p = ecdf(data)
```

```
#plot empirical cumulative distribution function with axis labels and title  
plot(p, xlab='x', ylab='CDF', main='CDF of Data')
```



The x-axis displays the values from the dataset.

The y-axis displays the cumulative distribution function.

Related:

[How to Plot a Normal Distribution in R](#)

[A Guide to dnorm, pnorm, qnorm, and rnorm in R](#)

[How to Perform a Shapiro-Wilk Test for Normality in R](#)