**Experiment 15**

**Aim:** To implement different linear algebra functions using Scipy.

**Theory :**

## What is SciPy?

* SciPy is an open-source Python library which is used to solve scientific and mathematical problems.
* It is built on the [NumPy](https://www.edureka.co/blog/python-numpy-tutorial/) extension and allows the user to manipulate and visualize data with a wide range of high-level commands.

## NumPy vs SciPy

* Both NumPy and SciPy are [Python libraries](https://www.edureka.co/blog/python-libraries/) used for used mathematical and numerical analysis.
* NumPy contains array data and basic operations such as sorting, indexing, etc whereas, SciPy consists of all the numerical code.
* Though NumPy provides a number of [functions](https://www.edureka.co/blog/python-functions) that can help resolve linear algebra, Fourier transforms, etc, SciPy is the library that actually contains fully-featured versions of these functions along with many others.
* However, if you are doing scientific analysis using Python, you will need to install both NumPy and SciPy since SciPy builds on NumPy.

## Subpackages in SciPy:

SciPy has a number of subpackages for various scientific computations which are shown in the following table:

| **Name** | **Description** |
| --- | --- |
| cluster | Clustering algorithms |
| constants | Physical and mathematical constants |
| fftpack | Fast Fourier Transform routines |
| integrate | Integration and ordinary differential equation solvers |
| interpolate | Interpolation and smoothing splines |
| io | Input and Output |
| linalg | Linear algebra |
| ndimage | N-dimensional image processing |
| odr | Orthogonal distance regression |
| optimize | Optimization and root-finding routines |
| signal | Signal processing |
| sparse | Sparse matrices and associated routines |
| spatial | Spatial data structures and algorithms |
| special | Special functions |
| stats | Statistical distributions and functions |

**Conclusion:** Thus studied different linear algebra functions using Scipy.