SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore – 641 107

Accredited by NAAC-UGC with 'A' Grade

Approved by AICTE, Recognized by UGC & Affiliated to Anna University, Chennai

Department of Artificial Intelligence and Data Science

Course Name – Big Data Analytics
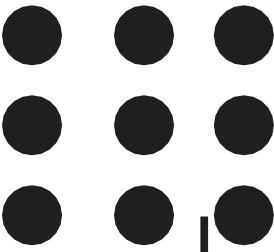**III Year / V Semester**

Unit 2 – Data Science using Python

Topic 4 - Scipy – Manipulation of mathematical functions using special package

Scipy Packages

Sub-packages of SciPy:
- File input/output – scipy.io
- Special Function – scipy.special
- Linear Algebra Operation – scipy.linalg
- Interpolation – scipy.interpolate
- Optimization and fit – scipy.optimize
- Statistics and random numbers – scipy.stats
- Numerical Integration – scipy.integrate
- Fast Fourier transforms – scipy.fftpack
- Signal Processing – scipy.signal
- Image manipulation – scipy.ndimage

Scipy Packages

File Input / Output package:

Scipy, I/O package, has a wide range of functions for work with different files format which are Matlab, Arff, Wave, Matrix Market, IDL, NetCDF, TXT, CSV and binary format.

Special Function package

scipy.special package contains numerous functions of mathematical physics.

SciPy special function includes Cubic Root, Exponential, Log sum Exponential, Lambert, Permutation and Combinations, Gamma, Bessel, hypergeometric, Kelvin, beta, parabolic cylinder, Relative Error Exponential, etc..

Scipy Packages

Linear Algebra with SciPy

Linear Algebra of SciPy is an implementation of BLAS and ATLAS LAPACK libraries.

Performance of Linear Algebra is very fast compared to BLAS and LAPACK.

Linear algebra routine accepts two-dimensional array object and output is also a two-dimensional array.

Inverse Matrix , Eigenvalues and Eigenvector

Discrete Fourier Transform – scipy.fftpack

DFT is a mathematical technique which is used in converting spatial data into frequency data.

FFT (Fast Fourier Transformation) is an algorithm for computing DFT

FFT is applied to a multidimensional array.

Frequency defines the number of signal or wavelength in particular time period.

Scipy Packages

Optimization and Fit in SciPy – scipy.optimize
Optimization provides a useful algorithm for minimization of curve fitting, multidimensional or scalar and root fitting.

Integration with Scipy – Numerical Integration
When we integrate any function where analytically integrate is not possible, we need to turn for numerical integration.

SciPy provides functionality to integrate function with numerical integration.
scipy.integrate library has single integration, double, triple, multiple, Gaussian quadrate, Romberg, Trapezoidal and Simpson's rules.

THANK YOU