Artificial Intelligence (Machine Learning & Deep Learning) [Course]
Week 3 - Day 3 n Day 4 - Numpy
[See examples / code in GitHub code repository]

It is not about Theory, it is 20% Theory and 80% Practical – Technical/Development/Programming [Mostly Python based]
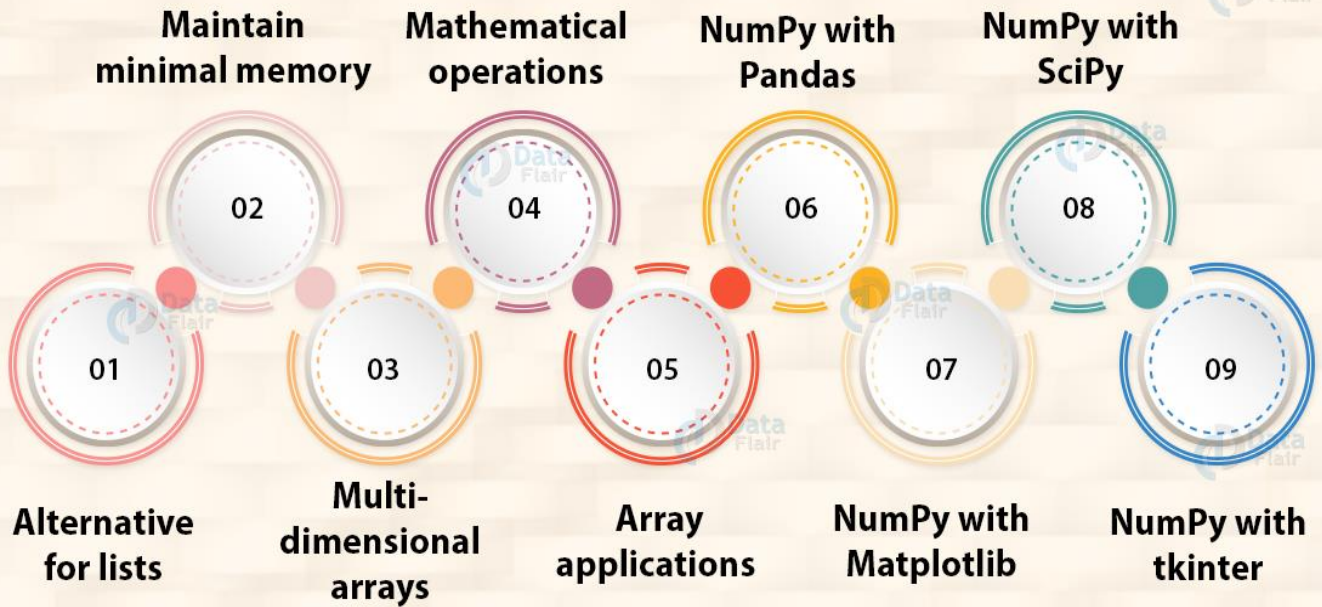
Numpy - Overview

NumPy is a Python library.
NumPy is used for working with arrays.
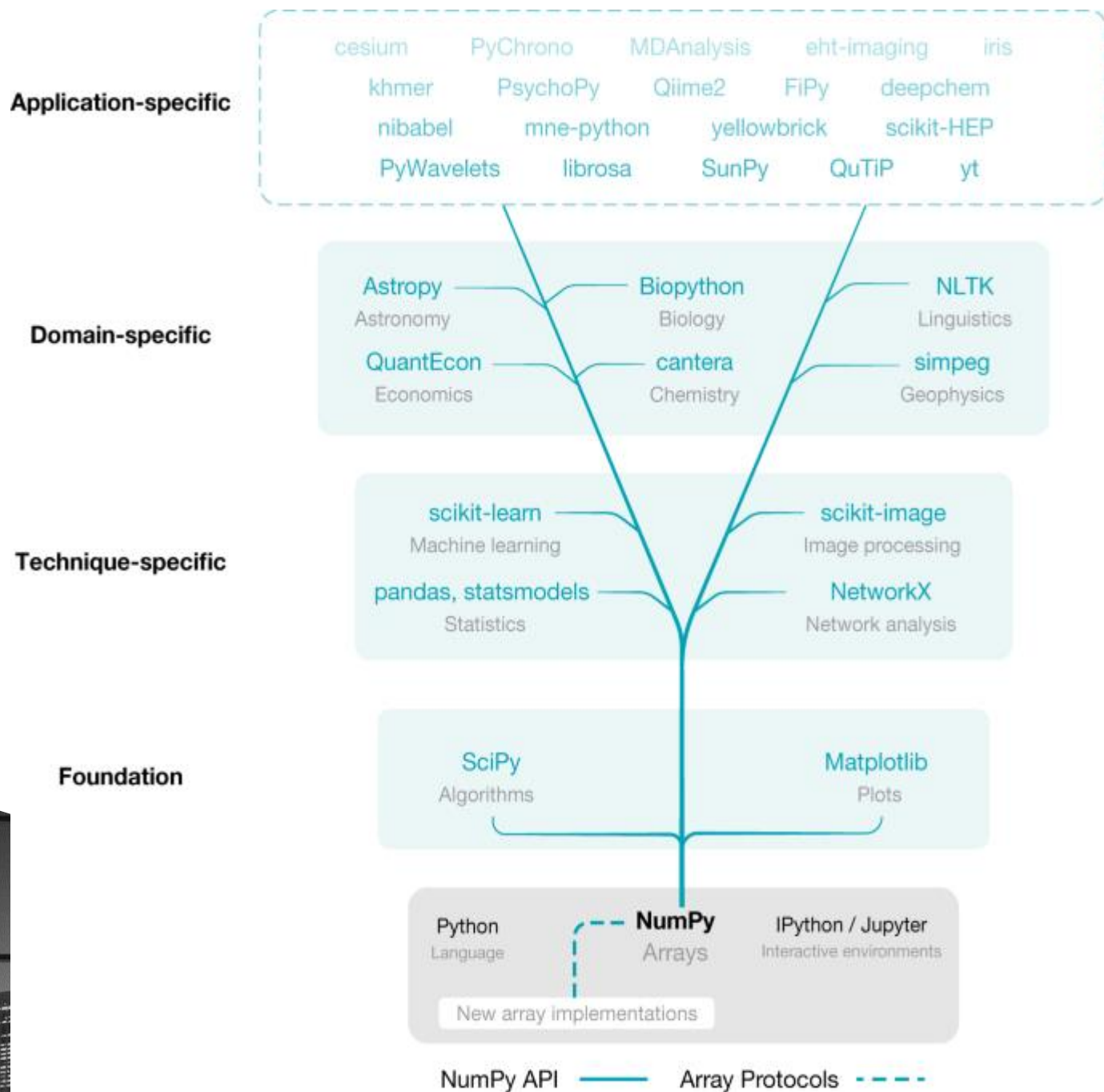NumPy is short for "Numerical Python".

Applications of NumPy

Maintain minimal memory 02	**Mathematical operations** 04	**NumPy with Pandas** 06	**NumPy with SciPy** 08
Alternative for lists 01	**Multi-dimensional arrays** 03	**Array applications** 05	**NumPy with Matplotlib** 07	**NumPy with tkinter** 09

Numpy – Overview 2

Application-specific	cesium	PyChrono	MDAnalysis	eht-imaging	iris
	khmer	PsychoPy	Qiime2	FiPy	deepchem
	nibabel	mne-python	yellowbrick		scikit-HEP
	PyWavelets	librosa	SunPy	QuTiP	yt

Domain-specific	Astropy	Biopython	NLTK
	Astronomy	Biology	Linguistics
	QuantEcon	cantera	simpeg
	Economics	Chemistry	Geophysics

Technique-specific	scikit-learn	scikit-image
	Machine learning	Image processing
	pandas, statsmodels	NetworkX
	Statistics	Network analysis

Foundation	SciPy	Matplotlib
	Algorithms	Plots

Python	**NumPy**	IPython / Jupyter
Language	Arrays	Interactive environments

New array implementations

NumPy API ——— Array Protocols - - - -

Numpy – cheat sheets

NumPy

PYTHON FOR DATA SCIENCE
CHEAT SHEET

Python NumPy

What is NumPy?
A library consisting of multidimensional array objects and a collection of routines for processing those arrays.

Why NumPy?
Mathematical and logical operations on arrays can be performed. Also provides high performance.

Import Convention
import numpy as np – Import numpy

ND Array
Space efficient multi-dimensional array, which provides vectorized arithmetic operations.

Creating Array
• a=np.array([1,2,3])
• b=np.array([[1,2,3,4],(7,8,9,10)],dtype=int)

Saving and Loading
On disk:
• np.save("new_array",x)
• np.load("new_array.npy")

Text/CSV files:
• np.loadtxt('New_file.txt') - From a text file
• np.genfromtxt('New_file.csv',delimiter=',') - From a CSV file
• np.savetxt('New_file.txt',arr,delimiter=' ') - Writes to a text file
• np.savetxt('New_file.csv',arr,delimiter=',') - Writes to a CSV file

Properties:
• array.size - Returns number of elements in array
• array.shape - Returns dimensions of array(rows, columns)
• array.dtype - Returns type of elements in array

Operations
Copying:
• np.copy(array) - Copies array to new memory array.
• view(dtype) - Creates view of array elements with type dtype

Sorting:
• array.sort() - Sorts array
• array.sort(axis=0) - Sorts specific axis of array
• array.reshape(2,3) - Reshapes array to 2 rows, 3 columns without changing data.

Array Mathematics
Arithmetic Operations:
• Addition: np.add(a,b)
• Subtraction: np.subtract(a,b)
• Multiplication: np.multiply(a,b)
• Division: np.divide(a,b)
• Exponentiation: np.exp(a)
• Square Root: np.sqrt(b)

Comparison:
• Element-wise: a==b
• Array-wise: np.array_equal(a,b)

Functions
• Array-wise Sum: a.sum()
• Array-wise min value: a.min()
• Array row max value: a.max(axis=0)
• Mean: a.mean()
• Median: a.median()

• Learn from industry experts and be sought-after by the industry!
• Learn any technology, show exemplary skills and have an unmatched career!

Python NumPy Cheat Sheet

https://intellipaat.com/blog/tutorial/python-tutorial/numpy-cheat-sheet/

https://intellipaat.com/blog/wp-content/uploads/2022/10/Python-Numpy-Cheat-Sheet-2022.pdf

https://www.datacamp.com/cheat-sheet/numpy-cheat-sheet-data-analysis-in-python

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Numpy - Exercises

NumPy

See code here: https://github.com/ShahzadSarwar10/AI-ML-Explorer
You should be able to analyze – each code statement, you should be able to see trace information – at each step of debugging. "DEBUGGING IS BEST STRATEGY TO LEARN A LANAGUAGE." So debug code files, line by line, analyze the values of variable – changing at each code statement. BEST STRATEGY TO LEARN DEEP.

Let's put best efforts.
Thanks.
Shahzad – Your AI – ML Instructor

Exercises

python

Thank you - for listening and participating

❑**Questions / Queries**

❑**Suggestions/Recommendation**

❑**Ideas…..?**

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