SYSTEM REQUIREMENTS

HARDWARE REQUIRMENT

1. 32 bit /64 bit System (Windows, MacOS, Linux) with **Minimum** 2 GB Ram or more
2. Processor: **Minimum** 1 GHz; Recommended 2 GHz or more
3. Hard Drive: **Minimum** 32 GB; Recommended 64 GB or more

SOFTWARE REQUIREMENT

FRAMEWORK AND API

ANACONDA 4.5.11

Anaconda Distribution is a free, easy-to-install package manager, environment manager and Python distribution with a collection of 1,000+ open source packages with free community support.it is platform-agnostic, so we can use it whether on Windows, macOS or Linux and Anaconda Navigator is a desktop graphical user interface (GUI) included in Anaconda distribution that allows you to launch applications and easily manage conda packages, environments and channels without using command-line commands.it has features like :

- Manage libraries, dependencies, and environments with Conda
- Develop and train machine learning and deep learning models with scikit-learn, TensorFlow, and Theano
- Analyze data with scalability and performance with Dask, NumPy, pandas, and Numba
- Visualize results with Matplotlib, Bokeh, Datashader, and Holoviews

TENSORFLOW-GPU 1.12.0

TensorFlow is an open source software library for numerical computation using data flow graphs. the graph nodes represent mathematical operations, while the graph edges represent the multidimensional data arrays (tensors) that flow between them. It's also includes TensorBoard, a data visualization toolkit and Tensorflow developed for the purposes of conducting machine learning and deep neural networks research.it provides stable Python and C APIs as well as non-

guaranteed backwards compatible API's for C++, Go, Java, JavaScript and Swift. TensorFlow offers multiple levels of abstraction so we can choose the right one a/c to our needs to build and train models by using the high-level Keras API. Build and train state-of-the-art models without sacrificing speed or performance. TensorFlow gives you the flexibility and control with features like the Keras Functional API and Model Subclassing API for creation of complex topologies. For easy prototyping and fast debugging, use eager execution.

PySWARMS

PySwarms is an open source extensible research toolkit for particle swarm optimization (PSO) in Python.It is intended for swarm intelligence researchers and practitioners who prefer a high-level declarative interface for implementing PSO in their problems.it enables basic optimization with PSO and interaction with swarm optimizations.

PROGRAMMING LANGUAGE & LIBRARIES

PYTHON (2.7 OR HIGHER **)**

Python is an interpreted, object-oriented, high-level programming language with dynamic semantics.Its high-level built in data structures, combined with dynamic typing and dynamic binding, make it very attractive for Rapid Application Development, as well as for use as a scripting or glue language to connect existing components together. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

MATPLOTLIB 3.2.0

Matplotlib is a Python 2D plotting library which produces publication quality figures in a variety of hardcopy formats and interactive environments across platforms. Matplotlib can be used in Python scripts, the Python and IPython shells, the Jupyter notebook, web application servers, and four graphical user interface toolkits.

Matplotlib tries to make easy things easy and hard things possible. You can generate plots,histograms, power spectra, bar charts, errorcharts, scatterplots, etc., with just a few lines of code.

NUMPY 1.16.1

NumPy is the fundamental package for scientific computing with Python. It contains among other things

- a powerful N-dimensional array object
- useful linear algebra, Fourier transform, and random number capabilities

Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined. This allows NumPy to seamlessly and speedily integrate with a wide variety of databases.

PANDAS 0.23.0

Pandas is a open source library in Python for data manipulation and analysis. In particular, it offers data structures and operations for manipulating numerical tables and time series.

SCIKIT LEARN 0.20.3

Scikit-learn is a open source machine learning library for the Python programming language. It's simple and efficient tools for classification, regression and clustering , and also designed to interoperate with the Python numerical and scientific libraries NumPy and SciPy.

IMBLEARN 0.4.3

imbalanced-learn is a python package offering a number of re-sampling techniques commonly used in datasets showing strong between-class imbalance. It is compatible with scikit-learn and is part of scikit-learn-contrib projects.