Machine Learning
Cyber security using Python

AI origin

Humans first have dreamed of using computers

to create human-like brains

and cloned humans.

AI origin

After decades of trying to make this dream , it was realized that developing a cloned human and a cloned brain was impossible.

AI origin

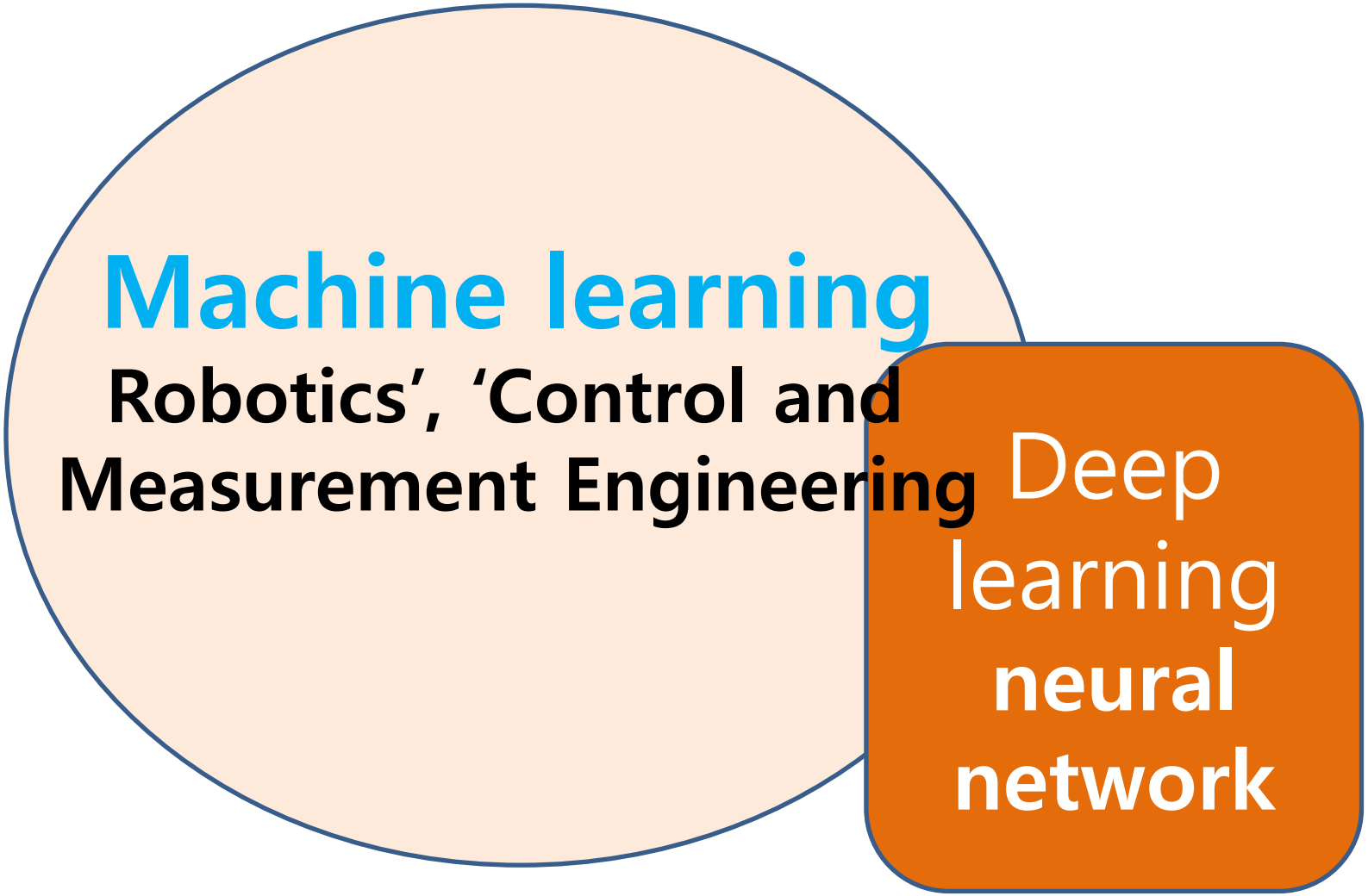
- As a result, human studied a system that performs functions in each field instead of humans.

- That's an Expert system

Evolution of AI

- Expert system
- Pattern reconizing
- Fuggy theory
- Neural network
- Machine learning
- Robotics

Machine learning, Deep Learning



Machine Learning

- **Various methods of training machines to create artificial intelligence**
- **‘Robotics’, ‘Control and Measurement Engineering’.**
- **Wide concept and area**

Deep Learning

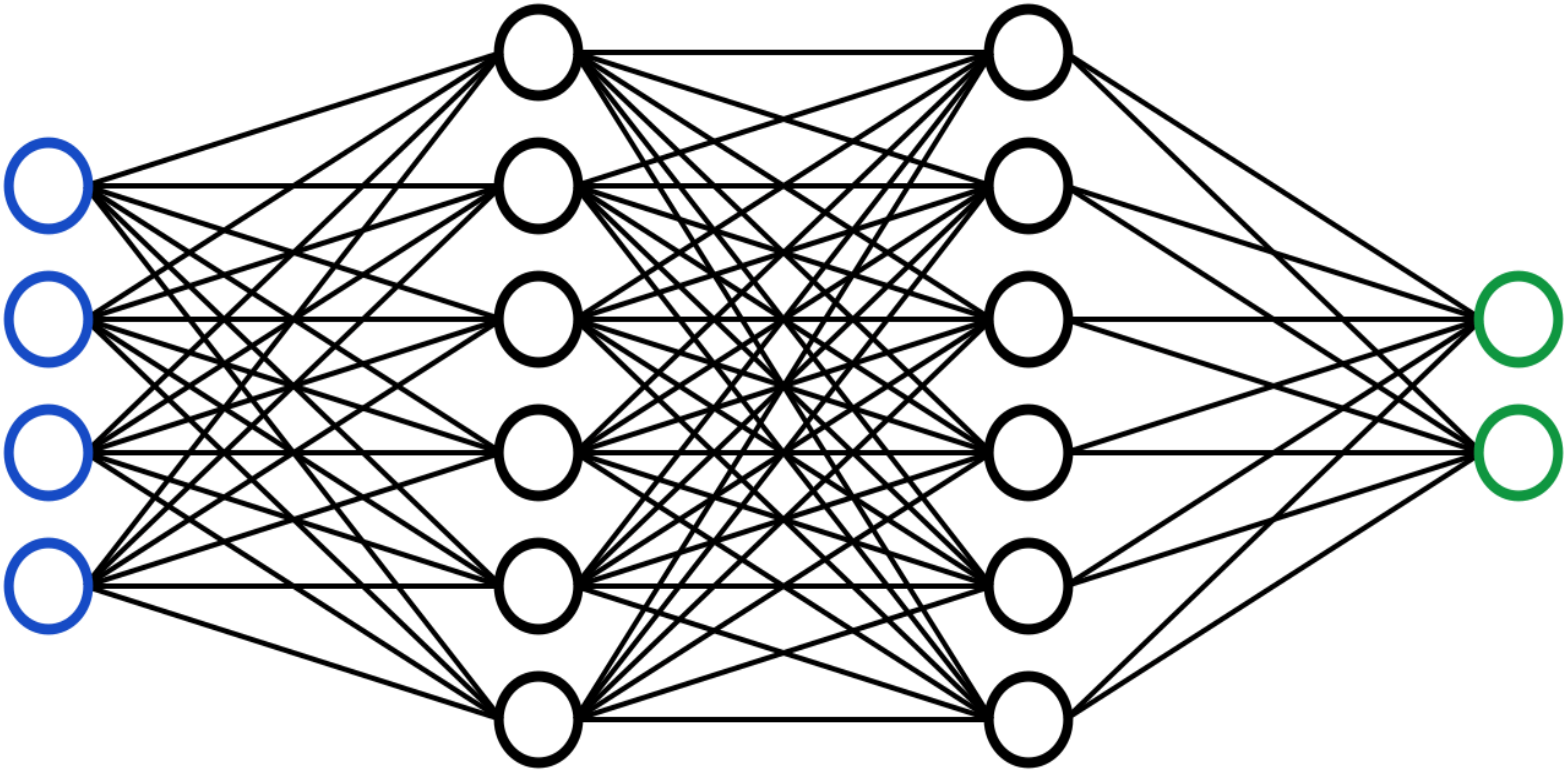
A type of machine learning

that creates artificial intelligence through a ‘neural network’,

A smaller concept than machine learning.

Deep Learning

Neural network



https://victorzhou.com/series/neural-networks-from-scratch/

Exercise process

- **What is Python Machine Learning library & How to install**
- **What is Machine Learning exercise process**
- **How to develop Machine Learning cyber security project**

Difference between Library vs Algorithm

- Library

Program language under Python

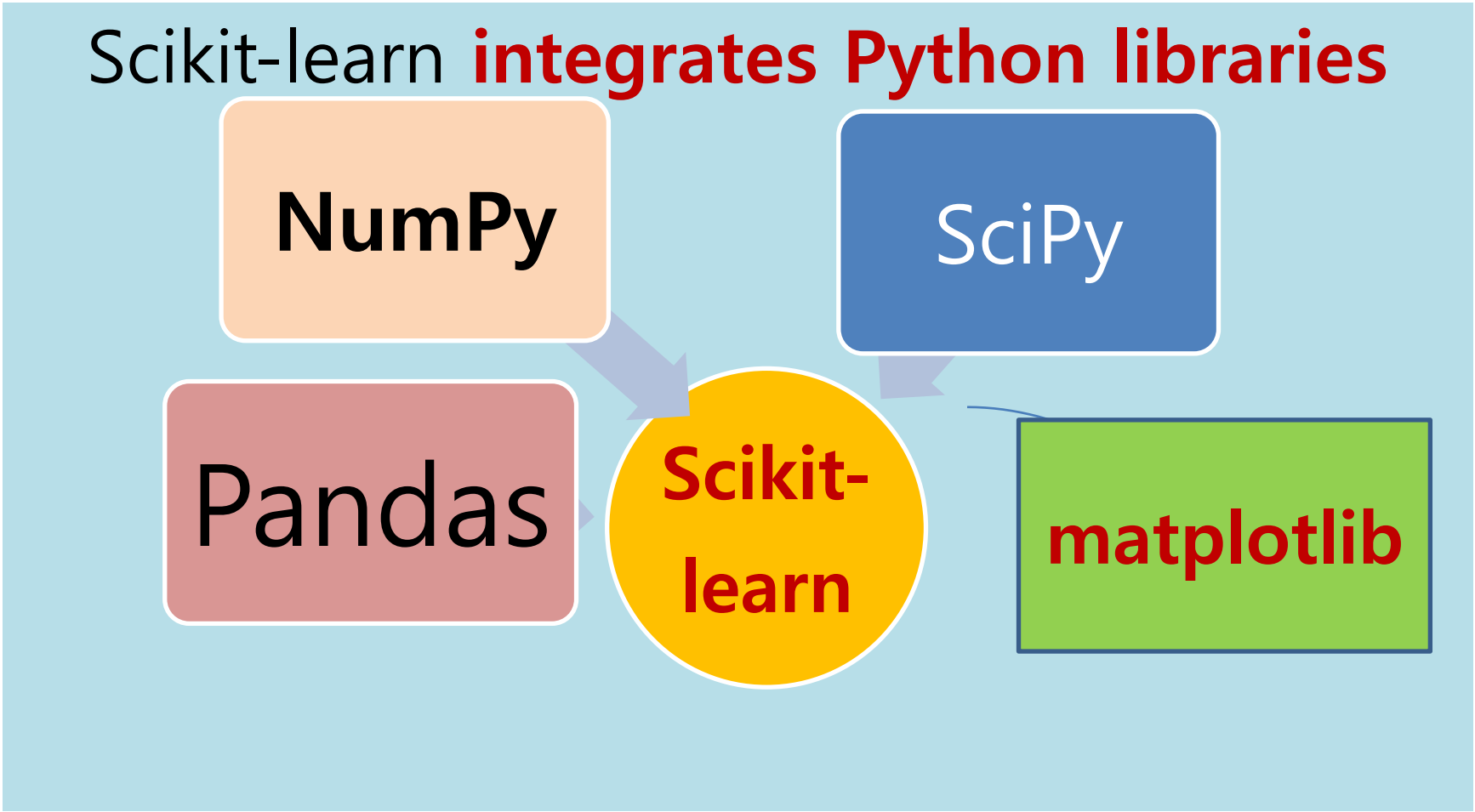
- Algorithm

Formulas, sequences, and formulas for problem solving

The algorithm has regular steps of working

ML language adopts its algorithm

Python libraries



Python libraries

Scikit-learn integrates well with many other Python libraries, such as

- **matplotlib and plotly for plotting,**
- **NumPy for array vectorization,**
- **Pandas dataframes,**
- **SciPy, and many more.**

plotting

- **Plotting is used to analyze and interpret data**.

- 데이터를 나타내기 위해 그래프 또는 차트에 점을 표시하는 과정

Vectorization

- **Replacing the for statement that reduces programming and algorithm performanceCalculating the total without using the for statement.**

- --> for 구문은 불필요한 연산과정이 많이 들어가기에 , 알고리즘의 성능 저하
- 여기서 np.dot은 numpy라는 파이썬 라이브러리를 통한 내장 함수로써, w , x를 벡터화 해주는 역할을 수행.
- 벡터의 형태로 계산하면, 병렬적 연산,
- cpu보다 gpu가 훨씬 잘합니다.
- --> cpu보다 그래픽카드가 인공지능 연산에 훨씬 유리

Two models of python library

- Scikit-learn library

⇒machine learning

⇒easy and simple exercise model

⇒We can develop cyber security project using Python

- Python TensorFlow library

=>Basic deep learning

Two models of python library

- **Scikit-Learn,**

Understanding and utilizing basic machine learning algorithms and model training and evaluation using Scikit-Learn

- **TensorFlow**

Fundamentals of deep learning using TensorFlow/Keras will help you perform data analysis and modeling more effectively.

Two models of python library

- Python TensorFlow library

=>Basic deep learning

⇒We can develop cyber security project using TensorFlow with diverse exercise model

Scikit-learn

machine learning and data modeling library for Python

Scikit-learn

Scikit-learn

- **Scikit-learn, also known as sklearn,**

is an open-source, machine learning and data modeling library for Python.

- **We can use Scikit-learn under Python**
- **Environment**
- **Scikit-learn is designed to interoperate with the Python libraries, NumPy and SciPy.**

Python libraries

NumPy is a powerful library in Python used for numerical computing.

It provides support for arrays, matrices, and a wide range of mathematical functions to operate on these data structures

Python libraries

SciPy[sa/I pai] is an open-source Python library used for scientific and technical computing.

It builds on NumPy and provides a large number of additional functions and tools for various scientific tasks

Python libraries

Pandas[pae/ndes] is very useful when dealing with datasets because it makes data analysis and preprocessing much easier.

In particular, it is very helpful for easily manipulating data using data frames, handling missing values, and dealing with various data formats.

Scikit-learn

- You can pass NumPy arrays and Pandas dataframes directly to Scikit-learn's algorithms.

- It provides a comprehensive set of supervised and unsupervised learning algorithms, covering areas such as:

How to install Python Machine Learning library

Installing scikit-learn

There are two ways in which you can install scikit-learn on your personal device:

By using the **Anaconda** method

By using the **pip method**

Installing the latest release

pip | conda

Windows | macOS | Linux

Python 3 is usually installed by default on most Linux distributions. To check if you have it installed, try:

```
$ python3 --version
$ pip3 --version
```

If you don't have Python 3 installed, please install `python3` and `python3-pip` from your distribution's package manager.

Now create a virtual environment (venv) and install scikit-learn. Note that the virtual environment is optional but strongly recommended, in order to avoid potential conflicts with other packages.

```
$ python3 -m venv sklearn-env
$ source sklearn-env/bin/activate  # activate
$ pip3 install -U scikit-learn
```

In order to check your installation, you can use:

```
$ python3 -m pip show scikit-learn  # show scikit-learn version and location
$ python3 -m pip freeze             # show all installed packages in the environment
$ python3 -c "import sklearn; sklearn.show_versions()"
```

https://scikit-learn.org/stable/install.html

conda-forge / packages / **scikit-learn**

- Installers
- **Info:** This package contains files in non-standard labels.
- linux-ppc64le v1.5.1
- linux-aarch64 v1.5.1
- linux-64 v1.5.1
- osx-arm64 v1.5.1
- osx-64 v1.5.1
- win-64 v1.5.1

https://anaconda.org/conda-forge/scikit-learn/labels

conda install

- To install this package run one of the following:
  conda install conda-forge::scikit-learn
  conda install conda-forge/label/broken::scikit-learn
  conda install conda-forge/label/cf201901::scikit-learn
  conda install conda-forge/label/cf202003::scikit-learn
  conda install conda-forge/label/gcc7::scikit-learn
  conda install conda-forge/label/rc::scikit-learn
  conda install conda-forge/label/scikit-learn_rc::scikit-learn

https://anaconda.org/conda-forge/scikit-learn

Installing scikit-learn

There are different ways to install scikit-learn:
Install the latest official release. This is the best approach for most users. It will provide a stable version and pre-built packages are available for most platforms.
Install the version of scikit-learn provided by your operating system or Python distribution. This is a quick option for those who have operating systems or Python distributions that distribute scikit-learn. It might not provide the latest release version.
Building the package from source. This is best for users who want the latest-and-greatest features and aren't afraid of running brand-new code. This is also needed for users who wish to contribute to the project.

Scikit-learn installation manually

1. Check Python installation
Scikit-learn is a library of Python
check Python installation

python --version

2. Check pip installation
pip is a Python package management tool. To check if pip is installed, type the following command:

pip –version

Python을 설치하면 기본적으로 pip도 함께 설치됩니다.

Scikit-learn installation manually

3. Install Scikit-learn:

pip install scikit-learn

Once the installation is complete, open the Python interpreter and type the following code to verify that the installation was successful:

python

import sklearnprint(sklearn.__version__)

4. Install the required libraries

By default, you can install Scikit-learn with just NumPy and SciPy, but for a better user experience, it is recommended to consider additional libraries.

pip install numpy scipy scikit-learn

This will install all the required libraries.

Scikit-learn installation manually

5. Pandas

Pandas is not required to use Scikit-learn.

Since Scikit-learn can process data using NumPy arrays, you can train models and make predictions without Pandas.

pip install pandas