Artificial Intelligence

Introduction

한양대학교 ERICA
소프트웨어융합대학
COLLEGE OF COMPUTING

인공지능학과
Department of
Artificial Intelligence

정 우 환 (whjung@hanyang.ac.kr)

Fall 2022

HANYANG UNIVERSITY

Data Science Lab

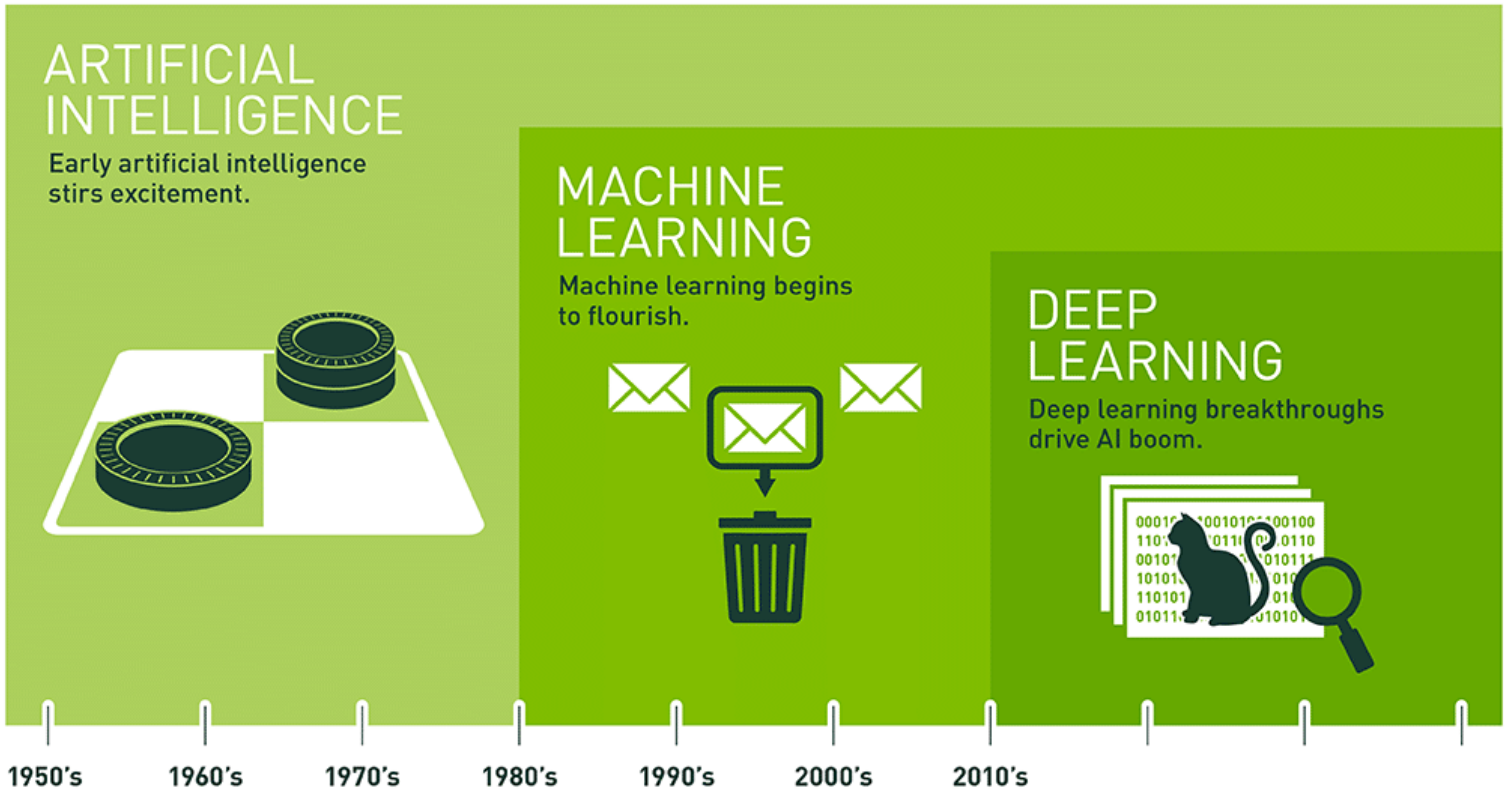
Class overview

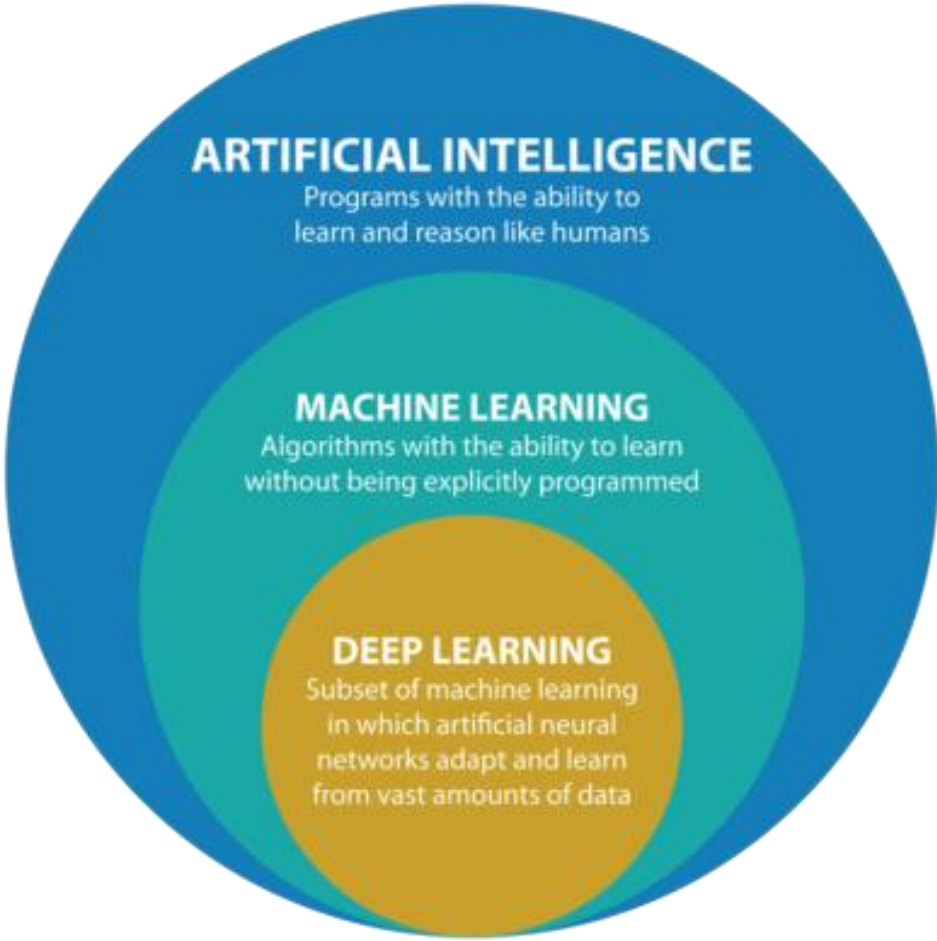
Data Science Lab

- 선수과목
  - Programming
  - Probability theory
  - Linear algebra
- 평가
  - 출석: 10%
  - 과제: 10%
  - 중간: 30%
  - 기말: 30%
  - (개인)프로젝트: 20%

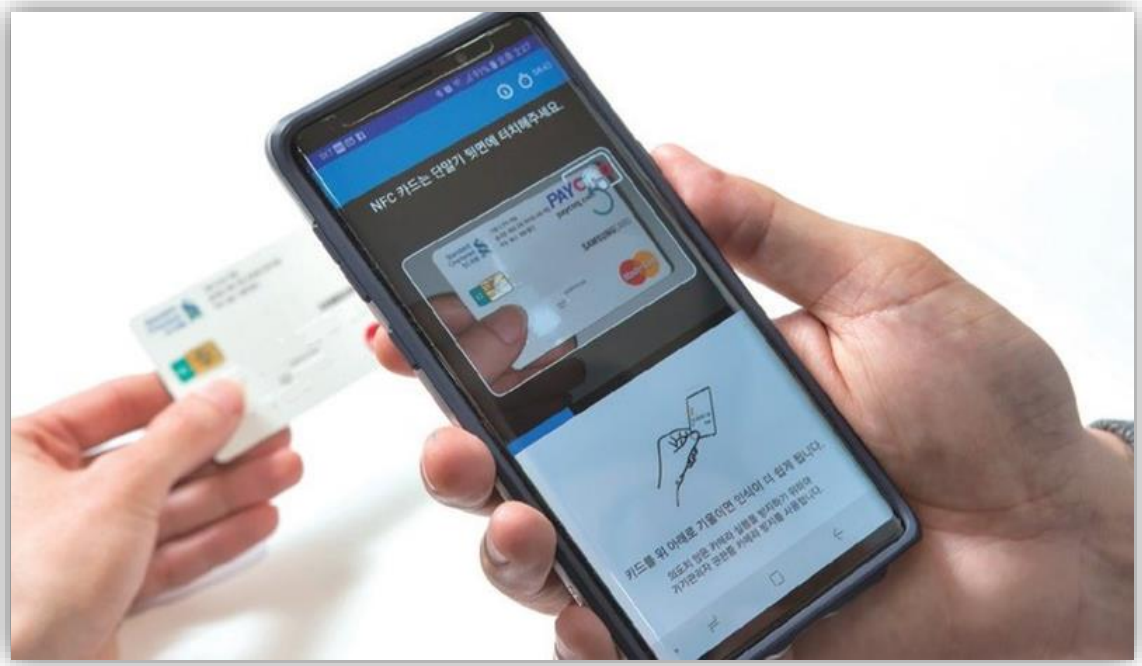
- 조교
  - 이동준 (foldtwice@hanyang.ac.kr)

- 강의시간 및 장소
  - 화 13:00~14:30 제1공학관 **509호**
  - 목 13:00~14:30 제1공학관 **203호**

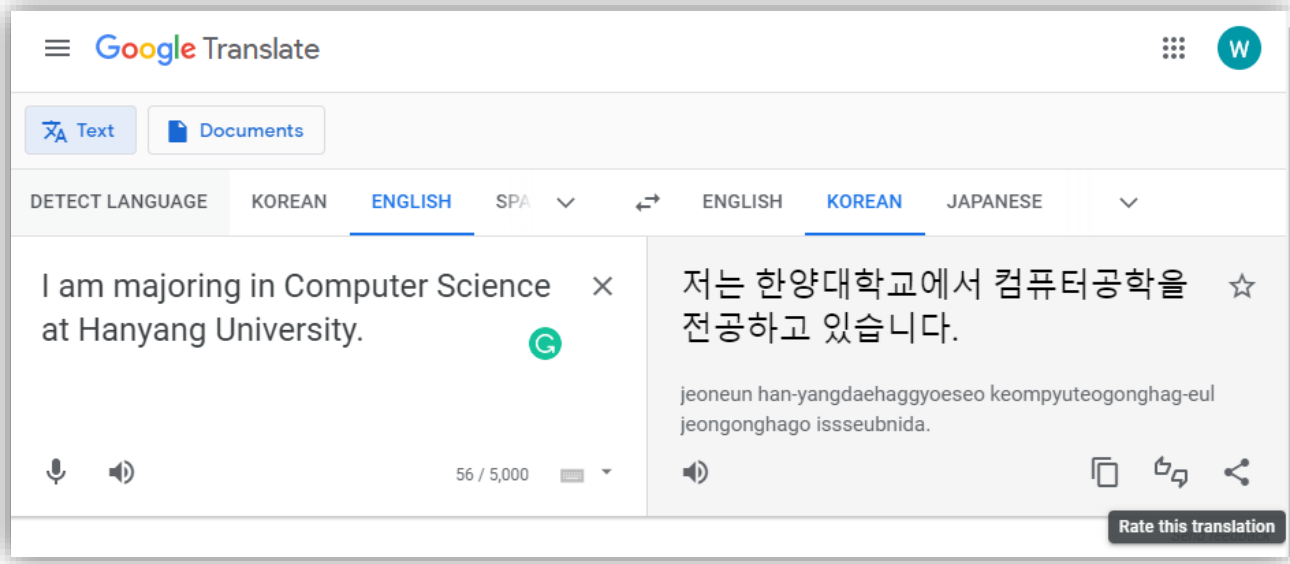




Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.



Computer vision



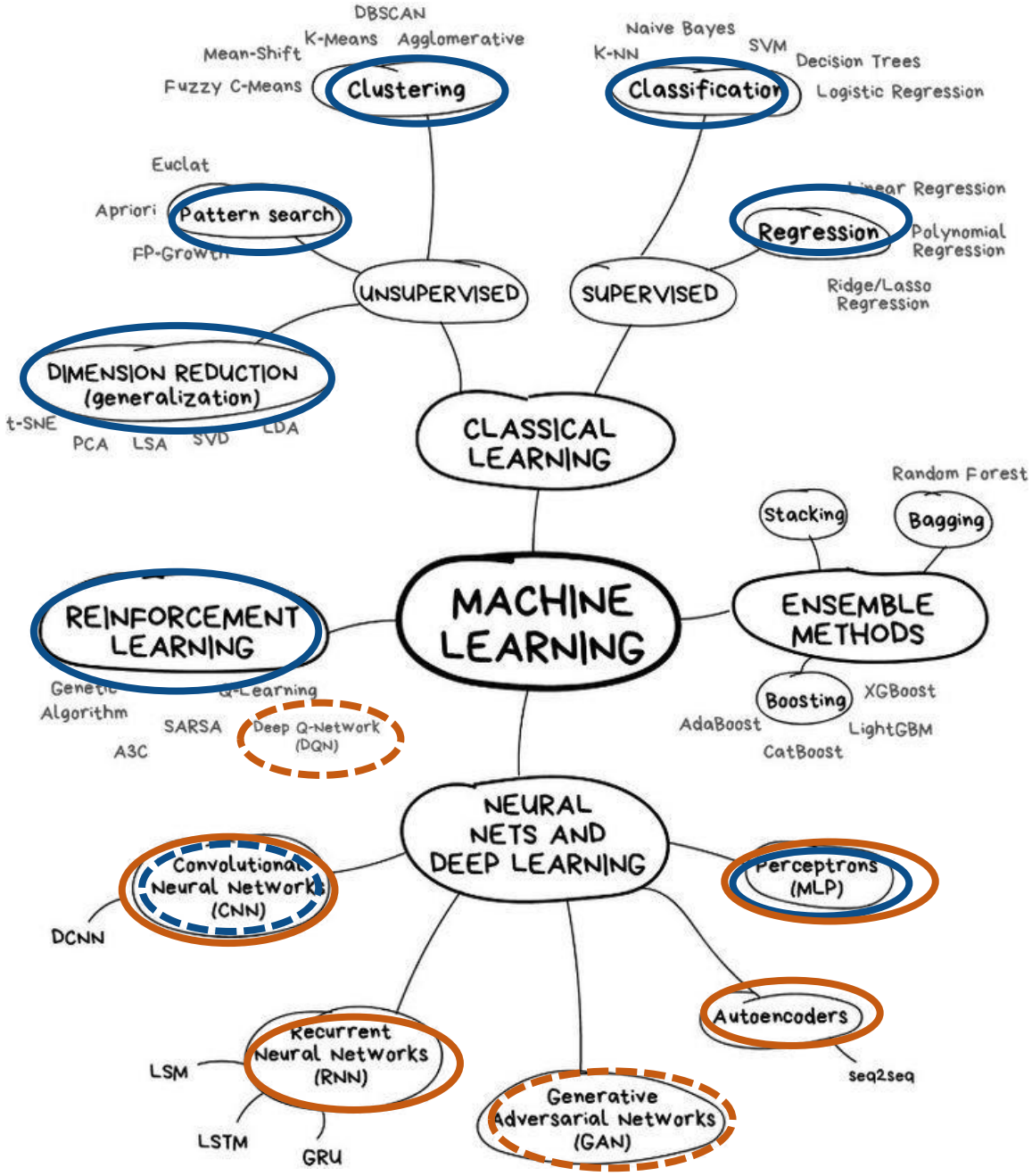
Natural language processing

3학년 인공지능

K-NN
Naïve bayes
Apriori
K-means
PCA
SVM
Reinforcement learning

4학년 딥러닝

Linear regression
Logistic regression
MLP
CNN
RNN
Seq2Seq
Transformer
ViT
GAN
Deep Q-learning



강의계획서

- 순서, 범위 바뀔 수 있음

주별 강의계획 및 과제

주(회)차	주제	활동사항
1주(회)차	강좌 오리엔테이션/ 인공지능 개요	오리엔테이션
2주(회)차	이론적 기초	확률/선형대수
3주(회)차	회귀	선형회귀, Gradient descent
4주(회)차	분류	Naive Bayes/K-NN
5주(회)차	분류	로지스틱 회귀
6주(회)차	커널 기법	-Kernel density estimation, kernel 회 귀
7주(회)차	중간 프로젝트	중간 프로젝트
8주(회)차	뉴럴 네트워크	Backpropagation
9주(회)차	정규화	L1,L2 regularization
10주(회)차	비지도학습	클러스터링/PCA
11주(회)차	비지도학습	클러스터링/PCA
12주(회)차	강화학습	강화학습
13주(회)차	강화학습	강화학습
14주(회)차	기말 프로젝트 발표	프로젝트 발표
15주(회)차	기말 고사	기말고사
16주(회)차	예비일	예비일

Python Environment Setup for Deep Learning

Anaconda

PyTorch

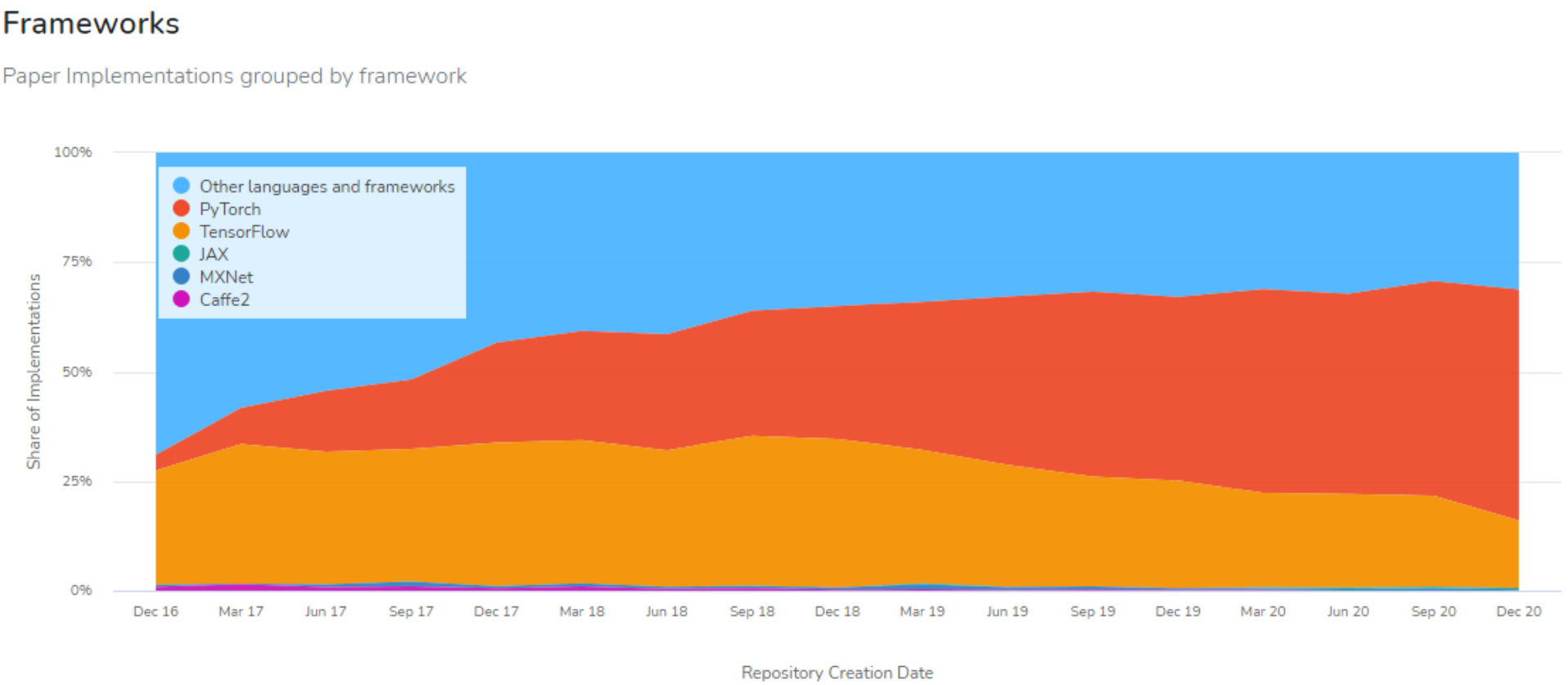
Jupyter Notebook

Pycharm

Installation order

- Anaconda
  - Installation: https://www.anaconda.com/products/individual
- PyTorch
  - Deep learning framework
  - Download: https://pytorch.org/get-started/locally/
- PyCharm
  - IDE
  - Download: https://www.jetbrains.com/ko-kr/pycharm/download
- Jupyter
  - A powerful tool for interactively developing and presenting data science projects
  - Installation: https://jupyter.org/install

Why PyTorch?



Others

PyTorch

Tensorflow

https://paperswithcode.com/

Anaconda

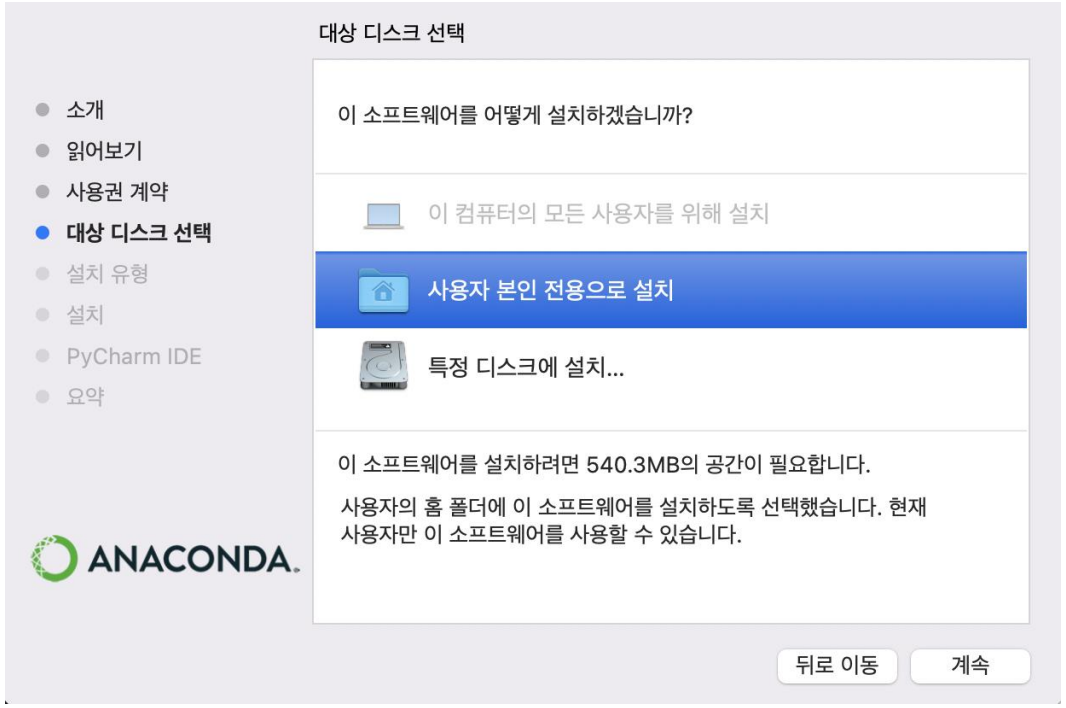
- 가상 환경 (가상머신X) 구축
- 데이터과학에 특화
- 패키지 설치 및 관리가 쉬움

- 터미널 접속
  - Windows
    - 작업표시줄 검색 → Anaconda Prompt
  - 기타 OS는 일반 terminal로 바로 접속

Anaconda Install

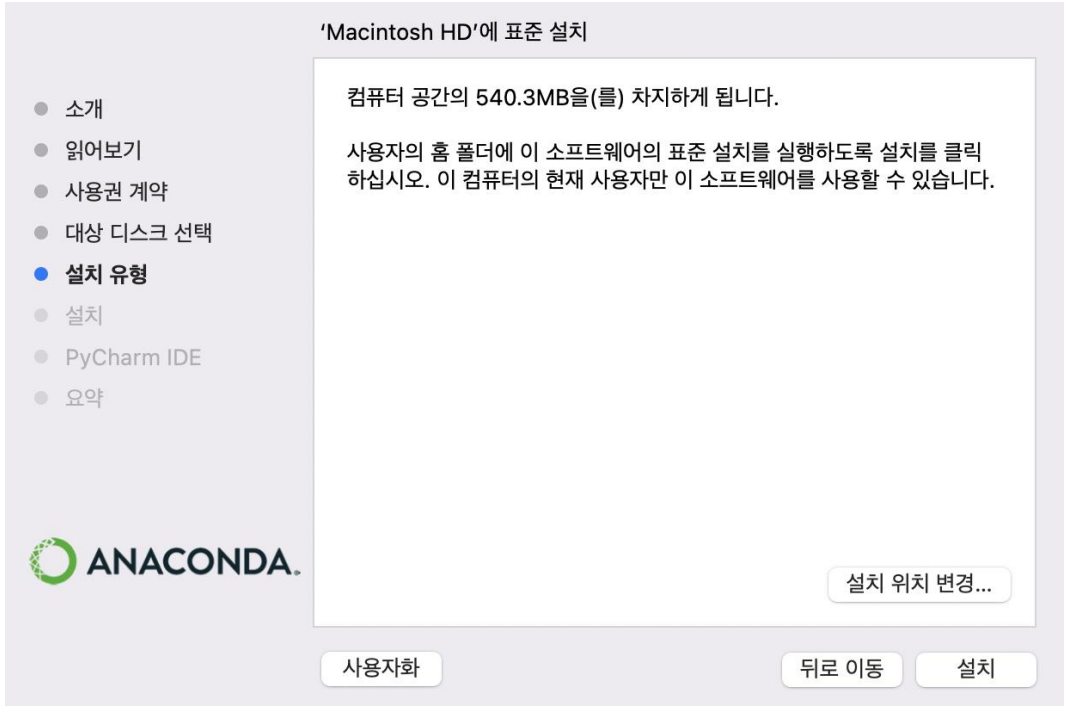
OS, 하드웨어에 맞게 다운로드

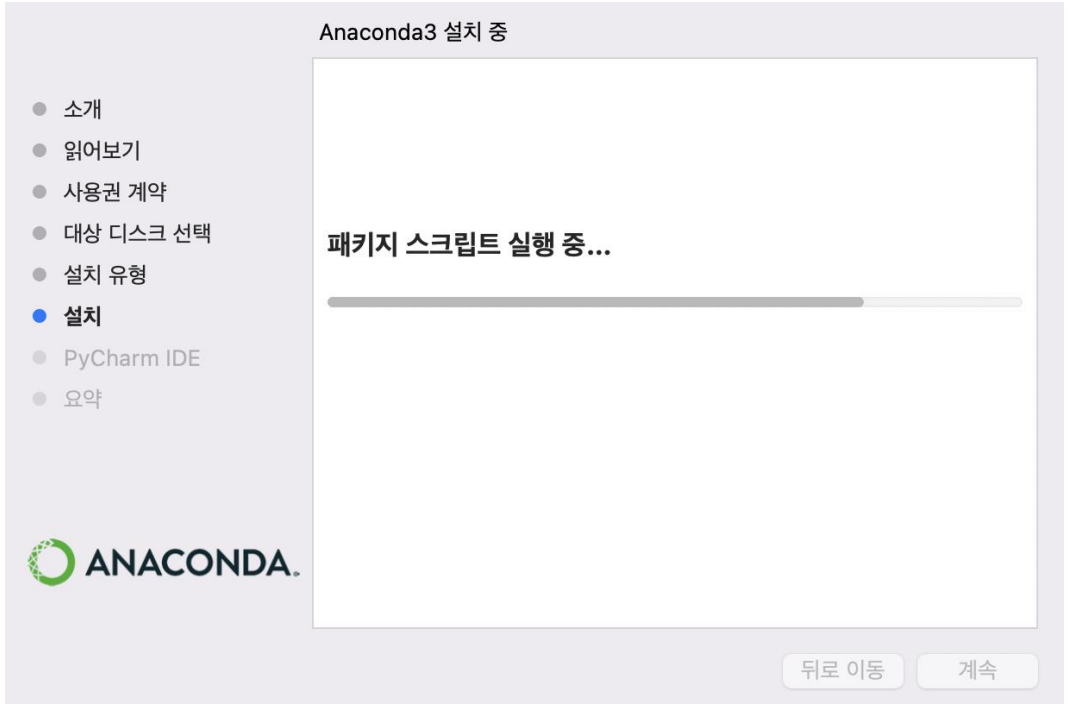
Anaconda Install - Mac



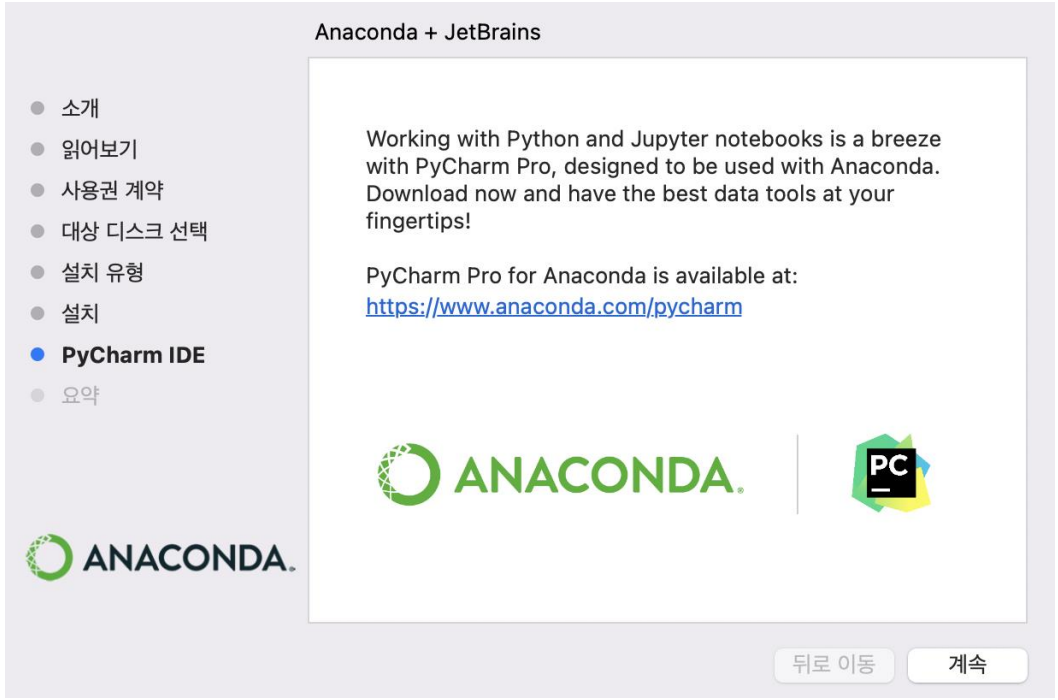
- 사용권 계약에서 '계속'을 눌러 동의
- 설치하고자 하는 디스크 선택

Anaconda Install - Mac





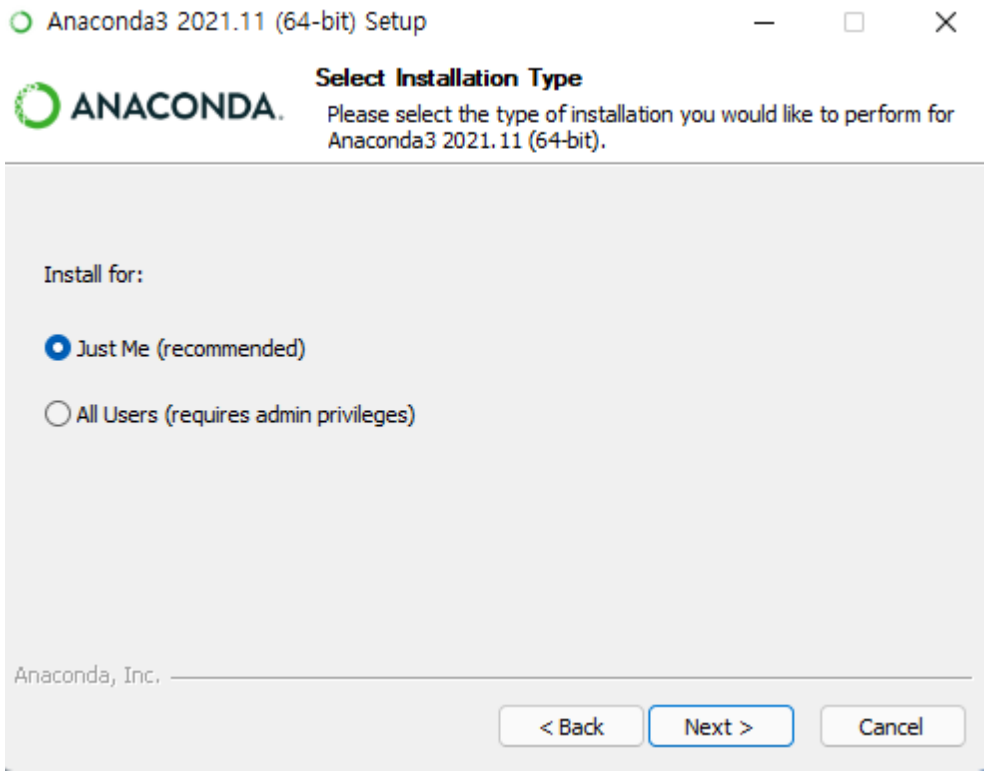
Anaconda Install - Mac

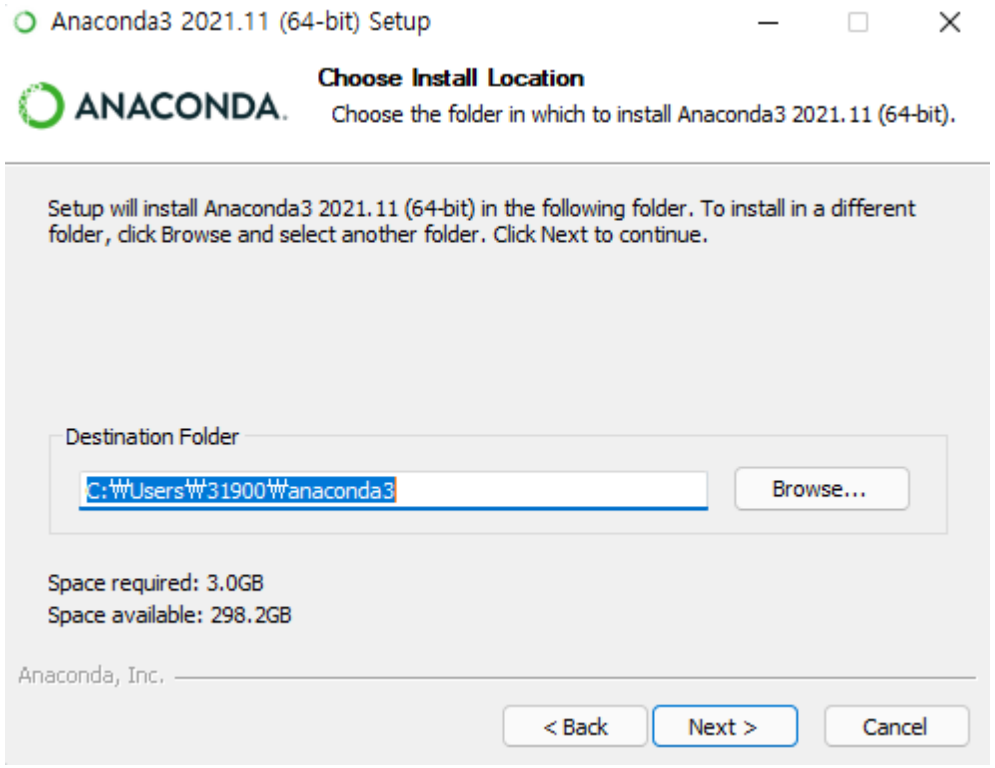


- 설치 완료 후 새 터미널에서 다음을 입력

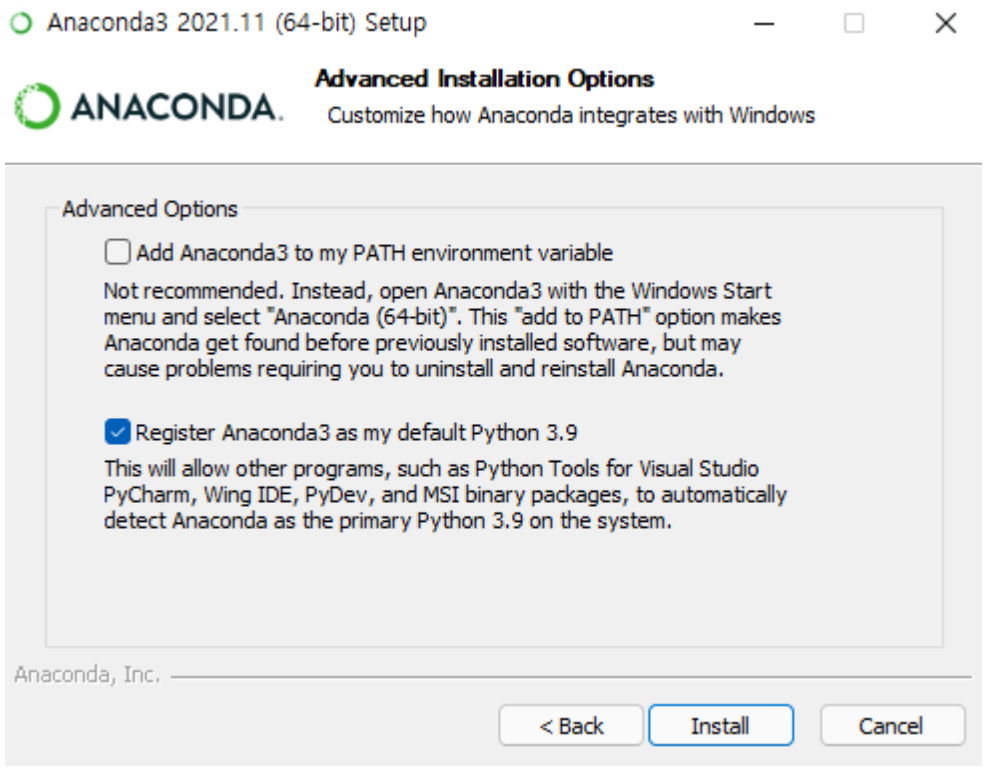
```
conda --version

conda update conda
```

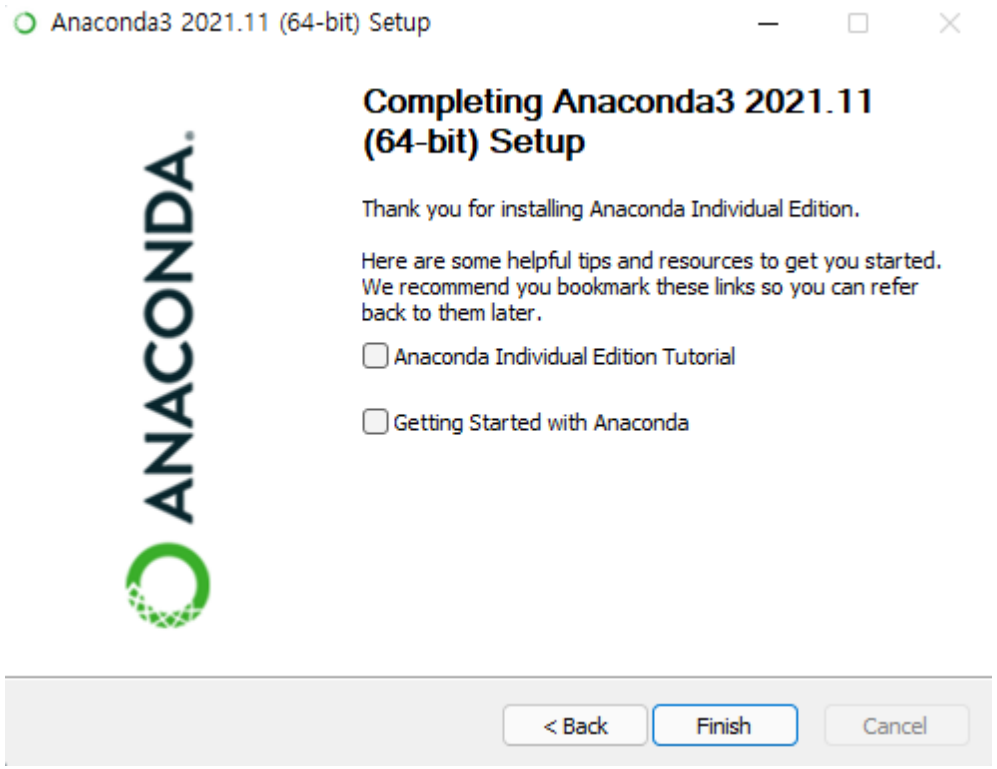
Anaconda Install - Windows



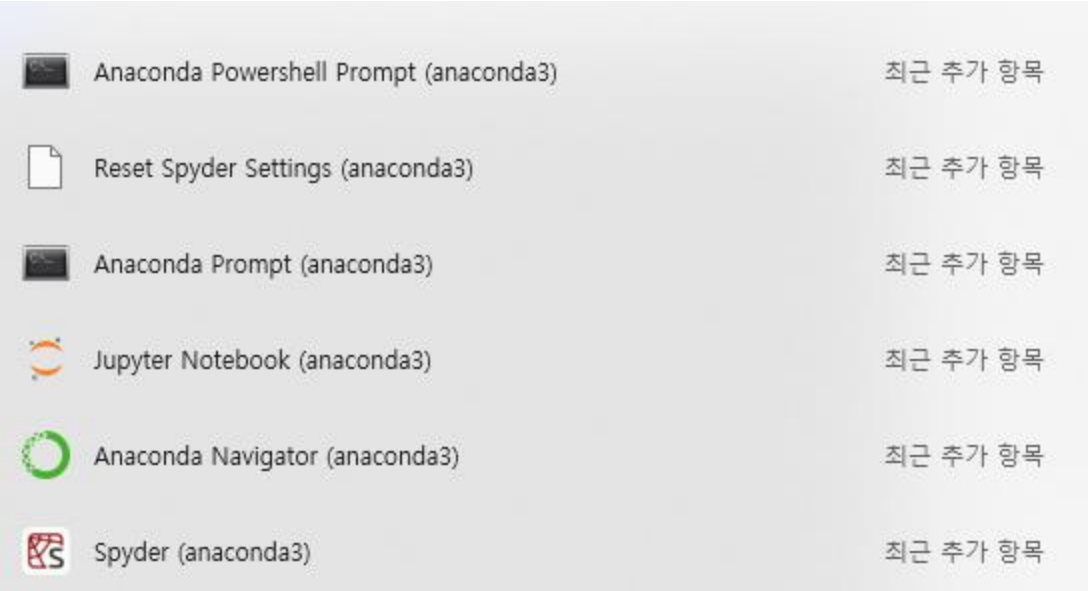


Anaconda Install - Windows





Anaconda Install - Windows



- 설치 완료 후 Anaconda Prompt에서 다음을 입력

```
conda --version
conda update conda
```

Anaconda

- 가상환경 확인

conda env list

```
(base) nykim@gimnayeon-ui-MacBookAir ~ % conda env list
# conda environments:
#
base                  *  /Users/nykim/opt/anaconda3
finbert                  /Users/nykim/opt/anaconda3/envs/finbert
pythonProject            /Users/nykim/opt/anaconda3/envs/pythonProject
pytorch                  /Users/nykim/opt/anaconda3/envs/pytorch
warc                     /Users/nykim/opt/anaconda3/envs/warc
```

Anaconda

- 가상환경 생성 (version 설정은 optional)

conda create –n <ENV_NAME> (python=3.8)

```
(base) nykim@gimnayeon-ui-MacBookAir ~ % conda create -n test python=3.7
Collecting package metadata (current_repodata.json): done
Solving environment: done


==> WARNING: A newer version of conda exists. <==
  current version: 4.10.3
  latest version: 4.12.0

Please update conda by running

    $ conda update -n base -c defaults conda



## Package Plan ##
```

Anaconda

- 가상환경 접속

conda activate <ENV_NAME>

```
(base) nykim@gimnayeon-ui-MacBookAir ~ % conda activate test
(test) nykim@gimnayeon-ui-MacBookAir ~ %
```

- 접속 중인 가상환경에서 나오기

conda deactivate

```
(test) nykim@gimnayeon-ui-MacBookAir ~ % conda deactivate
(base) nykim@gimnayeon-ui-MacBookAir ~ %
```

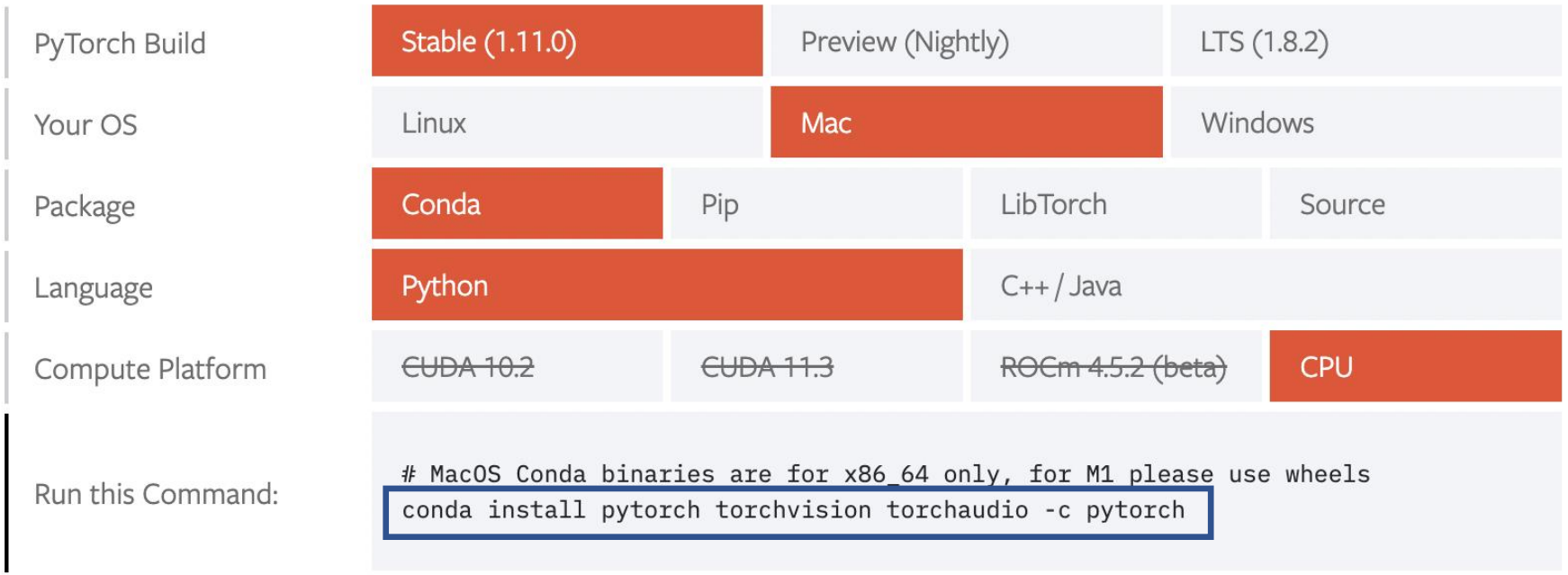
Anaconda

- 가상환경 삭제

conda env remove -n <ENV_NAME>

```
(base) nykim@gimnayeon-ui-MacBookAir ~ % conda env remove -n test

Remove all packages in environment /Users/nykim/opt/anaconda3/envs/test:

(base) nykim@gimnayeon-ui-MacBookAir ~ % conda env list
# conda environments:
#
base                  *  /Users/nykim/opt/anaconda3
finbert                  /Users/nykim/opt/anaconda3/envs/finbert
pythonProject            /Users/nykim/opt/anaconda3/envs/pythonProject
pytorch                  /Users/nykim/opt/anaconda3/envs/pytorch
warc                     /Users/nykim/opt/anaconda3/envs/warc
```

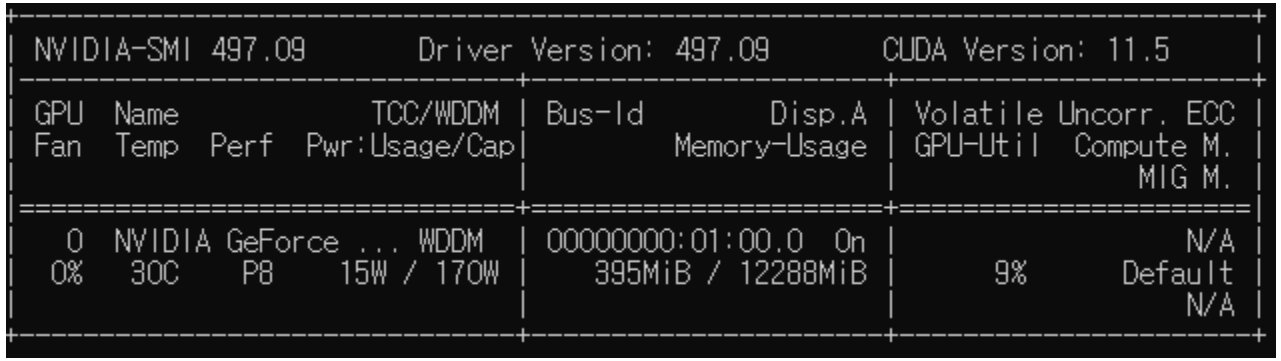
PyTorch



conda 가상환경 접속 후 OS, Compute Platform 등에 맞게 설치

PyTorch – GPU

1. Nvidia-smi로 설치된 그래픽 드라이버 확인 : 커맨드 창에 nvidia-smi



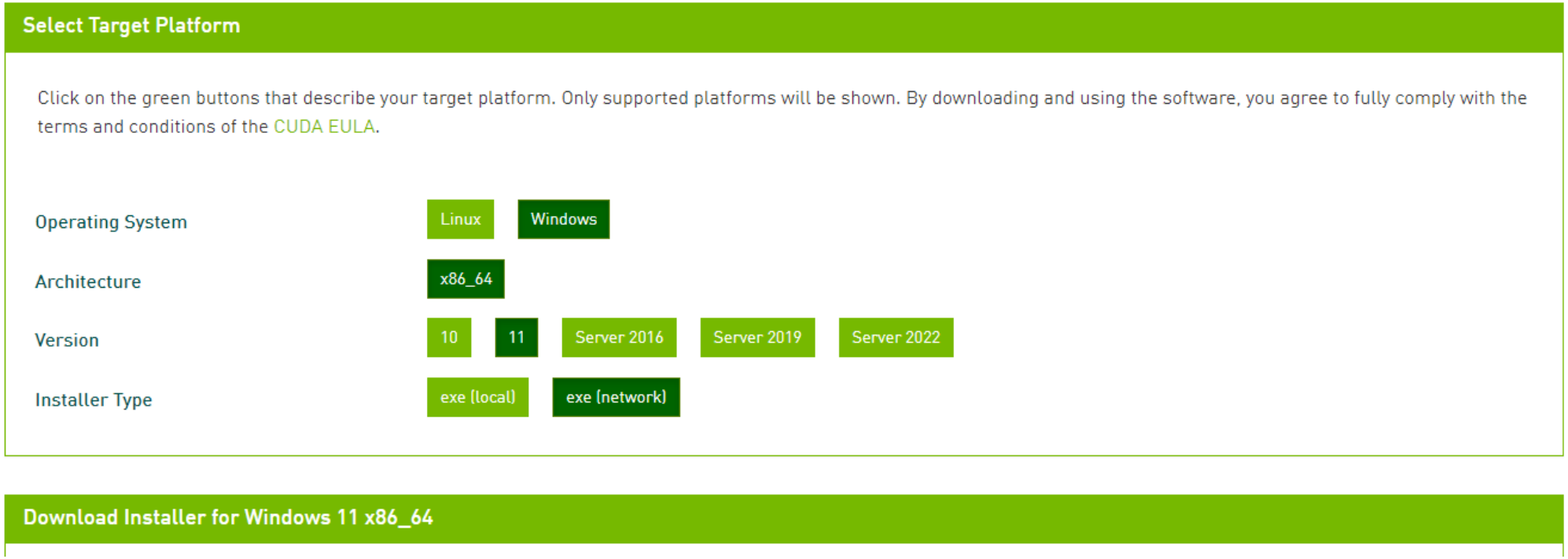
nvidia-smi 없으면 그래픽 드라이버 설치

→ https://www.nvidia.com/Download/index.aspx?lang=kr

설치할 CUDA 버전 확인

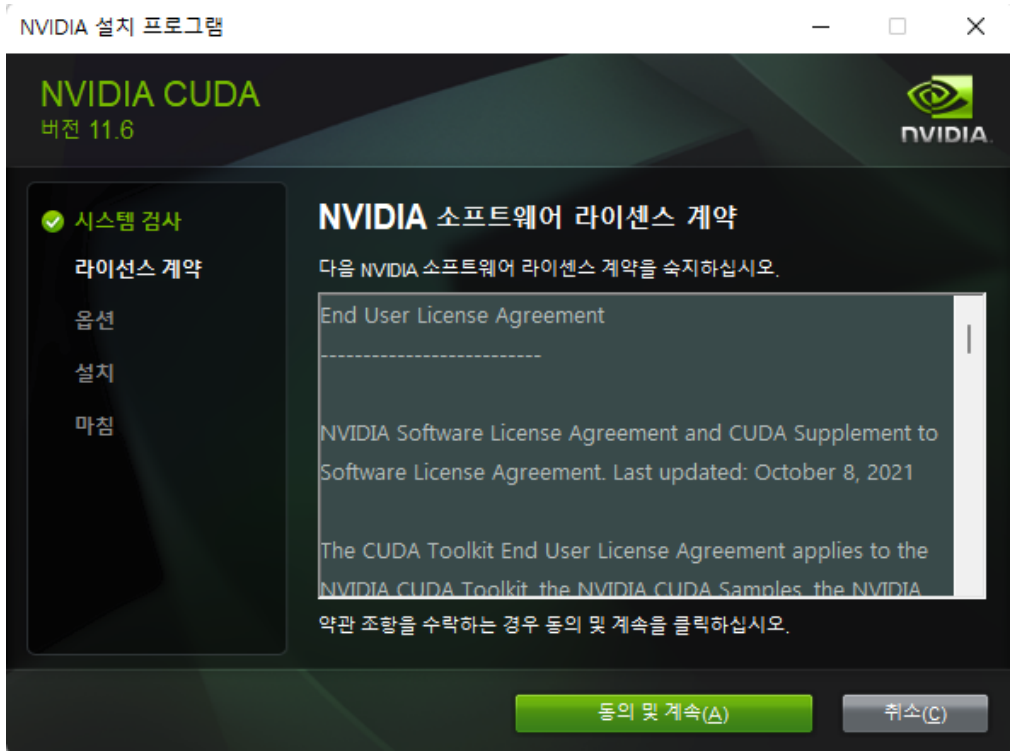
PyTorch – GPU

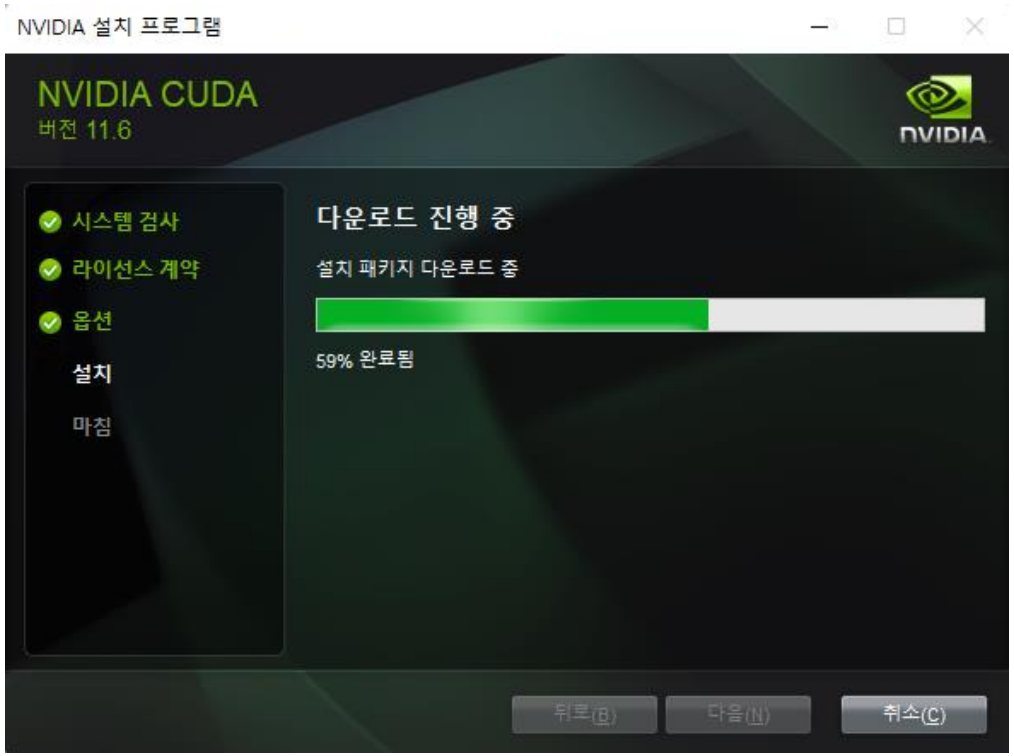
2. CUDA 설치
   https://developer.nvidia.com/cuda-toolkit-archive
   자신의 컴퓨터와 맞는 CUDA toolkit 다운로드



PyTorch – GPU

3. 설치 시작(다시 시작 필요)





PyTorch – GPU

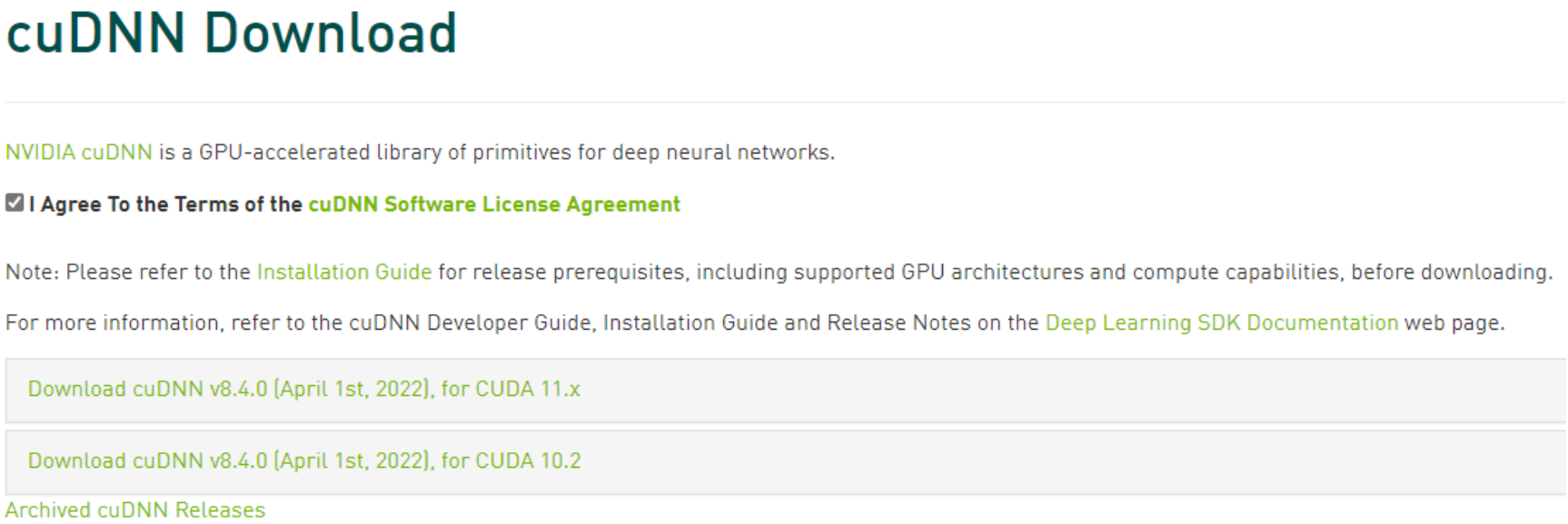
4. 설치 완료 후 다시 시작


```
C:₩Users₩31900>nvcc --version
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2022 NVIDIA Corporation
Built on Tue_Mar__8_18:36:24_Pacific_Standard_Time_2022
Cuda compilation tools, release 11.6, V11.6.124
Build cuda_11.6.r11.6/compiler.31057947_0
```

터미널 열어 nvcc –-version으로 설치 확인

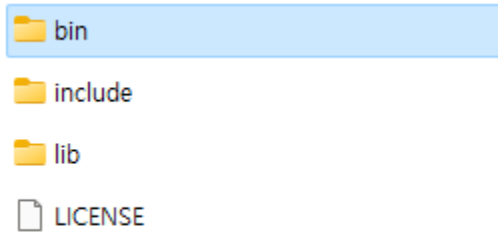
PyTorch – GPU

5. cuDNN 설치(nvidia 로그인 필요) : https://developer.nvidia.com/cudnn
   컴퓨터, CUDA 버전에 맞는 cuDNN 다운로드



PyTorch – GPU

6. 다운받은 파일 압축 해제



7. bin, include 폴더 안의 파일들을 각각 (버전은 다를 수 있음)

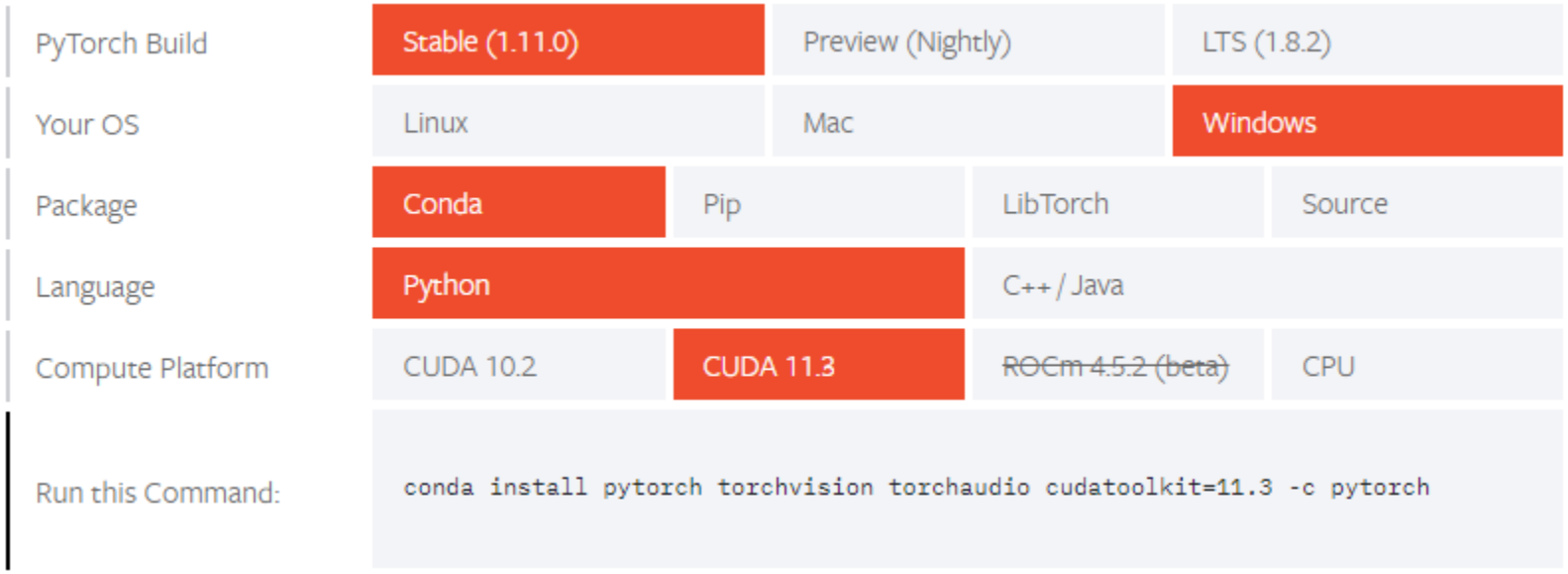
C:₩Program Files₩NVIDIA GPU Computing Toolkit₩CUDA₩v11.6₩include
C:₩Program Files₩NVIDIA GPU Computing Toolkit₩CUDA₩v11.6₩bin
에 복사하기

8. Lib 폴더 안의 파일들은

C:₩Program Files₩NVIDIA GPU Computing Toolkit₩CUDA₩v11.6₩extras₩CUPTI₩lib64 에 복사하기

PyTorch – GPU

9. 버전에 맞는 커맨드 복사하기



PyTorch – GPU

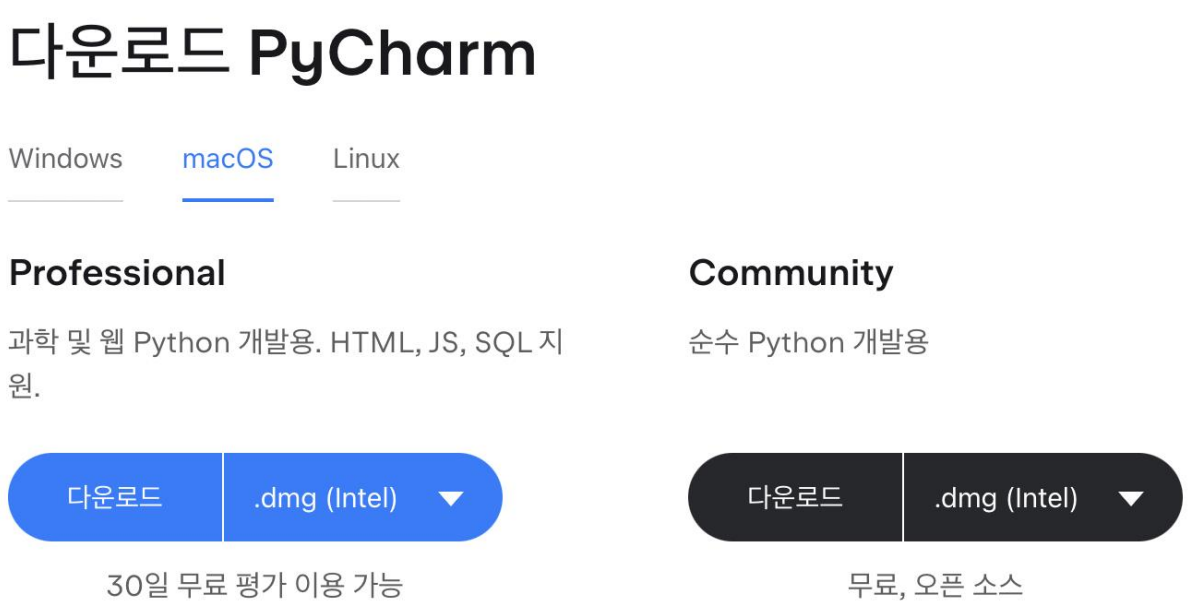
9. 설치하고자 하는 conda environment에 접속하고 해당 커맨드 붙여 넣기 하여 설치

```
(pytorch) C:₩Users₩31900>conda install pytorch torchvision torchaudio cudatoolkit=11.3 -c pytorch
```

10. 다음을 입력하여 오류가 나지 않는지 확인

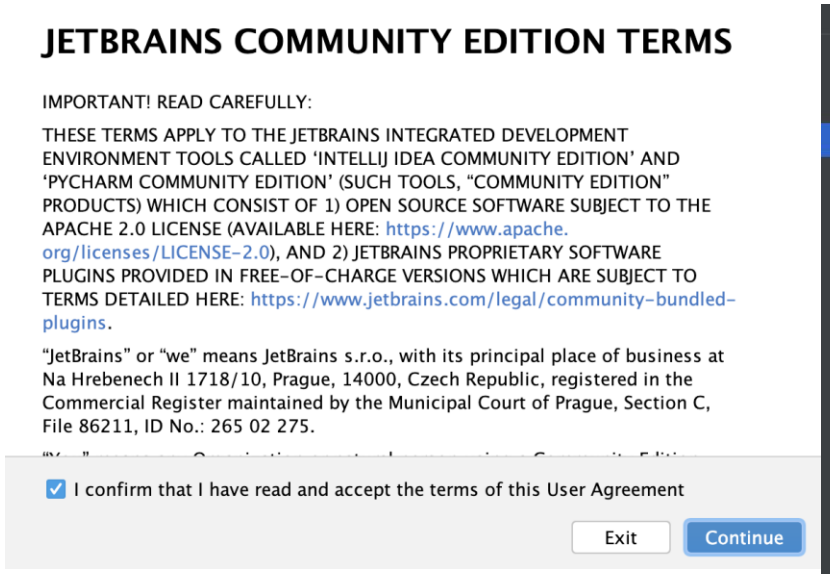
```
>>> import torch
>>> device = torch.device("cuda:0")
>>> device
device(type='cuda', index=0)
```

PyCharm



OS, 하드웨어에 맞는 것으로 다운로드/설치

PyCharm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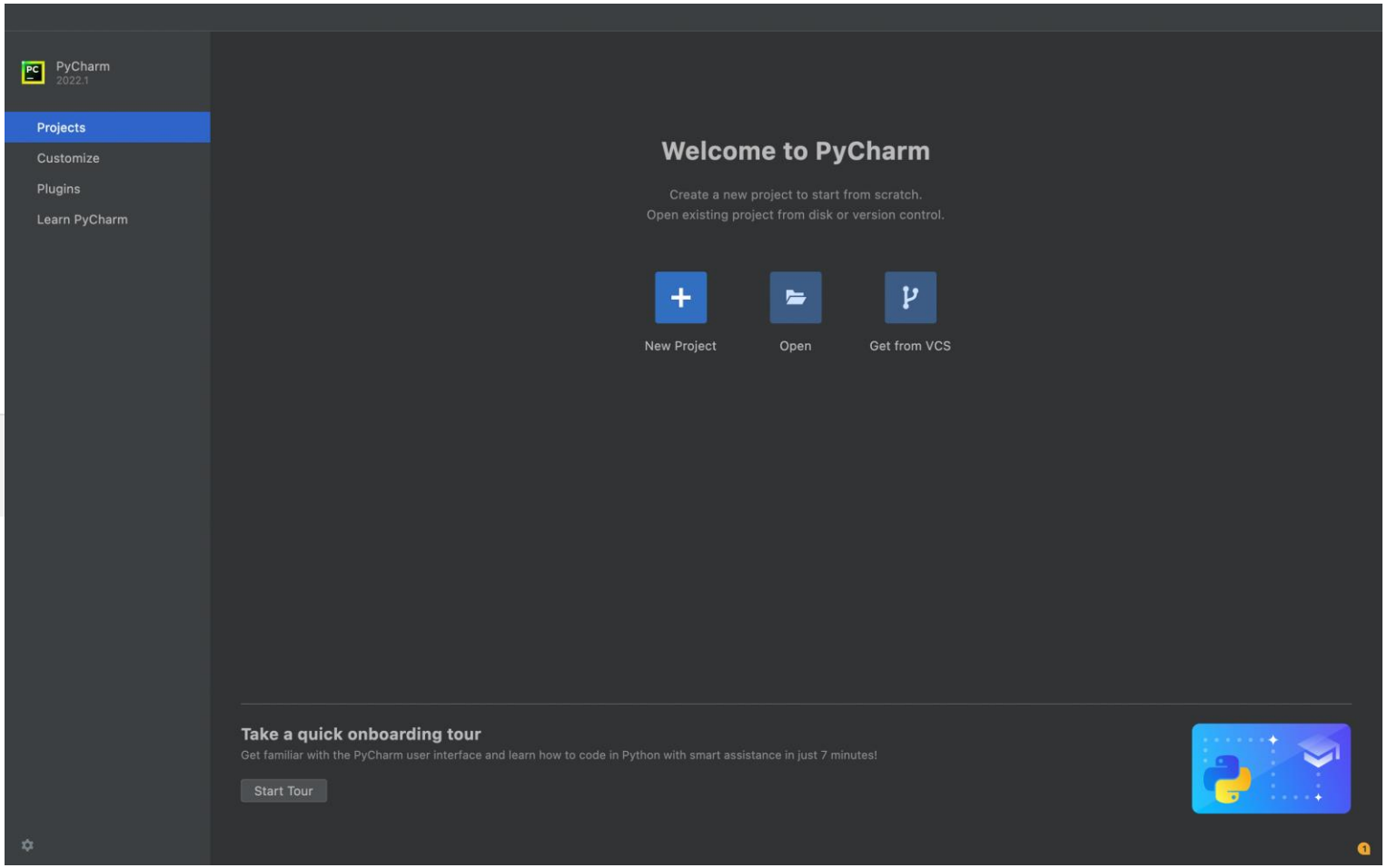
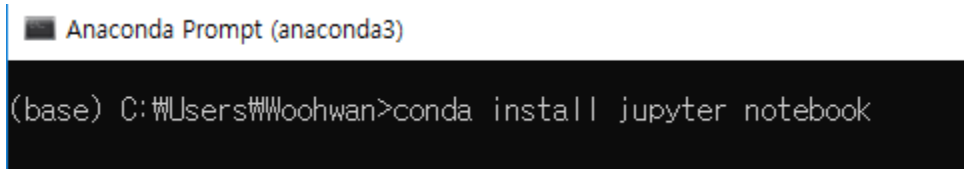
I confirm that I have read and accept the terms of this User Agreement
Exit
Continue


PyCharm
2022.1
Projects
Customize
Plugins
Learn PyCharm
Welcome to PyCharm
Create a new project to start from scratch.
Open existing project from disk or version control.
New Project
Open
Get from VCS
Take a quick onboarding tour
Get familiar with the PyCharm user interface and learn how to code in Python with smart assistance in just 7 minutes!
Start Tour

Jupyter notebook

- A powerful tool for interactively developing and presenting data science projects
- 설치
  - `conda install jupyter notebook`
- 실행
  - `jupyter notebook`
  - 자동으로 브라우저가 뜨지 않는 경우: 127.0.0.1:8888 로 접속

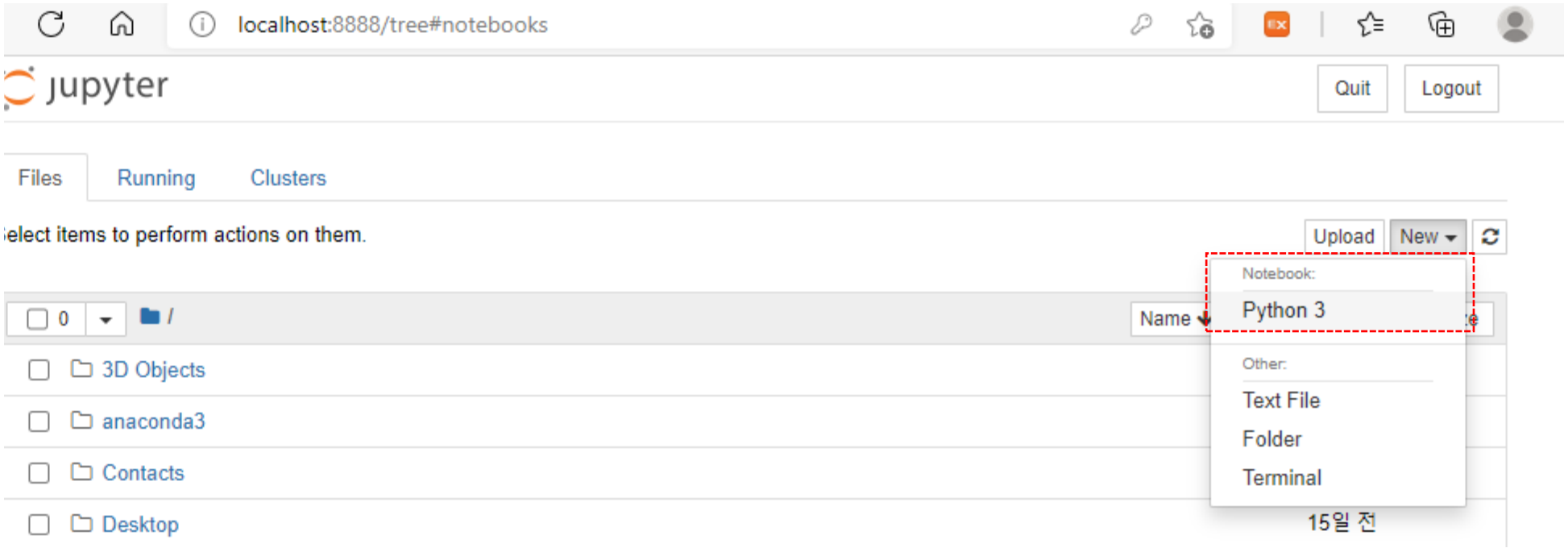


Libraries

- Conda 가상환경에 접속하여 다음을 입력
  - `conda install scipy`

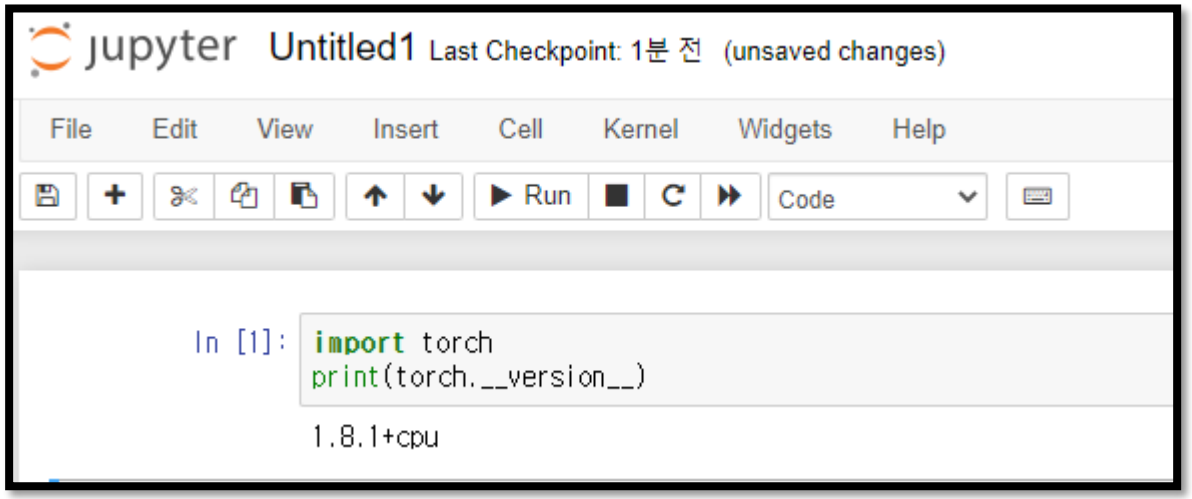
설치 확인

- 1. jupyter notebook 실행
- 2. 새 notebook file 열기 (New -> Python 3)



설치 확인

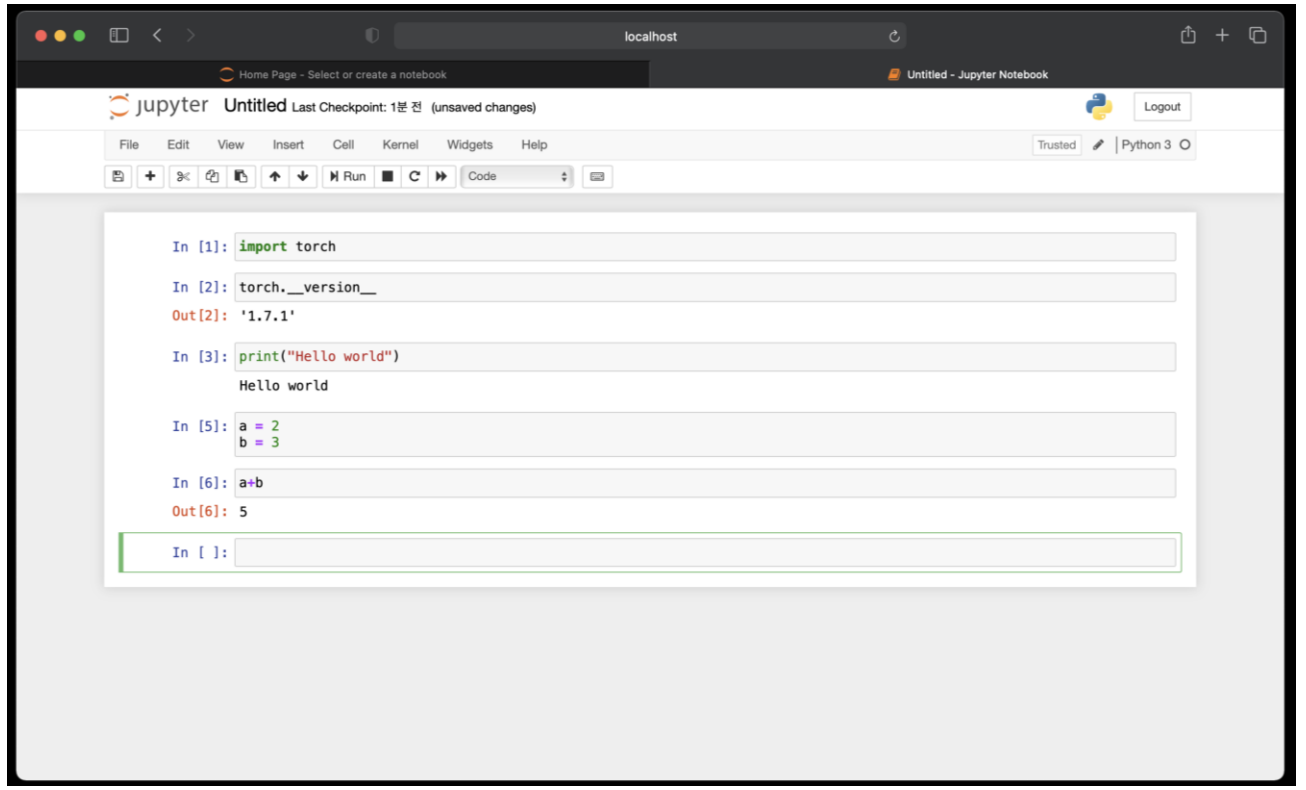
- 3. 오른쪽 코드 입력 후 실행
  - 실행 (shift + enter)
  - 줄바꿈 (enter)



- 4. Torch version이 출력되면 정상

공지1: Homework 1

- 1) Open jupyter notebook
- 2) Import torch
- 3) Print torch version
- 4) Do some operations
  - E.g.) Assign, add, print
- 제출: 2022/9/5



공지2: 휴강

- 학회출장으로 다음주 화, 목 휴강
- 보강은 녹화강의 또는 16주차수업으로 대체