

## PyTorch and CUDA installation

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### Brief introduction:

For Windows, Mac, & Linux systems, PyTorch framework can be installed with the respective version based on your machine GPU type. However, NVIDIA GPUs currently don't support Macbook and IOS systems. Hence, if you are using Mac, you may use CPU instead of GPU to conduct computational tasks.

However, using the CPU is a bit tough to execute deep learning codes elegantly for its low efficiency. For students without NVIDIA GPUs, students are encouraged to use the **Colab platform** with free resources of the **T4 GPU** to use.

## CUDA

CUDA is a parallel computing platform and programming model created by NVIDIA. It allows developers to utilize the power of NVIDIA GPUs for general-purpose computing. By offloading computationally intensive tasks from the CPU to the GPU, CUDA can significantly speed up data processing. It provides a set of tools and libraries that enable developers to write programs in languages like C, C++, and Fortran to run on GPUs. In the context of deep learning, frameworks like PyTorch can integrate with CUDA to accelerate the training and inference of neural networks, leveraging the GPU's parallel processing capabilities to achieve faster results.

First, you need to check your NVIDIA GPU support CUDA version by right-clicking your desktop and choosing the NVIDIA control panel (NVIDIA 控制面板) shown below to check your GPU Driver version and use the command **nvidia-smi** to check the corresponding CUDA version.



```
(C:\V3141) C:\Users\Administrator>nvidia-smi
Thu Mar  6 23:18:43 2025

+-----+
| NVIDIA-SMI 560.94                  Driver Version: 560.94      CUDA Version: 12.6     |
+-----+-----+
| GPU Name                               Driver-Model  Bus-Id          Disp.A    Volatile Uncorr. ECC  |
| Fan  Temp  Perf              Pwr:Usage/Cap     Memory-Usage  GPU-Util  Compute M. |
|                                           MIG M.       |
+-----+-----+
|  0  NVIDIA GeForce RTX 3080 Ti  WDDM          00000000:01:00:0 Off          N/A  |
|  0%   42C   P8              26W / 350W      10679MiB / 12288MiB      5%      Default  |
|                                           N/A          |
+-----+-----+

+-----+
| Processes: |
| GPU   GI    CI          PID    Type    Process name                        GPU Memory |
| ID    ID                                 Name                                Usage     |
+-----+-----+

```

To install CUDA for your personal computer with a GPU which is capable of the CUDA framework, you need to visit NVIDIA official website: <https://developer.nvidia.com/cuda-toolkit-archive> and download the CUDA packages which is compatible with your GPU driver and CUDA version.

## PyTorch

PyTorch is an open-source deep-learning framework developed by Facebook's AI Research lab. It offers a dynamic computational graph, which means the graph is built during runtime, providing high flexibility for researchers to experiment with new models and algorithms. With a Pythonic and intuitive API, it simplifies the process of building and training neural networks. PyTorch also supports automatic differentiation, which automatically computes gradients for efficient backpropagation. It includes pre-built neural network layers and optimization algorithms, making it suitable for various applications such as image recognition, natural language processing, and reinforcement learning.

To install PyTorch, please visit the official website <https://pytorch.org/> and copy the command that is recommended for your machine type such as operating system: Linux, Mac, or Windows; Compute Platform etc.

### INSTALL PYTORCH

Select your preferences and run the install command. Stable represents the most currently tested and supported version of PyTorch. This should be suitable for many users. Preview is available if you want the latest, not fully tested and supported, builds that are generated nightly. Please ensure that you have **met the prerequisites below (e.g., numpy)**, depending on your package manager. You can also **install previous versions of PyTorch**. Note that LibTorch is only available for C++.

**NOTE:** Latest PyTorch requires Python 3.9 or later.

PyTorch Build	Stable (2.6.0)			Preview (Nightly)	
Your OS	Linux		Mac	Windows	
Package	Conda	Pip		LibTorch	Source
Language	Python			C++ / Java	
Compute Platform	CUDA 11.8	CUDA 12.4	CUDA 12.6	ROCm 6.2.4	CPU
Run this Command:	pip3 install torch torchvision torchaudio --index-url https://download.pytorch.org/whl/cu118				

Previous versions of PyTorch >