Pytorch

A quick tour to basics of Pytorch and auto differentiation

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Which machine learning frameworks will be used in this course?

(A) scikit-learn

(B) TensorFlow

(C) PyTorch

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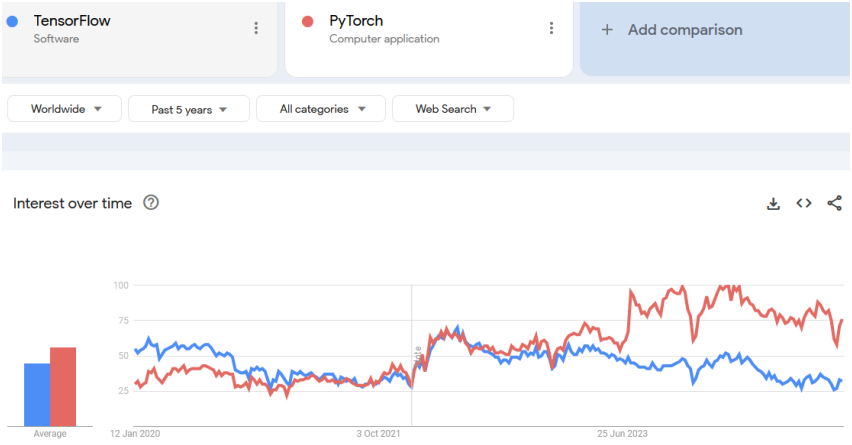
But why?

My job now is to convince you that we are going in the right direction.

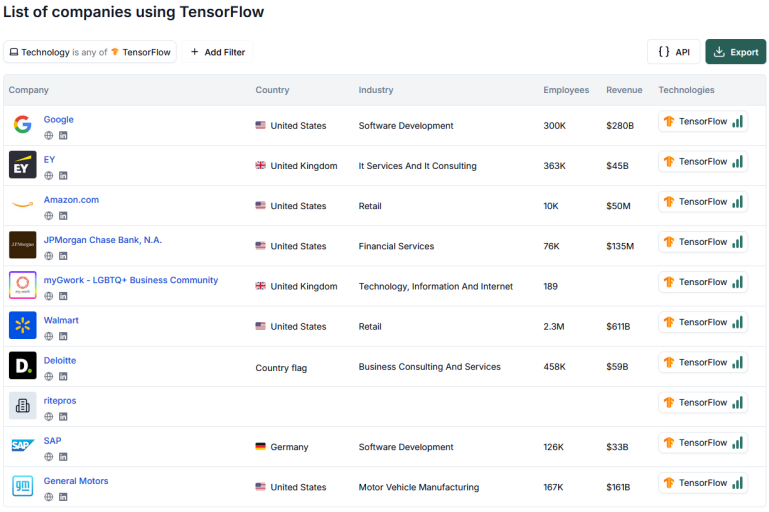
PyTorch versus TensorFlow



Google Trend: Click on Me!

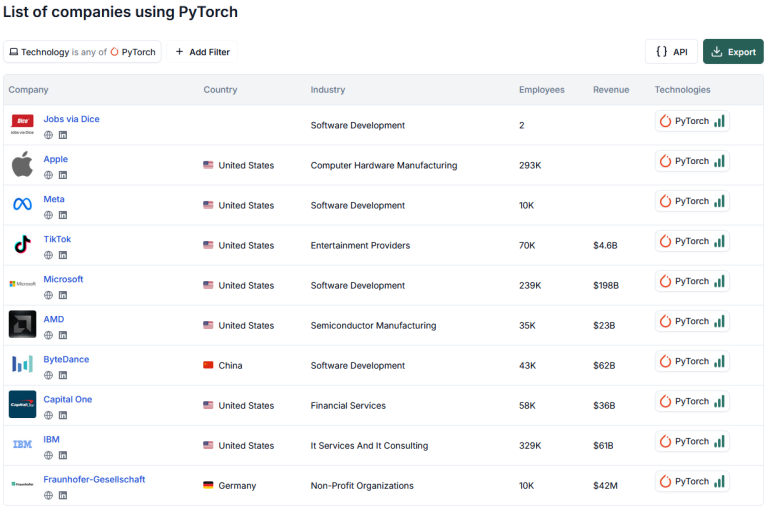
PyTorch versus TensorFlow

Four tech companies.
Most notable company: Google



PyTorch versus TensorFlow

Mostly big tech companies and research centers



List of companies using PyTorch

Technology is any of PyTorch | + Add Filter | { } API | Export

Company	Country	Industry	Employees	Revenue	Technologies
Jobs via Dice		Software Development	2		PyTorch
Apple	United States	Computer Hardware Manufacturing	293K		PyTorch
Meta	United States	Software Development	10K		PyTorch
TikTok	United States	Entertainment Providers	70K	$4.6B	PyTorch
Microsoft	United States	Software Development	239K	$198B	PyTorch
AMD	United States	Semiconductor Manufacturing	35K	$23B	PyTorch
ByteDance	China	Software Development	43K	$62B	PyTorch
Capital One	United States	Financial Services	58K	$36B	PyTorch
IBM	United States	It Services And It Consulting	329K	$61B	PyTorch
Fraunhofer-Gesellschaft	Germany	Non-Profit Organizations	10K	$42M	PyTorch

PyTorch versus TensorFlow

Discussion on Reddit. Click on Me!

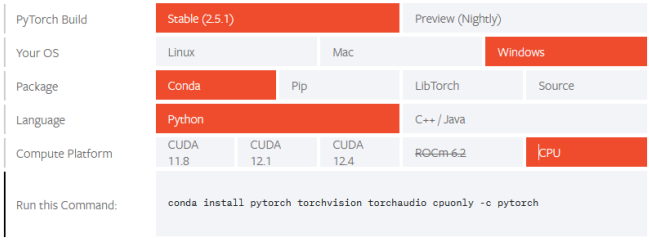
Install PyTorch

Install PyTorch with conda (only CPU)

START LOCALLY

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.



Install PyTorch

Install PyTorch with conda (CPU + GPU)

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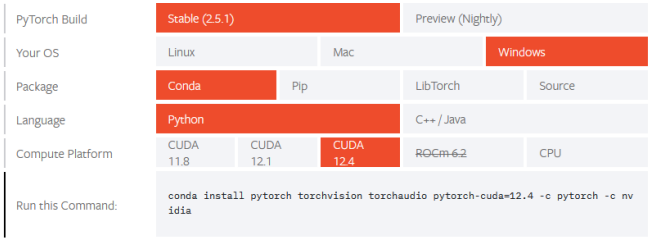

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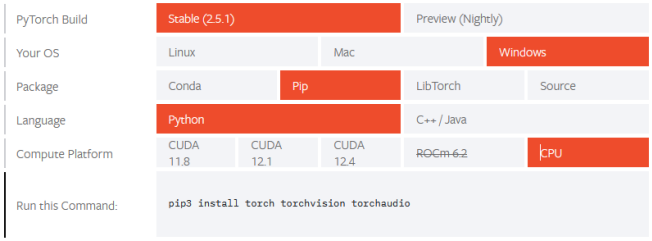

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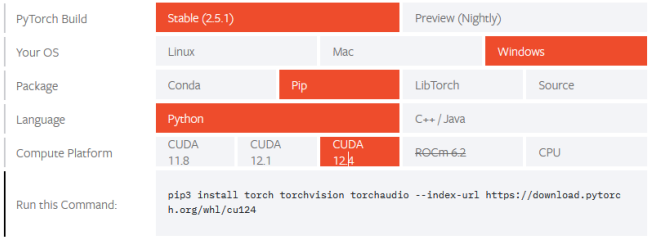
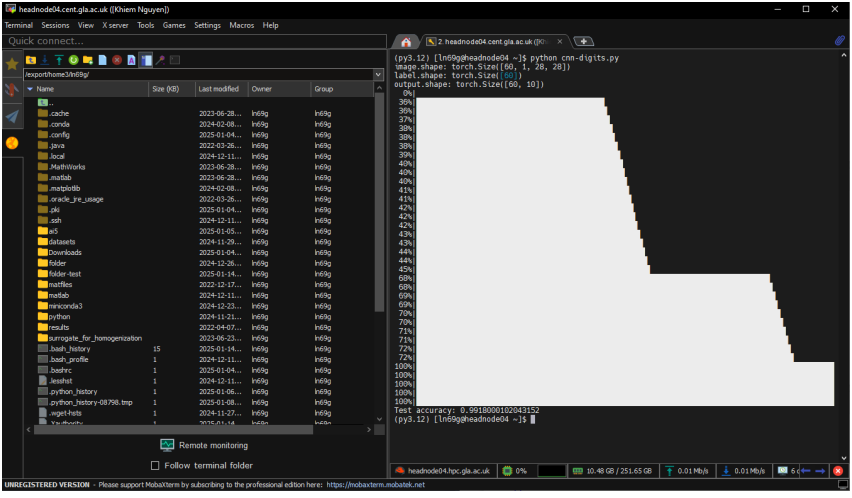
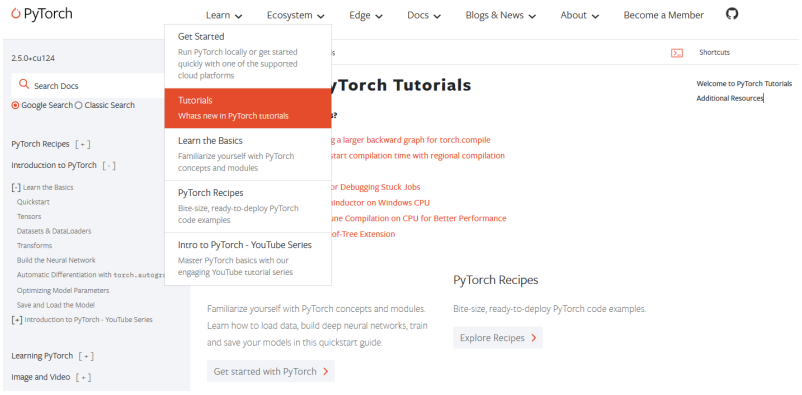


Run Python code on HPC



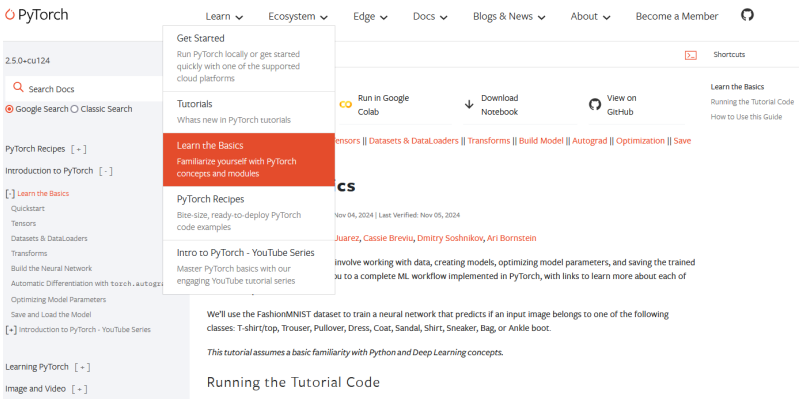
I walk you through this during the entire semester (even after my teaching session!)

Where to learn PyTorch



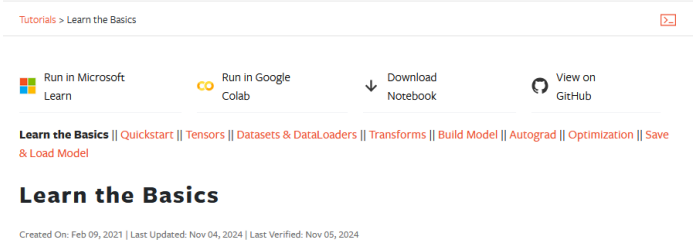
PyTorch documentation is unarguably the best source (at least in my opinion). Click on Me!

Where to learn PyTorch



- Learn the Basics as the first place to start. Click on Me!
- The tutorial assumes you are quite competent at Machine Learning and Python.

Where to learn PyTorch



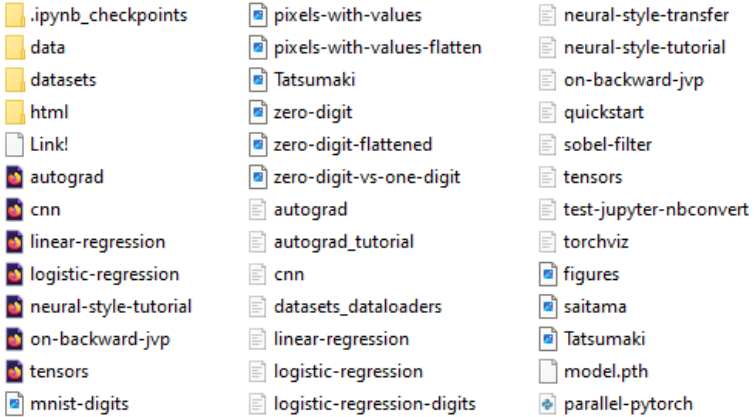
Some key components for building and training a deep neural network

- Tensors
- Datasets & DataLoaders
- Build Model
- Autograd
- Optimization

Where to learn PyTorch

Where else to learn?

Where to learn PyTorch



From Moodle and Me!

Design principles of PyTorch

1. Principle 1: **Usability over Performance**
   - PyTorch's primary goal is usability
   - A seconddary goal is to have reasonable performance
2. Principle 2: **Simple over Easy**
   - Simple/explicit (to understand, debug)
   - Easy/implicit (to use)
3. Principle 3: **Python First with Best In Class Language Interoperability**
   PyTorch is not a Python binding into a monolithic C++ framework. It is built to be deeply integrated into Python. You can use it naturally like you would use NumPy, SciPy, scikit-learn, or other Python libraries.

PyTorch Design Philosophy. Click on Me!

Let us get into business

Please bring out your laptop!!!