

0.1 Overview

Outline

- What's PyTorch
- PyTorch compared to Other Deep learning Frameworks
 - TensorFlow
 - Keras
- Who's this course for

WHAT IS PYTORCH?

- A replacement for NumPy to use the power of GPUs
- A deep learning research platform

Imperative programing

- Imperative programing defines computation as you type it
- Feels more like Python:

```
import torch
a=torch.tensor(1.0)
b=torch.tensor(1.0)
c=a+b
print('c:',c)

c: tensor(2.)
```

Symbolic Programming

- Define the computation
- Execute the computation

```
import tensorflow as tf
```



```
a = tf.constant(1.0,name="a")  
b = tf.constant(1.0,name="b")  
c = a+b  
print(c)
```

```
sess = tf.Session()  
output = sess.run(c)  
print("Value of c after running graph:",output)  
c: tensor(2.)
```



```
<tf.Tensor 'add_2:0' shape=() dtype=float32>
```

Imperative programming

- Each and every level of computation can be accessed
- Regular Python tools are easier to use in PyTorch like debugging tools
- Can integrate many standard Programming operations like control flow statements
- As a result you can quickly gain insight in your model

 TensorFlow	 PyTorch
TensorFlow is usually in large scale production	PyTorch is used for researchers to test out ideas quickly.

*The Battle: TensorFlow vs. Pytorch
by Eitan Rosenzvaig*

 Keras	 PyTorch
Keras is simpler to experiment with for standard layers	Lower-level environment allows you to experiment, with new ideas

Keras or PyTorch as your first deep learning framework: by Piotr Migdal and Rafał Jakubaniś

Who should take this Course

Anyone can build new better neural networks

You should have :

1. Basic knowledge of Calculus and Linear Algebra
2. Knowledge of Machine Learning
3. Knowledge of Neural Networks
4. Basic Knowledge of Deep learning

0.2 About this course

0.2.1 General Information

Prerequisites and recommended skills

PyTorch is a machine learning and deep learning library for Python. As such, to make use of the PyTorch you will need to have at least basic hands-on programming skills in Python.

- Python programming
- Recommended: Linear Algebra and Calculus

0.2.2 Learning Objectives

In this course you will learn about:

- Tensors , Gradients and Datasets
- Fundamentals of PyTorch with Linear Regression
- Logistic and Softmax Regression
- Feedforward Neural Network
- Deep Networks
- Intro to Convolution

0.2.3 Syllabus

Module 1 - Tensors and Gradients

- Tensors
- Derivatives
- Dataset Class

Module 2 - Fundamentals of PyTorch with Linear Regression

- Prediction 1D Regression
- Training 1D Regression
- Stochastic and Batch Gradient Descent
- PyTorch Way
- Model Validation
- Higher Dimensional Linear Regression

Module 3 - Logistic and Softmax Regression

- Logistic Regression Prediction
- Training Logistic Regression
- Softmax Regression

Module 4 - Feedforward Neural Network

- Neural Networks
- Back Propagation
- Activation Functions
- Building Deep Networks In Pytorch

Module 5 - Deep Networks

- Dropout
- Initialization

Module 6 - Intro to Convolution

- What's Convolution?
- Multiple Channel Convolution
- Activation Max Pooling
- Convolutional Neural Network

0.2.4 Grading Scheme

GRADING SCHEME

1. The minimum passing mark for the **course** is 70% with the following weights:
 - 50% - All Review Questions
 - 50% - The Final Exam
2. Though Review Questions and the Final Exam have a passing mark of 60% respectively, the only grade that matters is the overall grade for the **course**.
3. Review Questions have no time limit. You are encouraged to review the course material to find the answers. Please remember that the Review Questions are worth 50% of your final mark.
4. The final exam has a 1 hour time limit.
5. Attempts are per **question** in both, the Review Questions and the Final Exam:
 - One attempt - For True/False questions
 - Two attempts - For any question other than True/False
6. There are no penalties for incorrect attempts.
7. Clicking the "**Final Check**" button when it appears, means your submission is **FINAL**. You will **NOT** be able to resubmit your answer for that question ever again.
8. Check your grades in the course at any time by clicking on the "**Progress**" tab.

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