

Week 5: Introduction to Deep Learning in Python

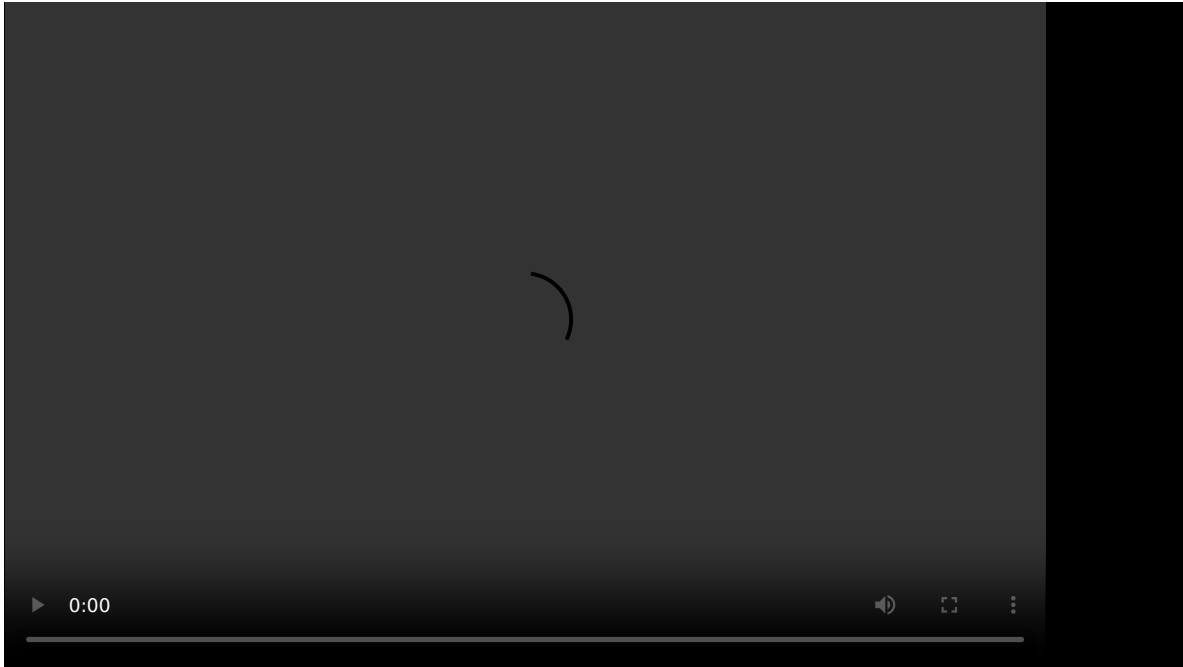
An introduction to deep learning in Python by [Dr. Yi-Xin Liu](#) at Fudan University (lyx@fudan.edu.cn).

This is a part of the course: *Road to Scientific Research: Powerful Computer Applications* (XDSY118019.01).

Lecture date: 2024.10.10

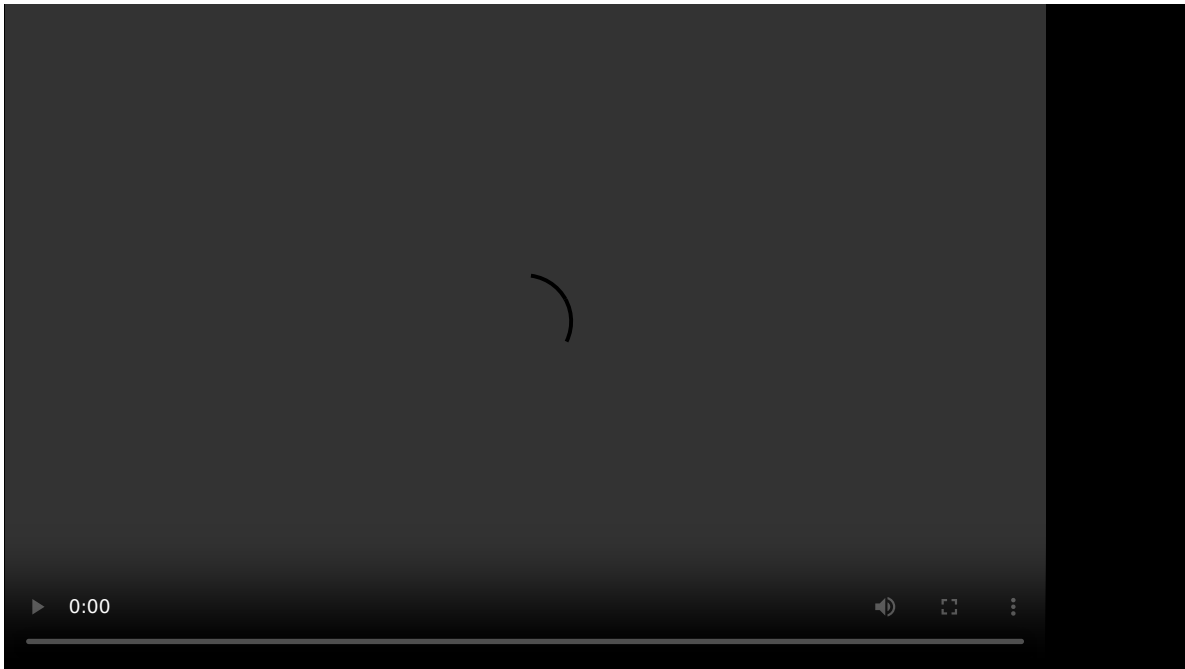
Introduction to Deep Learning

- [Deep Learning In 5 Minutes | What Is Deep Learning? | Deep Learning Explained Simply | Simplilearn](#) (length: 5:51)



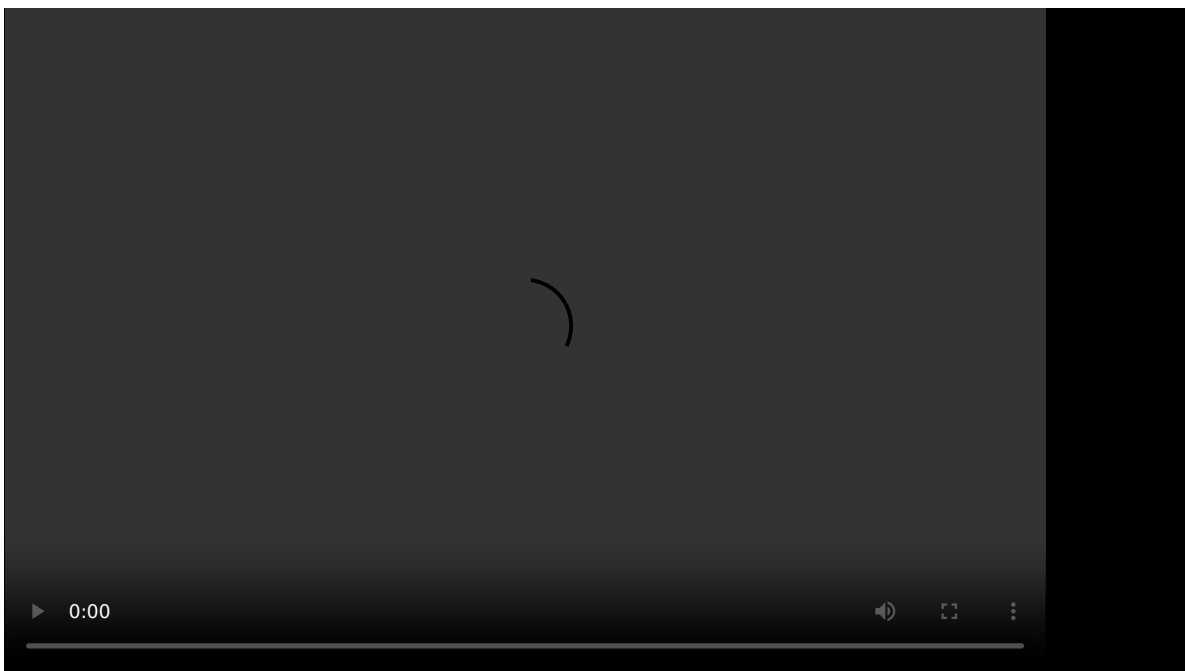
Fundamentals of Deep Learning

- [3Blue1Brown - But what is a neural network? | Chapter 1, Deep learning](#) (length: 19:13)



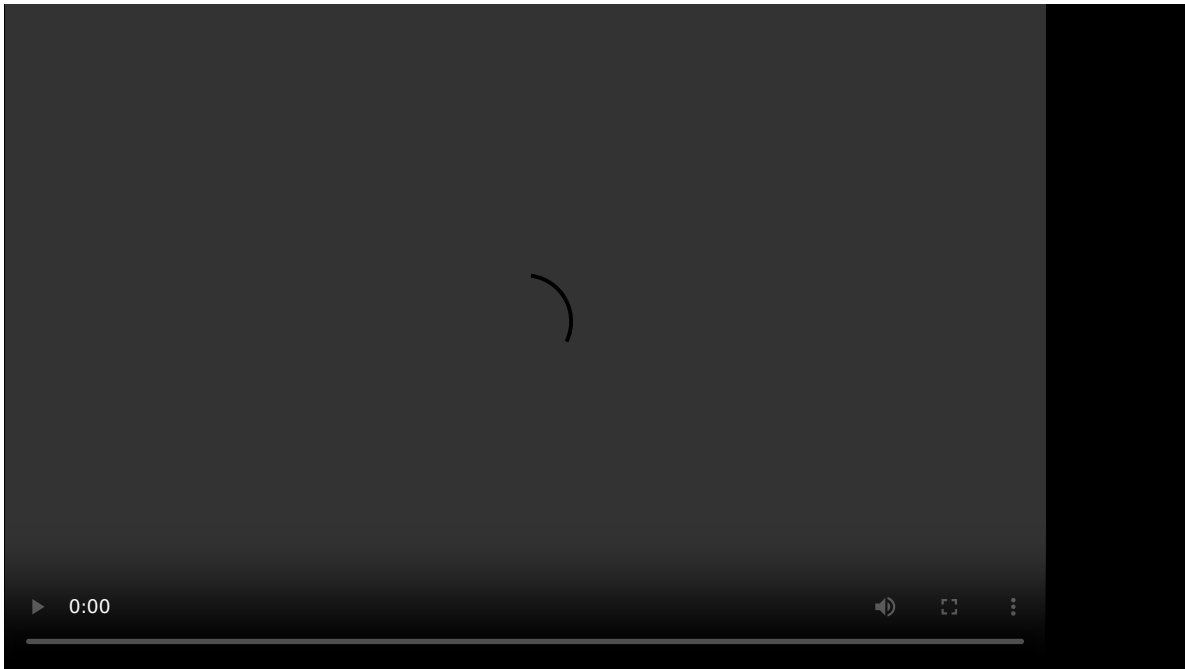
Fundamentals of Deep Learning

- [3Blue1Brown - Gradient descent, how neural networks learn | Chapter 2, Deep learning](#) (length: 21:00)



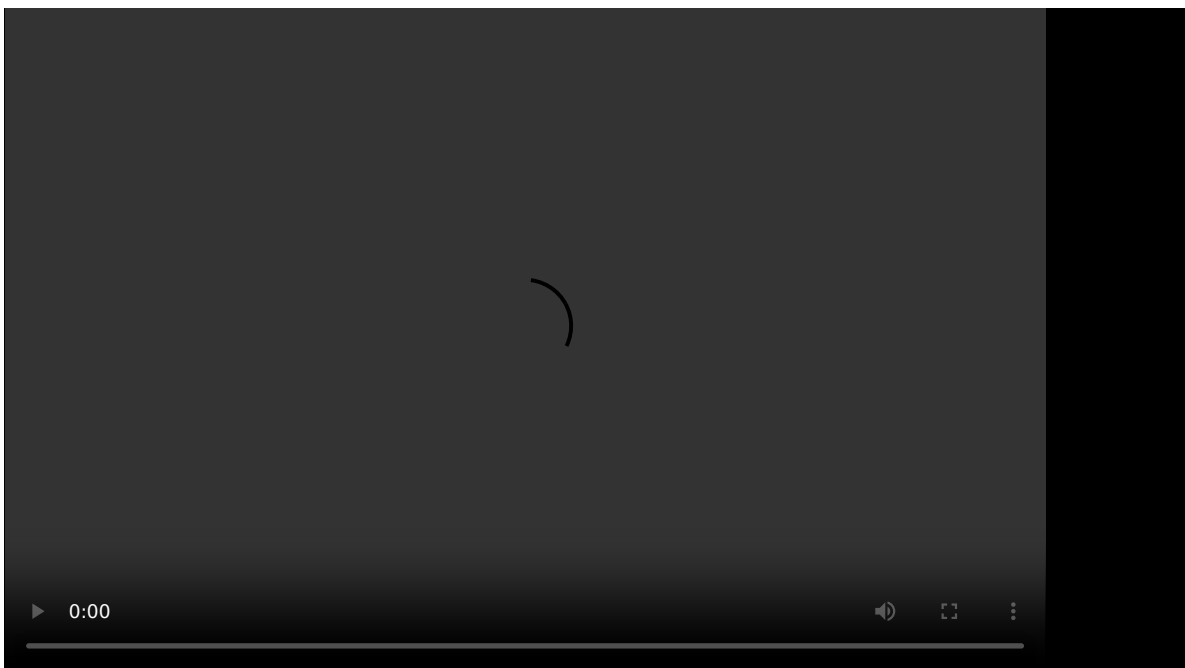
Fundamentals of Deep Learning

- [3Blue1Brown - What is backpropagation really doing? | Chapter 3, Deep learning](#) (length: 13:54)



Fundamentals of Deep Learning

- [3Blue1Brown - Backpropagation calculus | Chapter 4, Deep learning](#) (length: 10:17)



Deep Learning Experiments

Do the following experiments in [A neural network playground](http://playground.tensorflow.org/) (<http://playground.tensorflow.org/>):

- Choose **Gaussian** data, use **linear** activation function to train.
- Choose **Circle** data, use **linear** activation function to train. Does it succeed? How to obtain a successful training?
- (Optional) Choose **Spiral** data, find a successful classification neural network model.

Deep Learning with Pytorch

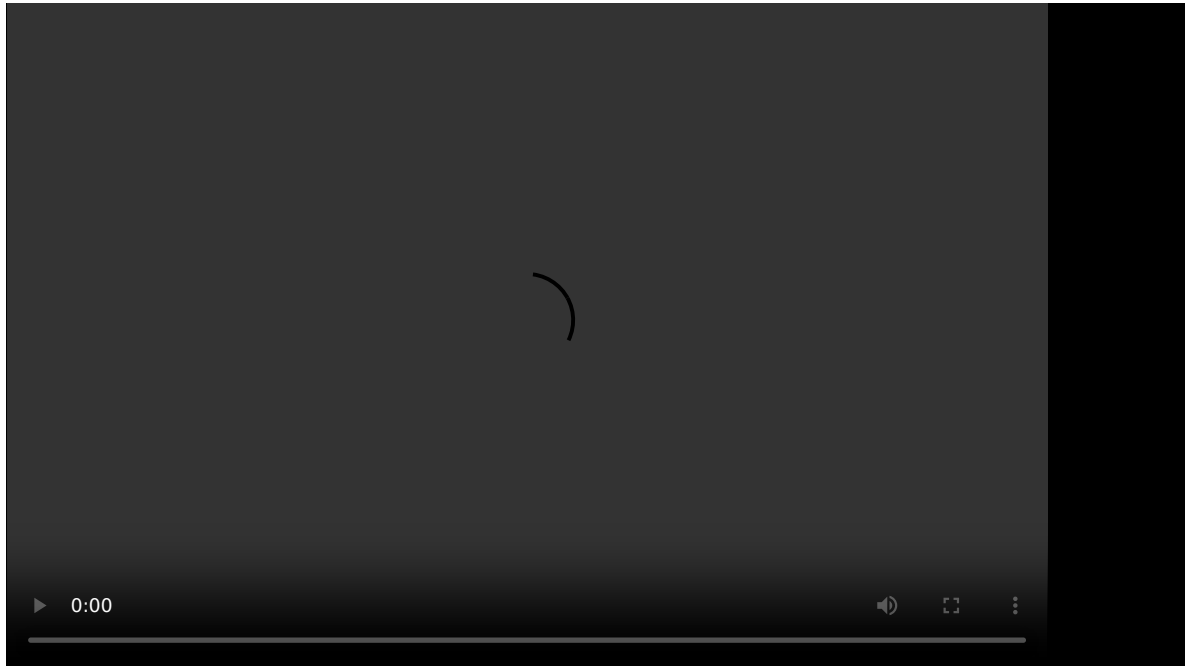
Why PyTorch?

PyTorch is currently the most popular deep learning framework not only in Python but all programming languages.

- See the overall trend for PyTorch and other competitors (TensorFlow, JAX, MxNet, Caffe2, MindSpore, etc.) [here](#).
- Watch the video for the current state of machine learning frameworks [here](#).

Introduction to PyTorch

- [Introduction to PyTorch](#) (length: 23:22)



Additional Resources for PyTorch

- [PyTorch Beginner Series](#)
- [Youtube: Learn PyTorch for deep learning in a day. Literally.](#)
- [Online Course: Learn PyTorch for Deep Learning: Zero to Mastery](#)

A Simple Walkthrough

Go to [03_python_deep_learning.ipynb](#).

More Resources for Machine Learning

[Why Biological Neurons Are Deep Neural Networks \(Youtube Video\)](#)

General Machine Learning

- [scikit-learn](#): Machine learning in Python
- Gradient Boost: [XGBoost](#), [LightGBM](#), [CatBoost](#)
- [Kaggle](#): Largest AI & ML community, competitions, datasets, notebooks, etc.
- [Hugging Face](#): AI community for ML models and datasets

LLM

- [Transformer](#)
- [Ollama](#): open-source machine learning models
- [ChatGPT](#): AI-powered chatbot by OpenAI