



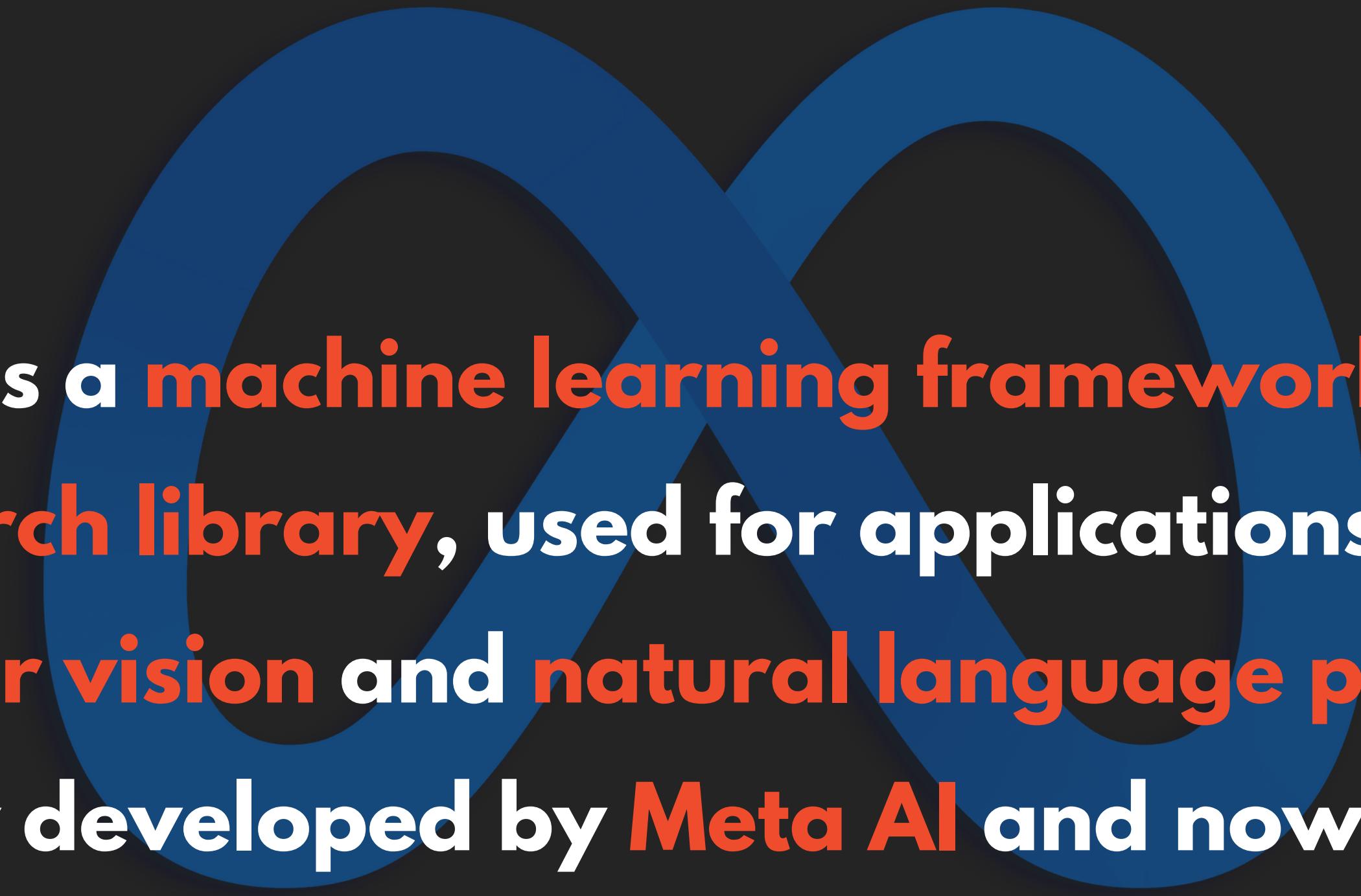
# PYTORCH

## Deep Learning Fundamentals Course

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By Teddy Tassew





**PyTorch is a machine learning framework based on the Torch library, used for applications such as computer vision and natural language processing, originally developed by Meta AI and now part of the Linux Foundation umbrella.**



# Projects

A number of pieces of deep learning software are built on top of PyTorch, including **Tesla Autopilot**, **Uber's Pyro**, **Hugging Face's Transformers**, **PyTorch Lightning**, and **Catalyst**.

# Authors

**Adam Paszke**

**Sam Gross**

**Soumith Chintala**

**Gregory Chanan**



**AI Researcher, Programmer**

# Companies and Universities using PyTorch



Reduce inference costs by 71% and drive scale out using PyTorch, TorchServe, and AWS Inferentia.

[Learn More >](#)



Pushing the state of the art in NLP and Multi-task learning.

[Learn More >](#)



Using PyTorch's flexibility to efficiently research new algorithmic approaches.

[Learn More >](#)

# History

- Meta (formerly known as Facebook) operates both PyTorch and Convolutional Architecture for Fast Feature Embedding (Caffe2), but models defined by the two frameworks were mutually incompatible.
- The Open Neural Network Exchange (ONNX) project was created by Meta and Microsoft in September 2017 for converting models between frameworks.
- Caffe2 was merged into PyTorch at the end of March 2018.
- In September 2022, Meta announced that PyTorch would be governed by PyTorch Foundation, a newly created independent organization – a subsidiary of Linux Foundation.

# Different DL Frameworks



# Different DL Frameworks

## #1. Definition

### Keras



The Neural network library is available as an open-source.

### TensorFlow



TensorFlow is available as an open-source and a free software library.

### PyTorch

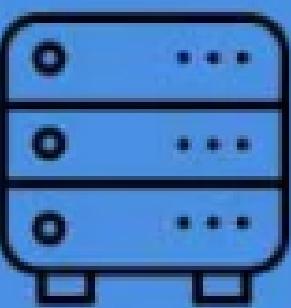


It is a machine learning library that is available as an open-source.

# Different DL Frameworks

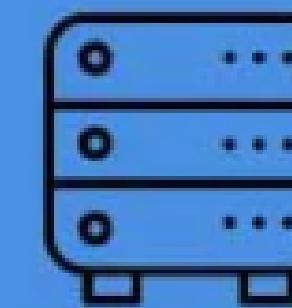
## #2. Coding Language

### Keras



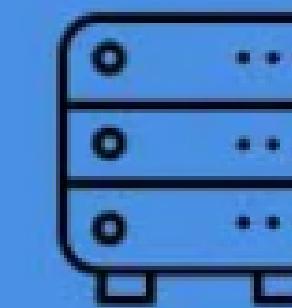
It is available as a coding. All the codes are scripted in a single line.

### TensorFlow



The library is compact with C, C++, Java, and other coding languages. The accuracy is increased by programming it with small codes.

### PyTorch

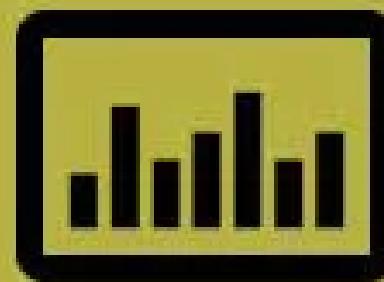


It is scripted only with python. The codes of PyTorch is scripted with larger lines.

# Different DL Frameworks

## #3. Applications

### Keras



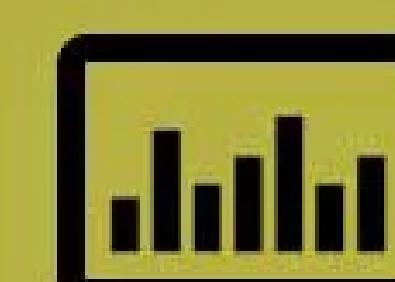
It is designed to perform robust experiments in neural networks.

### TensorFlow



It is employed to teach the machine about multiple computational techniques.

### PyTorch

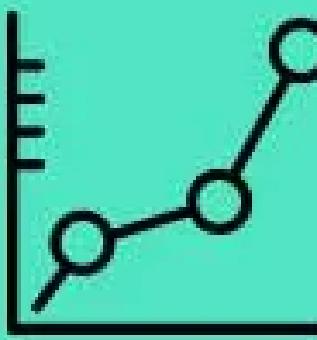


It is used to build natural language processing and neural networks.

# Different DL Frameworks

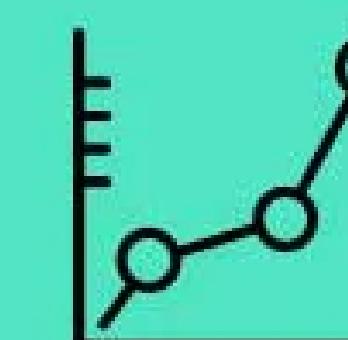
## #4. Level of API's

**Keras**



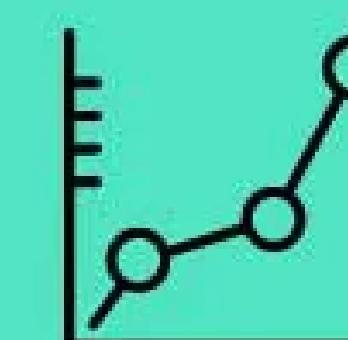
It can execute on Theano and CNTK as it has high-level API.

**TensorFlow**



It comprises of both low level and high-level API's.

**PyTorch**



PyTorch focuses only on array expression because of its low-level API.

# Different DL Frameworks

## #5. Architecture

### Keras



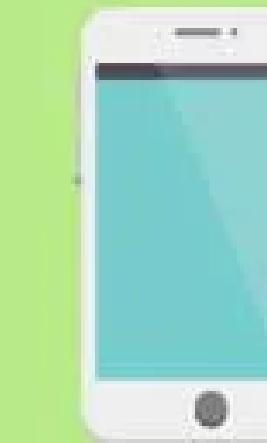
It has an understandable syntax and can be easily interpretable.

### TensorFlow



It is popular because of its rapid computation ability in the various platform but has little complex architecture which is difficult to interpret

### PyTorch



The beginners feel complicated at PyTorch's architecture but they are interested in its deep learning application and also used for various academic purposes.

# Different DL Frameworks

## #6. Speed

### Keras



It operates at the minimum speed only.

### TensorFlow



It works on maximum speed which in turns provides high performance.

### PyTorch



The performance and speed of PyTorch are similar to TensorFlow.

# Different DL Frameworks

## #7. Dataset

**Keras**



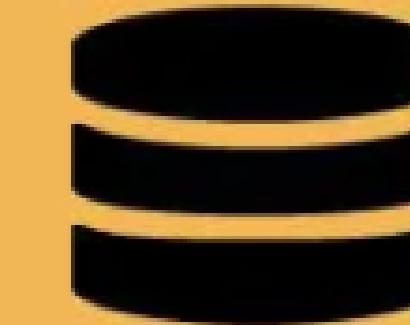
It operates effectively in the smaller dataset as the speed of execution is low.

**TensorFlow**



It is highly capable to manage large dataset as it has a maximum speed of execution.

**PyTorch**



It can manage a high-performance task in a higher dimensional dataset.

# Different DL Frameworks

## #8. Debugging

### Keras



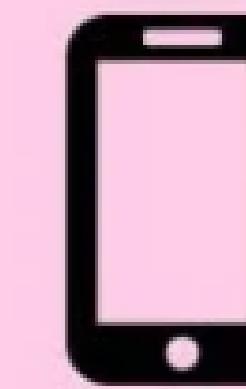
The administrator need not require any frequent process of debugging.

### TensorFlow



It is challenging to perform debugging.

### PyTorch



The abilities to debug is better than Keras and TensorFlow.

# Different DL Frameworks

## #9. Popularity

### Keras



It is widely used in neural networks and supports convolutional and utility layers.

### TensorFlow



It is famous for its automated image capturing software and its internal use of google.

### PyTorch



It is popular because of its automatic differentiation on deep learning networks and supports high power GPU applications with the NN module, optimum module, and autograd module.

# Different DL Frameworks

## #10. Glimpse of verdict

### Keras



It provides multiple back-end support and robust prototyping.

### TensorFlow



High performance and functionalities in Object detection on a large dataset.

### PyTorch



Flexibility.  
The duration of training is short.  
Has a wide variety of debugging.