# Creator: William Falcon

- In 2023, William Flacon launched Lightning AI Studio, a cloud platform for coding, training, and deploying AI models directly from the browser with zero setup.

- PyTorch Lightning has over 160M downloads. AI Studio supports 240K+ users across thousands of enterprises.

PyTorch Lightning

- ❖ PyTorch is an open-source deep learning framework that's known for its flexibility and ease-of-use.

- ❖ PyTorch is a fully featured framework for building deep learning models, which is a type of machine learning that's commonly used in applications like image recognition and language processing.

- ❖ Written in Python, it's relatively easy for most machine learning developers to learn and use.

- ❖ PyTorch makes it easy to develop and train deep learning models.
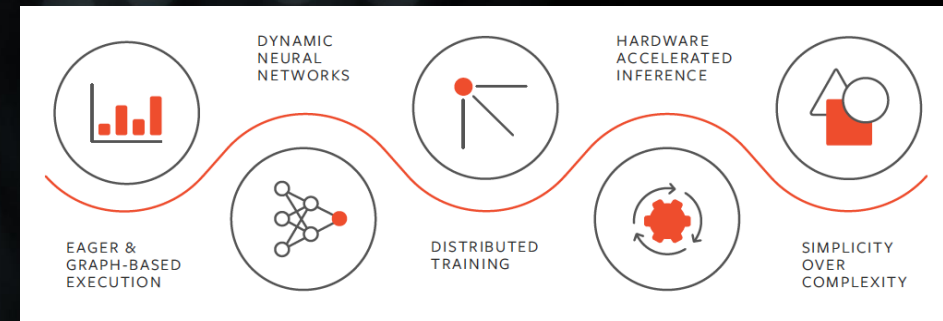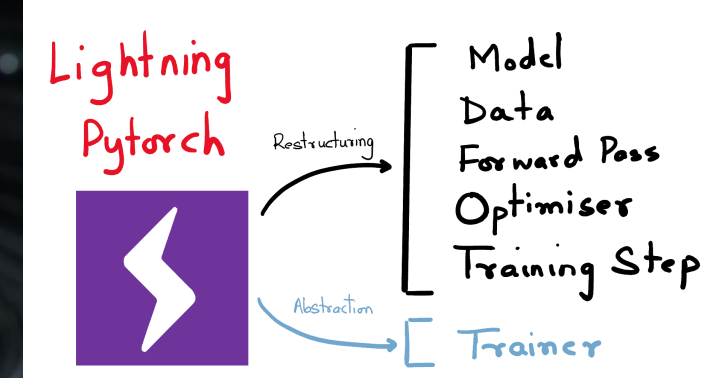
Creator: Jeremy Howard & Rachel Thomas

Slogan: The world needs everyone involved with AI, no matter how unlikely your background.

o FastAI is a deep learning library that aims to make deep learning accessible to a wider audience by simplifying the development process.

o Fastai is structured around two primary design objectives: being highly hackable and adaptable and being approachable and productive quickly.
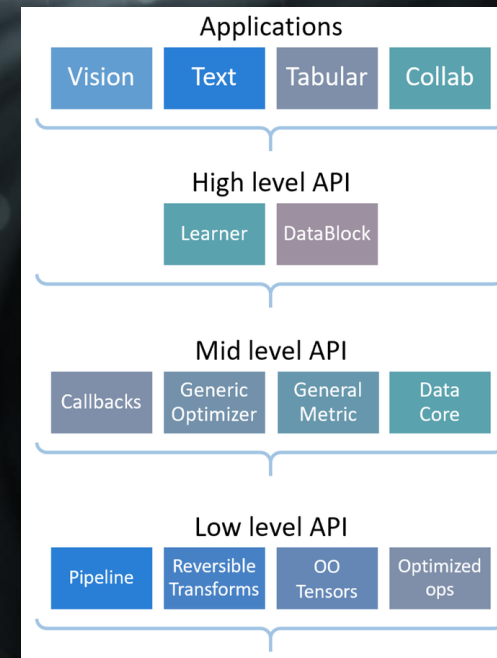
Key Features

PyTorch Lightning Key features:

- Simplifies the codebase through minimal boilerplate code.

- Offers multi-GPU and distributed training for scalability.

- Integrates with PyTorch.

- Encourages organized and modular code.

- Simplifies complex setups like mixed precision tuning and distributed training.

- Offers built-in features for checkpoints, logs, and experiment tracking.

FastAI Key Features:

- A GPU-optimized computer vision library which can be extended in pure Python

- A novel 2-way callback system that can access any part of the data, model, or optimizer and change it at any point during training

- FastAI's layered architecture allows it to offer both ease of use for beginners and the flexibility needed by researchers.

- FastAI offers flexibility and customization options, catering to both those who want to get started quickly and those who require fine-grained control over their models.

Real-World Applications

Wildlife Conservation – Recognizing Wild Animals
Organization: Microsoft AI for Earth grantees

- Impact: Recognized and classified endangered animals from camera trap photos using FastAI.
- Why it matters: Enabled conservationists with no deep learning background to build high-performing models.

Livestock Identification – Farm Animals via Satellite
Organization: Wadhwani AI + FastAI

- Impact: Identified cows in satellite images in developing regions to support farmers.
- Tech: FastAI was used to fine-tune models for satellite vision, helping with data scarcity.
- Why it matters: Used by non-profits with minimal computing resources.

AI Startups
Companies: Weights & Biases, Grid.ai, and HuggingFace

- PyTorch Lightning integrates well with tools like W&B, making it a go-to framework for AI startups building MLOps-friendly pipelines.
- Common for multi-GPU, multi-node, and TPU training setups.

Biology & Drug Discovery – Recursion Pharmaceuticals

- Use Case: Deep learning for cell imaging to discover drug candidates
- Impact: Recursion uses PyTorch Lightning to train hundreds of models in parallel using large biomedical datasets.

Comparative Perspective

PyTorch Lightning

- Low to mid-level abstraction

- Customizability : Very high; user controls training loop if needed

- Use: Moderate- requires more manual setup

- Performance tuning: Easier distributed & multi-GPU Training.

- API Design: Clean, modular class-based design.

Similarities

- Both support research and production

- Both support callbacks, and logging.

- Both are built on PyTorch

- Both allow some costume model logic.

FastAI

- High-level abstraction.

- Customizability: Limited: Custom training loops are harder to write.

- Use: Straightforward, many things automated.

- Performance tuning: less flexible for distributed settings

- API Design: Functional API with helper utilities.

Citations

- *About – fast.ai*. (2025). Fast.ai. https://www.fast.ai/about.html

- Bex Tuychiev. (2024, July 14). *PyTorch Lightning: A Comprehensive Hands-On Tutorial*. Datacamp.com; DataCamp. https://www.datacamp.com/tutorial/pytorch-lightning-tutorial#

- CodingNomads. (2025). *Introduction: Pytorch Lightning and FastAi*. Codingnomads.com. https://codingnomads.com/introduction-pytorch-lightning-fastai

- Howard, J., & Gugger, S. (2020). Fastai: A Layered API for Deep Learning. *Information*, *11*(2), 108. https://doi.org/10.3390/info11020108

- *Lightning AI*. (2023). Lightning AI. https://lightning.ai/about

- Lightning-AI. (2025, June 20). *GitHub - Lightning-AI/pytorch-lightning: Pretrain, finetune ANY AI model of ANY size on multiple GPUs, TPUs with zero code changes*. GitHub. https://github.com/Lightning-AI/pytorch-lightning

- *Welcome to ⚡ PyTorch Lightning — PyTorch Lightning 2.0.6 documentation*. (n.d.). Lightning.ai. https://lightning.ai/docs/pytorch/stable/

- *What is PyTorch?* (2017). NVIDIA Data Science Glossary. https://www.nvidia.com/en-eu/glossary/pytorch/