1.3 PyTorch CORE MODULES

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these comes along with PyTorch as inbuilt

Core PyTorch Modules

Module	Description
torch	The core module providing multidimensional arrays (tensors) and mathematical operations on them.
torch.autograd	Automatic differentiation engine for recording operations on tensors to compute gradients for optimization.
torch.nn	Neural networks library for layers, activations, loss functions, and utilities for deep learning models.
torch.optim	Optimizers like SGD, Adam, RMSprop for training neural networks.
torch.utils.data	Data handling utilities including Dataset and DataLoader for efficient data management and loading.
torch.jit	Supports JIT compilation and TorchScript to optimize models and enable deployment without Python dependencies.
torch.distributed	Tools for distributed training across multiple GPUs/machines (parallel computation).
torch.cuda	Interfaces with NVIDIA CUDA for GPU acceleration in tensor computations and model training.
torch.backends	Settings/control over backend libraries (cuDNN, MKL, etc.) for performance tuning.
torch.multiprocessing	Utilities for parallelism with multiprocessing, supporting CUDA tensors.
torch.quantization	Tools for model quantization to reduce size and improve inference, especially on edge devices.
torch.onnx	Exporting PyTorch models to ONNX format for interoperability with other frameworks/deployment.

PyTorch Domain Libraries

Library	Description
torchvision	Datasets, model architectures, image transformations for computer vision tasks.

torchtext	NLP tools, datasets, data preprocessing, vocabulary management.
torchaudio	Audio processing utilities like I/O, transforms, pre-trained models for speech recognition.
torcharrow	Accelerated data loading/preprocessing for tabular/time series data (experimental).
torchserve	Model serving library for deploying trained models at scale in production environments.
pytorch_lightning	Lightweight wrapper for PyTorch, simplifies training loop and reduces boilerplate for scalable, reproducible models.

Popular PyTorch Ecosystem Libraries

Library	**Description**
Hugging Face Transformers	State-of-the-art pre-trained models for NLP tasks, translation, QA, built on PyTorch.
Fastai	High-level library for fast and accurate neural net training with modern best practices, built on PyTorch.
PyTorch Geometric	Extension for geometric deep learning (graph neural networks, 3D data processing).
TorchMetrics	Modular metrics API for standardized implementations, compatible with PyTorch Lightning.
TorchElastic	Dynamic scaling of PyTorch distributed training jobs; enables elasticity in resource management.
Optuna	Hyperparameter optimization framework, integrates well with PyTorch for tuning models.
Catalyst	High-level features for training neural networks, focusing on reproducibility and fast experimentation.
Ignite	Lightweight library for training/evaluating neural networks in PyTorch; helps with training workflows.
AllenNLP	Research library supporting deep learning for NLP, built on PyTorch.
Skorch	scikit-learn compatible wrapper, enables using PyTorch models with scikit-learn utilities/APIs.
PyTorch Forecasting	High-level library for time series forecasting; easy model building, training, evaluation.

TensorBoard for PyTorch	Visualization of training metrics, model graphs, and data within TensorBoard for PyTorch.