

This is a curated list of tutorials, projects, libraries, videos, papers, books and anything related to the incredible PyTorch. Feel free to make a pull request to contribute to this list.

Tutorials

- Official PyTorch Tutorials
- Official PyTorch Examples
- Practical Deep Learning with PyTorch
- <u>Dive Into Deep Learning with PyTorch</u>
- Deep Learning Models
- Minicourse in Deep Learning with PyTorch
- <u>C++ Implementation of PyTorch Tutorial</u>
- Simple Examples to Introduce PyTorch
- Mini Tutorials in PyTorch
- Deep Learning for NLP
- Deep Learning Tutorial for Researchers
- Fully Convolutional Networks implemented with PyTorch
- Simple PyTorch Tutorials Zero to ALL
- DeepNLP-models-Pytorch
- MILA PyTorch Welcome Tutorials
- Effective PyTorch, Optimizing Runtime with TorchScript and Numerical Stability
 Optimization
- Practical PyTorch
- PyTorch Project Template

Visualization

- Loss Visualization
- <u>Grad-CAM: Visual Explanations from Deep Networks via Gradient-based</u> Localization

- <u>Deep Inside Convolutional Networks: Visualising Image Classification Models and Saliency Maps</u>
- SmoothGrad: removing noise by adding noise
- DeepDream: dream-like hallucinogenic visuals
- FlashTorch: Visualization toolkit for neural networks in PyTorch
- <u>Lucent: Lucid adapted for PyTorch</u>

Explainability

- Efficient Covariance Estimation from Temporal Data
- Hierarchical interpretations for neural network predictions
- Shap, a unified approach to explain the output of any machine learning model
- VIsualizing PyTorch saved .pth deep learning models with netron
- <u>Distilling a Neural Network Into a Soft Decision Tree</u>

Object Detection

- MMDetection Object Detection Toolbox
- Mask R-CNN Benchmark: Faster R-CNN and Mask R-CNN in PyTorch 1.0
- YOLOv3
- YOLOv2: Real-Time Object Detection
- SSD: Single Shot MultiBox Detector
- <u>Detectron models for Object Detection</u>
- <u>Multi-digit Number Recognition from Street View Imagery using Deep</u>
 Convolutional Neural Networks
- Whale Detector

Long-Tailed / Out-of-Distribution Recognition

- <u>Distributionally Robust Neural Networks for Group Shifts: On the Importance of</u> Regularization for Worst-Case Generalization
- Invariant Risk Minimization
- <u>Training Confidence-Calibrated Classifier for Detecting Out-of-Distribution Samples</u>
- Deep Anomaly Detection with Outlier Exposure
- Large-Scale Long-Tailed Recognition in an Open World
- Principled Detection of Out-of-Distribution Examples in Neural Networks
- <u>Learning Confidence for Out-of-Distribution Detection in Neural Networks</u>

<u>PyTorch Imbalanced Class Sampler</u>

Energy-Based Learning

- EBGAN, Energy-Based GANs
- Maximum Entropy Generators for Energy-based Models

Missing Data

• BRITS: Bidirectional Recurrent Imputation for Time Series

Architecture Search

- DenseNAS
- DARTS: Differentiable Architecture Search
- Efficient Neural Architecture Search (ENAS)
- EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks

Optimization

- AccSGD, AdaBound, AdaMod, DiffGrad, Lamb, NovoGrad, RAdam, SGDW, Yogi and more
- Lookahead Optimizer: k steps forward, 1 step back
- RAdam, On the Variance of the Adaptive Learning Rate and Beyond
- Over9000, Comparison of RAdam, Lookahead, Novograd, and combinations
- AdaBound, Train As Fast as Adam As Good as SGD
- Riemannian Adaptive Optimization Methods
- L-BFGS
- OptNet: Differentiable Optimization as a Layer in Neural Networks
- Learning to learn by gradient descent by gradient descent

Quantization

 Additive Power-of-Two Quantization: An Efficient Non-uniform Discretization For Neural Networks

Quantum Machine Learning

- Tor10, generic tensor-network library for quantum simulation in PyTorch
- PennyLane, cross-platform Python library for quantum machine learning with PyTorch interface

Neural Network Compression

- Bayesian Compression for Deep Learning
- Neural Network Distiller by Intel Al Lab: a Python package for neural network compression research
- Learning Sparse Neural Networks through L0 regularization
- Energy-constrained Compression for Deep Neural Networks via Weighted Sparse Projection and Layer Input Masking
- <u>EigenDamage: Structured Pruning in the Kronecker-Factored Eigenbasis</u>
- Pruning Convolutional Neural Networks for Resource Efficient Inference
- Pruning neural networks: is it time to nip it in the bud? (showing reduced networks work better)

Facial, Action and Pose Recognition

- Facenet: Pretrained Pytorch face detection and recognition models
- DGC-Net: Dense Geometric Correspondence Network
- <u>High performance facial recognition library on PyTorch</u>
- <u>FaceBoxes</u>, a <u>CPU real-time face detector with high accuracy</u>
- How far are we from solving the 2D & 3D Face Alignment problem? (and a dataset of 230,000 3D facial landmarks)
- <u>Learning Spatio-Temporal Features with 3D Residual Networks for Action Recognition</u>
- <u>PyTorch Realtime Multi-Person Pose Estimation</u>
- SphereFace: Deep Hypersphere Embedding for Face Recognition
- GANimation: Anatomically-aware Facial Animation from a Single Image
- Shufflenet V2 by Face++ with better results than paper
- Towards 3D Human Pose Estimation in the Wild: a Weakly-supervised Approach
- Unsupervised Learning of Depth and Ego-Motion from Video
- FlowNet 2.0: Evolution of Optical Flow Estimation with Deep Networks
- FlowNet: Learning Optical Flow with Convolutional Networks
- Optical Flow Estimation using a Spatial Pyramid Network
- OpenFace in PyTorch
- Deep Face Recognition in PyTorch

Super resolution

- Enhanced Deep Residual Networks for Single Image Super-Resolution
- Superresolution using an efficient sub-pixel convolutional neural network
- Perceptual Losses for Real-Time Style Transfer and Super-Resolution

Synthetesizing Views

NeRF, Neural Radian Fields, Synthesizing Novels Views of Complex Scenes

Voice

 Google Al VoiceFilter: Targeted Voice Separatation by Speaker-Conditioned Spectrogram Masking

Medical

- U-Net for FLAIR Abnormality Segmentation in Brain MRI
- Genomic Classification via ULMFiT
- <u>Deep Neural Networks Improve Radiologists' Performance in Breast Cancer</u>
 Screening
- Delira, lightweight framework for medical imaging prototyping
- V-Net: Fully Convolutional Neural Networks for Volumetric Medical Image Segmentation
- Medical Torch, medical imaging framework for PyTorch

3D Segmentation, Classification and Regression

- Kaolin, Library for Accelerating 3D Deep Learning Research
- PointNet: Deep Learning on Point Sets for 3D Classification and Segmentation

Video Recognition

- Dancing to Music
- Devil Is in the Edges: Learning Semantic Boundaries from Noisy Annotations
- Deep Video Analytics

<u>PredRNN: Recurrent Neural Networks for Predictive Learning using Spatiotemporal LSTMs</u>

Recurrent Neural Networks (RNNs)

- Ordered Neurons: Integrating Tree Structures into Recurrent Neural Networks
- Averaged Stochastic Gradient Descent with Weight Dropped LSTM
- Training RNNs as Fast as CNNs
- Quasi-Recurrent Neural Network (QRNN)
- ReSeg: A Recurrent Neural Network-based Model for Semantic Segmentation
- A Recurrent Latent Variable Model for Sequential Data (VRNN)
- Improved Semantic Representations From Tree-Structured Long Short-Term Memory Networks
- Attention-Based Recurrent Neural Network Models for Joint Intent Detection and Slot Filling
- Attentive Recurrent Comparators
- Collection of Sequence to Sequence Models with PyTorch
 - i. Vanilla Sequence to Sequence models
 - ii. Attention based Sequence to Sequence models
 - iii. Faster attention mechanisms using dot products between the final encoder and decoder hidden states

Convolutional Neural Networks (CNNs)

- LegoNet: Efficient Convolutional Neural Networks with Lego Filters
- MeshCNN, a convolutional neural network designed specifically for triangular meshes
- Octave Convolution
- PyTorch Image Models, ResNet/ResNeXT, DPN, MobileNet-V3/V2/V1, MNASNet, Single-Path NAS, FBNet
- Deep Neural Networks with Box Convolutions
- Invertible Residual Networks
- Stochastic Downsampling for Cost-Adjustable Inference and Improved Regularization in Convolutional Networks
- Faster Faster R-CNN Implementation
 - Faster R-CNN Another Implementation
- Paying More Attention to Attention: Improving the Performance of Convolutional Neural Networks via Attention Transfer

- Wide ResNet model in PyTorch -DiracNets: Training Very Deep Neural Networks
 Without Skip-Connections
- An End-to-End Trainable Neural Network for Image-based Sequence Recognition and Its Application to Scene Text Recognition
- Efficient Densenet
- Video Frame Interpolation via Adaptive Separable Convolution
- Learning local feature descriptors with triplets and shallow convolutional neural networks
- Densely Connected Convolutional Networks
- Very Deep Convolutional Networks for Large-Scale Image Recognition
- <u>SqueezeNet: AlexNet-level accuracy with 50x fewer parameters and <0.5MB</u> model size
- <u>Deep Residual Learning for Image Recognition</u>
- Training Wide ResNets for CIFAR-10 and CIFAR-100 in PyTorch
- Deformable Convolutional Network
- Convolutional Neural Fabrics
- Deformable Convolutional Networks in PyTorch
- Dilated ResNet combination with Dilated Convolutions
- Striving for Simplicity: The All Convolutional Net
- Convolutional LSTM Network
- Big collection of pretrained classification models
- PyTorch Image Classification with Kaggle Dogs vs Cats Dataset
- CIFAR-10 on Pytorch with VGG, ResNet and DenseNet
- Base pretrained models and datasets in pytorch (MNIST, SVHN, CIFAR10, CIFAR100, STL10, AlexNet, VGG16, VGG19, ResNet, Inception, SqueezeNet)
- NVIDIA/unsupervised-video-interpolation

Segmentation

- Detectron2 by FAIR
- Pixel-wise Segmentation on VOC2012 Dataset using PyTorch
- Pywick High-level batteries-included neural network training library for Pytorch
- Improving Semantic Segmentation via Video Propagation and Label Relaxation

Geometric Deep Learning: Graph & Irregular Structures

- PyTorch Geometric, Deep Learning Extension
- <u>Self-Attention Graph Pooling</u>

- Position-aware Graph Neural Networks
- Signed Graph Convolutional Neural Network
- Graph U-Nets
- <u>Cluster-GCN: An Efficient Algorithm for Training Deep and Large Graph</u>
 Convolutional Networks
- MixHop: Higher-Order Graph Convolutional Architectures via Sparsified Neighborhood Mixing
- <u>Semi-Supervised Graph Classification: A Hierarchical Graph Perspective</u>
- PyTorch BigGraph by FAIR for Generating Embeddings From Large-scale Graph
 Data
- Capsule Graph Neural Network
- Splitter: Learning Node Representations that Capture Multiple Social Contexts
- A Higher-Order Graph Convolutional Layer
- Predict then Propagate: Graph Neural Networks meet Personalized PageRank
- Lorentz Embeddings: Learn Continuous Hierarchies in Hyperbolic Space
- Graph Wavelet Neural Network
- Watch Your Step: Learning Node Embeddings via Graph Attention
- Signed Graph Convolutional Network
- Graph Classification Using Structural Attention
- SimGNN: A Neural Network Approach to Fast Graph Similarity Computation
- SINE: Scalable Incomplete Network Embedding
- HypER: Hypernetwork Knowledge Graph Embeddings
- TuckER: Tensor Factorization for Knowledge Graph Completion

Sorting

• Stochastic Optimization of Sorting Networks via Continuous Relaxations

Ordinary Differential Equations Networks

- Latent ODEs for Irregularly-Sampled Time Series
- GRU-ODE-Bayes: continuous modelling of sporadically-observed time series

Multi-task Learning

Hierarchical Multi-Task Learning Model

<u>Task-based End-to-end Model Learning</u>

GANs, VAEs, and AEs

- Mimicry, PyTorch Library for Reproducibility of GAN Research
- Clean Readable CycleGAN
- StarGAN
- Block Neural Autoregressive Flow
- High-Resolution Image Synthesis and Semantic Manipulation with Conditional GANs
- A Style-Based Generator Architecture for Generative Adversarial Networks
- GANDissect, PyTorch Tool for Visualizing Neurons in GANs
- <u>Learning deep representations by mutual information estimation and maximization</u>
- Variational Laplace Autoencoders
- VeGANS, library for easily training GANs
- Progressive Growing of GANs for Improved Quality, Stability, and Variation
- Conditional GAN
- Wasserstein GAN
- Adversarial Generator-Encoder Network
- Image-to-Image Translation with Conditional Adversarial Networks
- <u>Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial</u> <u>Networks</u>
- On the Effects of Batch and Weight Normalization in Generative Adversarial Networks
- Improved Training of Wasserstein GANs
- Collection of Generative Models with PyTorch
 - Generative Adversarial Nets (GAN)
 - a. Vanilla GAN
 - b. Conditional GAN
 - c. InfoGAN
 - d. Wasserstein GAN
 - e. Mode Regularized GAN
 - Variational Autoencoder (VAE)
 - a. Vanilla VAE
 - b. Conditional VAE
 - c. Denoising VAE
 - d. Adversarial Autoencoder

- e. Adversarial Variational Bayes
- Improved Training of Wasserstein GANs
- CycleGAN and Semi-Supervised GAN
- Improving Variational Auto-Encoders using Householder Flow and using convex combination linear Inverse Autoregressive Flow
- PyTorch GAN Collection
- Generative Adversarial Networks, focusing on anime face drawing
- Simple Generative Adversarial Networks
- Adversarial Auto-encoders
- torchgan: Framework for modelling Generative Adversarial Networks in Pytorch

Unsupervised Learning

- Unsupervised Embedding Learning via Invariant and Spreading Instance Feature
- AND: Anchor Neighbourhood Discovery

Adversarial Attacks

- <u>Deep Neural Networks are Easily Fooled: High Confidence Predictions for Unrecognizable Images</u>
- Explaining and Harnessing Adversarial Examples
- AdverTorch A Toolbox for Adversarial Robustness Research

Style Transfer

- Detecting Adversarial Examples via Neural Fingerprinting
- A Neural Algorithm of Artistic Style
- Multi-style Generative Network for Real-time Transfer
- DeOldify, Coloring Old Images
- Neural Style Transfer
- Fast Neural Style Transfer
- Draw like Bob Ross

Image Captioning

- Neuraltalk 2, Image Captioning Model, in PyTorch
- Generate captions from an image with PyTorch

Transformers

- Attention is all you need
- Spatial Transformer Networks

Similarity Networks and Functions

Conditional Similarity Networks

Reasoning

• Inferring and Executing Programs for Visual Reasoning

General NLP

- Espresso, Module Neural Automatic Speech Recognition Toolkit
- <u>Label-aware Document Representation via Hybrid Attention for Extreme Multi-</u> Label Text Classification
- XLNet
- Conversing by Reading: Contentful Neural Conversation with On-demand Machine Reading
- Cross-lingual Language Model Pretraining
- Libre Office Translate via PyTorch NMT
- BERT
- VSE++: Improved Visual-Semantic Embeddings
- A Structured Self-Attentive Sentence Embedding
- Neural Sequence labeling model
- Skip-Thought Vectors
- Complete Suite for Training Seg2Seg Models in PyTorch
- MUSE: Multilingual Unsupervised and Supervised Embeddings

Question and Answering

- Visual Question Answering in Pytorch
- Reading Wikipedia to Answer Open-Domain Questions
- Deal or No Deal? End-to-End Learning for Negotiation Dialogues
- Interpretable Counting for Visual Question Answering

• Open Source Chatbot with PyTorch

Speech Generation and Recognition

- <u>PyTorch-Kaldi Speech Recognition Toolkit</u>
- WaveGlow: A Flow-based Generative Network for Speech Synthesis
- OpenNMT
- Deep Speech 2: End-to-End Speech Recognition in English and Mandarin

Document and Text Classification

- Hierarchical Attention Network for Document Classification
- Hierarchical Attention Networks for Document Classification
- CNN Based Text Classification

Text Generation

Pytorch Poetry Generation

Translation

Open-source (MIT) Neural Machine Translation (NMT) System

Sentiment Analysis

- Recurrent Neural Networks for Sentiment Analysis (Aspect-Based) on SemEval 2014
- Seg2Seg Intent Parsing
- Finetuning BERT for Sentiment Analysis

Deep Reinforcement Learning

- Image Augmentation Is All You Need: Regularizing Deep Reinforcement Learning from Pixels
- Exploration by Random Network Distillation
- EGG: Emergence of lanGuage in Games, quickly implement multi-agent games with discrete channel communication
- <u>Temporal Difference VAE</u>

- High-performance Atari A3C Agent in 180 Lines PyTorch
- Learning when to communicate at scale in multiagent cooperative and competitive tasks
- Actor-Attention-Critic for Multi-Agent Reinforcement Learning
- PPO in PyTorch C++
- Reinforcement Learning for Bandit Neural Machine Translation with Simulated Human Feedback
- Asynchronous Methods for Deep Reinforcement Learning
- Continuous Deep Q-Learning with Model-based Acceleration
- Asynchronous Methods for Deep Reinforcement Learning for Atari 2600
- Trust Region Policy Optimization
- Neural Combinatorial Optimization with Reinforcement Learning
- Noisy Networks for Exploration
- <u>Distributed Proximal Policy Optimization</u>
- Reinforcement learning models in ViZDoom environment with PyTorch
- Reinforcement learning models using Gym and Pytorch
- SLM-Lab: Modular Deep Reinforcement Learning framework in PyTorch

Deep Bayesian Learning and Probabilistic Programmming

- <u>BatchBALD: Efficient and Diverse Batch Acquisition for Deep Bayesian Active</u>
 Learning
- Subspace Inference for Bayesian Deep Learning
- Bayesian Deep Learning with Variational Inference Package
- Probabilistic Programming and Statistical Inference in PyTorch
- Bayesian CNN with Variational Inferece in PyTorch

Spiking Neural Networks

Norse, Library for Deep Learning with Spiking Neural Networks

Anomaly Detection

• <u>Detection of Accounting Anomalies using Deep Autoencoder Neural Networks</u>

Regression Types

Quantile Regression DQN

Time Series

- <u>Dual Self-Attention Network for Multivariate Time Series Forecasting</u>
- DILATE: Distortion Loss with shApe and tImE
- Variational Recurrent Autoencoder for Timeseries Clustering
- Spatio-Temporal Neural Networks for Space-Time Series Modeling and Relations
 <u>Discovery</u>

Synthetic Datasets

• Meta-Sim: Learning to Generate Synthetic Datasets

Neural Network General Improvements

- In-Place Activated BatchNorm for Memory-Optimized Training of DNNs
- <u>Train longer, generalize better: closing the generalization gap in large batch</u> training of neural networks
- FreezeOut: Accelerate Training by Progressively Freezing Layers
- Binary Stochastic Neurons
- Compact Bilinear Pooling
- Mixed Precision Training in PyTorch

DNN Applications in Chemistry and Physics

- Wave Physics as an Analog Recurrent Neural Network
- Neural Message Passing for Quantum Chemistry
- <u>Automatic chemical design using a data-driven continuous representation of</u> molecules
- Deep Learning for Physical Processes: Integrating Prior Scientific Knowledge

New Thinking on General Neural Network Architecture

- Complement Objective Training
- <u>Decoupled Neural Interfaces using Synthetic Gradients</u>

Linear Algebra

<u>Eigenvectors from Eigenvalues</u>

API Abstraction

Torch Layers, Shape inference for PyTorch, SOTA Layers

Low Level Utilities

• TorchSharp, .NET API with access to underlying library powering PyTorch

PyTorch Utilities

- PyTorch Metric Learning
- Kornia: an Open Source Differentiable Computer Vision Library for PyTorch
- BackPACK to easily Extract Variance, Diagonal of Gauss-Newton, and KFAC
- PyHessian for Computing Hessian Eigenvalues, trace of matrix, and ESD
- Hessian in PyTorch
- <u>Differentiable Convex Layers</u>
- Albumentations: Fast Image Augmentation Library
- Higher, obtain higher order gradients over losses spanning training loops
- Neural Pipeline, Training Pipeline for PyTorch
- Layer-by-layer PyTorch Model Profiler for Checking Model Time Consumption
- Sparse Distributions
- <u>Diffdist, Adds Support for Differentiable Communication allowing distributed</u> model parallelism
- HessianFlow, Library for Hessian Based Algorithms
- Texar, PyTorch Toolkit for Text Generation
- PyTorch FLOPs counter
- PyTorch Inference on C++ in Windows
- <u>EuclidesDB, Multi-Model Machine Learning Feature Database</u>
- Data Augmentation and Sampling for Pytorch
- PyText, deep learning based NLP modelling framework officially maintained by FAIR
- Torchstat for Statistics on PyTorch Models
- Load Audio files directly into PyTorch Tensors

- Weight Initializations
- Spatial transformer implemented in PyTorch
- PyTorch AWS AMI, run PyTorch with GPU support in less than 5 minutes
- <u>Use tensorboard with PyTorch</u>
- Simple Fit Module in PyTorch, similar to Keras
- torchbearer: A model fitting library for PyTorch
- PyTorch to Keras model converter
- Gluon to PyTorch model converter with code generation
- Catalyst: High-level utils for PyTorch DL & RL research

PyTorch Video Tutorials

- Practical Deep Learning with PyTorch
- PyTorch Zero to All Lectures

Datasets

Worldbank Data

Community

- PyTorch Discussion Forum
- StackOverflow PyTorch Tags

Links to This Repository

- Github Repository
- Website

To be Classified

- Perturbative Neural Networks
- Accurate Neural Network Potential
- Scaling the Scattering Transform: Deep Hybrid Networks
- CortexNet: a Generic Network Family for Robust Visual Temporal Representations
- Oriented Response Networks
- Associative Compression Networks

- <u>Clarinet</u>
- Continuous Wavelet Transforms
- mixup: Beyond Empirical Risk Minimization
- Network In Network
- Highway Networks
- Hybrid computing using a neural network with dynamic external memory
- Value Iteration Networks
- <u>Differentiable Neural Computer</u>
- A Neural Representation of Sketch Drawings
- <u>Understanding Deep Image Representations by Inverting Them</u>
- NIMA: Neural Image Assessment
- NASNet-A-Mobile. Ported weights
- Graphics code generating model using Processing