Deep Learning Masterclass

Short Description:

Deep learning is a subfield of machine learning that focuses on training artificial neural networks to learn and make predictions or decisions. It is inspired by the structure and function of the human brain, specifically the way neurons are connected and interact with each other.

Deep learning algorithms are designed to automatically learn and extract useful features from raw data by using multiple layers of artificial neural networks. These networks are composed of interconnected nodes, called neurons, organized in layers. Each neuron takes input data, applies a mathematical operation to it, and produces an output

Total Duration: 45 Hrs   Modules: 4   Assignments: 8

Related Tags : Python, ML, DL, Algorithms, Ai, Chatbot, neural networks, activation function , nodes or neurons , convolutional layer, recurrent networks , images , nlp technique.

Module 1 Deep Learning Concepts

- o Introduction to Deep Learning
- o Overview of deep learning and its applications
- o History and evolution of deep learning
- o Basic concepts: neural networks, activation functions, and optimization

Module 2 Neural Networks and its classification

Artificial Neural Networks

- o Perceptron's and multi-layer perceptron's
- o Forward propagation and backpropagation algorithms
- o Activation functions: sigmoid, ReLU, and others
- o Loss functions: mean squared error, cross-entropy, etc.

Training Deep Neural Networks

- o Data preprocessing and normalization
- o Gradient descent optimization algorithms
- o Regularization techniques: dropout, L1/L2 regularization
- o Mini-batch training and learning rate scheduling

Convolutional Neural Networks (CNNs)

- o Introduction to CNN architecture
- o Convolutional layers, pooling layers, and padding
- o CNN architectures: LeNet, AlexNet, VGG, ResNet
- o Transfer learning and fine-tuning

Recurrent Neural Networks (RNNs)

- o Introduction to RNNs and their applications
- o Backpropagation through time (BPTT)
- o Long Short-Term Memory (LSTM) networks
- o Gated Recurrent Units (GRUs)

Advanced Deep Learning Techniques

- o Generative Adversarial Networks (GANs)
- o Autoencoders and variational autoencoders (VAEs)
- o Reinforcement learning with deep neural networks
- o Attention mechanisms and transformer models

Module 3 Natural Language Processing (NLP) with Deep Learning

- o Word embeddings: Word2Vec, GloVe
- o Recurrent models for language modeling and text generation
- o Sequence-to-sequence models and machine translation
- o Transformer models: BERT, GPT, and their applications

Module 4 Deep Learning Frameworks and Tools

- o Overview of popular deep learning frameworks (TensorFlow, PyTorch)
- o Hands-on exercises and coding examples
- o Deployment and inference on GPUs or cloud platforms

Practical Projects and Applications

- o Image classification and object detection
- o Text sentiment analysis and language generation
- o Speech recognition and synthesis
- o Reinforcement learning in games or robotics

Current Trends and Future Directions

- o State-of-the-art advancements in deep learning
- o Ethical considerations and responsible AI
- o Open research challenges and ongoing developments

Module 5 Deep Learning Projects

- Age and Gender Detection with Deep Learning for Real-Time Applications
- Bit Coin Price Prediction
- Automatic Parking Vehicle Verification and Parking System using Number Plate Recognition
- Person Counting System using Deep Learning
- Vehicle Speed Estimation
- Face Recognition
- Automatic Multi-Class Classification of Food Ingredients using Deep Learning
- Detection Algorithms in Deep Learning
- Fire Detection Using Flame Detector in Deep Learning
- Image-to-Text, Text-to-Speech Conversion
- Social Distance Detection
- Handwritten Recognition using Deep Features
- Head Pose Estimation in the Wild Using Convolutional Neural Networks and Adaptive Gradient Methods
- Driver Drowsiness and Yawn Detection
- Drone Detection using OpenCV
- face Emotion Detection
- Automatic Leaf Characteristics Detection using Neural Network
- Face Recognition using OpenCV and Deep Learning
- Yolo Object Detection Using OpenCV Technique
- Face Clustering using DL
- Covid -19 chest X-ray images detection using dl
- Smart Glasses and sign Language Based Hand Gesture Recognition
- Optical Character Recognition using OpenCV

Deep Learning Assignments

- We need to learn about various initializers, constraints, regularizations, activation functions to create a deep learning model with the help of keras framework.
- Assignment 2: list various constraints and regularizers.
- Lesson 2: various constraints and regularizers implementations in keras deep learning model.
- Implement constraints and regularizers
- Assignment 3: what are various constraints how to implement them ?
- Lesson 3: activation functions
- Learn how to implement activation functions in keras framework.
- Assignment 4 -   describe how to use the pytorch framework .
- Lesson 4: pytorch
- Implementation of pytorch library file with deep learning models .