Deep Learning with Tensorflow Course Content

Course Description:

TensorFlow is a leading opensource framework for machine learning that is developed and maintained by Google. TensorFlow is the most popular deep learning library based on Python that provides different types of functionality for implementing deep learning models. TF high-level APIs are based on the Keras API standard for defining and training neural networks.

tf.Keras is popular because it provides a clean and simple interface, also allows much more computationally intensive deep learning models to be defined, fit, and evaluated in just a few lines of code. Using the TensorFlow tool beginners and experts can easily create machine learning models.

DeepLearning with TensorFlow online training provided by skilled professionals from end to end concepts. TensorFlow deep learning tutorial covers all basic and advanced topics such as regression, classification, create, develop MLP, CNN, RNN models, inspect, diagnose, overfitting reduction, training acceleration, autoencoders. By learning the Tensor flow concepts one can easily apply in deep learning technology applications.

Course Content:

Essential Programming

- Introduction to Deep Learning
- Introduction to Numpy
- Introduction to Tensorflow and Keras

Essential basics of Linear Algebra

- Solution of Equations, row and column Interpretation
- Vector Space Properties
- Partial Derivative of Polynomial and Two conditions for Local Minima
- Physical Interpretation of gradient (Direction of Maximum Change)
- Matrix-Vector Multiplication
- EVD and interpretation of Eighen Vectors
- Linear Independence and Rank of Matrix
- Orthonormal Matrices, Projection Matrices, Vandemonde Matrix, Markov Matrix, Symmetric, Block Diagonal

Selected topics of Machine Learning

- Intuition behind Linear Regression, classification
- Grid Search
- Gradient Descent
- Training Pipeline
- Metrics ROC Curve, Precision Recall Curve
- Calculating Entropy

Basics of Neural Network

- Evolution of Perceptrons, Hebbs Principle, Cat Experiment
- Single layer NN
- Tensorflow Code
- Multilayer NN
- Backpropagation, Dynamic Programming
- Mathematical Take on NN
- Function Approximator
- Link with Linear Regression
- Dropout and Activation
- Optimizers and Loss Functions

Introduction to Convolutional Neural Network

- 1D and 2D Convolution
- Why CNN for Images and speech?
- Convolution Layer
- Coding Convolution Layer
- Learning Sharpening using single Convolution Layer in Tensor-Flow

Different Layers in CNN pipeline

- Convolution
- Pooling
- Activation
- Dropout
- Batch Normalization
- Object Classification
- Creating Batch in Tensorflow and Normalize
- Training MNIST and CIFAR datasets
- Understanding a pre-trained Inception Architecture
- Input Augmentation Techniques for Images

Transfer Learning

- Finetuning last layers of CNN Model
- Selecting appropriate Loss
- Adding a new class in the Last Layer
- Making a model Fully Convolutional for Deployment
- Finetune Imagenet for Cats vs Dog Classification

Object Detection and Localization

- Different types of problem in Objects
- Difficulties in Object Detection and Localization
- Fast RCNN

- Faster RCNN
- YOLO v1-v3
- SSD
- MobileNet

Autoencoders

- Image Compression Simple Autoencoder
- Denoising Autoencoder
- Variational Autoencoder and Reparematrization Trick
- Robust Word Embedding using Variational Autoencoder

Time Series Modelling

- Evolution of Recurrent Structures
- LSTM, RNN, GRU, Bi-RNN, Time-Dense
- Learning a Sine Wave using RNN in Tensorflow
- Creating Autocomplete for Harry Potter in Tensorflow

GANs

- Generative vs Discrimative Models
- Theory of GAN
- Simple Distribution Generator in Tensorflow using MCMC (Markov Chain Monte Carlo)
- DCGAN,WGANs for Images
- InfoGANs, CycleGANs and Progressive GANs
- Creating a GAN for generating Manga Art

Model Free Approaches in Reinforcement Learning

- Model Free Prediction
- Monte Carlo Prediction and TD Learning
- Model Free Control with REINFORCE and SARSA Learning
- Assignment : Implementation of REINFORCE and SARSA Learning in Gridworld
- Off policy vs On Policy Learning
- Importance Sampling for Off Policy Learning
- Q Learning

Behavioral Cloning and Deep Q Learning

- Understanding Deep Learning as Function Approximator
- Theory of Behavioral Cloning and Deep Q Learning
- Revisiting Point Collector Example in Unity and
- Assignment : Training Cartpole Example via Deep Q Learning

Deep Learning in Action

- Face Detection using Yolo-v3

- Building Autocomplete Feature using RNNs
- Real-time Depth Prediction and Pose Estimation
- How is Deep Learning used in Autonomous Driver Assistant systems
- Tips and Tricks for scaling and easy Deployment of Deep Learning Models