

TensorFlow



e-Learning Course

TENSORFLOW: WHERE ML MEETS INNOVATION

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COURSE MODULES

Module 1: Introduction to TensorFlow

- Overview of TensorFlow and Deep Learning
- Installation and Setup
- TensorFlow vs. Other Deep Learning Frameworks
- TensorFlow 2.x vs. TensorFlow 1.x
- Understanding Tensors and Computational Graphs

Module 2: TensorFlow Basics

- Tensors: Rank, Shape, and Type
- Variables, Constants, and Placeholders
- Tensor Operations and Manipulations
- TensorFlow Data Types
- Eager Execution vs. Graph Execution

Module 3: Building Neural Networks with Keras API

- Introduction to Keras API
- Sequential vs. Functional API
- Building a Simple Neural Network
- Activation Functions (ReLU, Sigmoid, Softmax)
- Loss Functions and Optimizers
- Model Compilation, Training, and Evaluation

Module 4: Data Handling in TensorFlow

- Loading and Preprocessing Data with tf.data API
- Working with CSV, Images, and TFRecords
- Data Augmentation Techniques
- Normalization and Feature Scaling
- Handling Imbalanced Datasets

Module 5: Convolutional Neural Networks (CNNs)

- Understanding Convolutions and Pooling
- Building a CNN using TensorFlow & Keras
- Transfer Learning with Pretrained Models (VGG16, ResNet, MobileNet)
- Image Classification with CNNs
- Data Augmentation for Image Processing

Module 6: Recurrent Neural Networks (RNNs) and NLP

- Introduction to Recurrent Networks
- Understanding LSTMs and GRUs
- Text Processing with Tokenization and Embeddings
- Sentiment Analysis using RNNs
- Transformer Models and Attention Mechanism

Module 7: TensorFlow for Computer Vision

- Object Detection using TensorFlow
- Image Segmentation using U-Net
- Face Recognition with TensorFlow
- Generative Adversarial Networks (GANs) for Image Synthesis

Module 8: TensorFlow for Natural Language Processing

- Word Embeddings (Word2Vec, GloVe, FastText)
- Text Classification with LSTMs and CNNs
- Machine Translation using Sequence-to-Sequence Models
- Transformers and BERT with TensorFlow

Module 9: Custom Model Training and Optimization

- Custom Training Loops with `tf.GradientTape`
- Callbacks and Model Checkpointing
- Hyperparameter Tuning with Keras Tuner
- Distributed Training with `tf.distribute`

Module 10: TensorFlow for Time Series Analysis

- Introduction to Time Series Data
- Forecasting with LSTMs and GRUs
- Autoencoders for Anomaly Detection
- Attention Mechanism for Time Series Predictions

Module 11: Model Deployment and Serving

- Exporting Models for Deployment
- TensorFlow Serving for REST API
- Deploying Models with TensorFlow Lite (for Mobile & Edge devices)
- TensorFlow.js for Web-Based Machine Learning
- Running TensorFlow on Cloud (Google Cloud, AWS, Azure)

Module 12: Reinforcement Learning with TensorFlow

- Basics of Reinforcement Learning
- Deep Q-Learning and Policy Gradients
- Training Agents with TensorFlow Agents
- Reinforcement Learning Applications (Game AI, Robotics)

Module 13: TensorFlow Extended (TFX) for Production ML

- Data Validation and Preprocessing with TFX
- Model Analysis and Monitoring
- ML Pipelines with TensorFlow Extended
- Deploying End-to-End ML Pipelines