Micro Engineering Certification Program

PRACTICAL DEEP LEARNING: REAL WORLD DEEP LEARNING PROJECTS WITH HARDWARE IMPLEMENTATION

Course Summary

Course Duration	8 weeks (approximately 2-3hrs/week)
Resource Person	**Dr. Pramod Kumar Naik & Team**, Director AIEDGE Technologies Pvt Ltd Bangalore.
Purpose of the course	This course provides a comprehensive introduction and focuses on few concepts of machine learning techniques and practical deep learning using MATLAB® and Python. This course provides a comprehensive introduction to practical deep learning using MATLAB®. Attendees will learn how to create, train, and evaluate different kinds of deep neural networks. The training will also cover how to implement algorithms of NVIDIA GPUs to accelerate network training.

Topics include:

❖ Importing image and sequence data
❖ Using convolutional neural networks for image classification, regression, and other image applications
❖ Using long short-term memory networks for sequence classification and forecasting
❖ Modifying common network architectures to solve custom problems
❖ Improving the performance of a network by modifying training option

This course seeks to fill all those gaps in knowledge that scare off beginners and simultaneously apply your knowledge of Data

Science and Deep Learning to real-world business problems.

Pre-requisites

Undergraduate-level mathematics and experience with basic computer operations

This course has a comprehensive syllabus that tackles all the major components of Practical Deep learning.

Our Learning path includes:

Week 1	**Introduction to Artificial Intelligence**
	❖ Course Introduction
	❖ Fundamentals of MATLAB
	❖ Cell Data Type
	❖ Tables and Time Tables
	❖ Converting between Different Data Types
	❖ Acquire real time data with concepts of IOT
	❖ Handling Large Data Set
Week 2	**Data Pre-processing for Machine Learning using MATLAB**
	❖ Handing Missing Values
	❖ Feature Scaling and Data Discretization
	❖ Selecting the Right Method for your Data
	❖ Concepts of Machine Learning Vs Deep Learning
Week 3	**Machine Learning Concepts Using MATLAB**
	❖ Data Pre-processing
	❖ Classification
	❖ K-Nearest Neighbor
	❖ Naive Bayes
	❖ Decision Trees
	❖ Support Vector Machine
	❖ Machine

Week 4	**Introduction to Neural network** ❖ Introduction to Neural network ❖ Overview of Neural Network ❖ Introduction to neuron ❖ Classification of cancer cells using neural network. ❖ Wine classification using neural network.
Week 5	**Introduction to Image and Computer Vision** ❖ Introduction to Image Processing ❖ Introduction to Computer Vision ❖ Demos on image and Computer Vision **Transfer Learning for Image Classification** Objective: Perform image classification using pretrained networks. Use transfer learning to train customized classification networks. ❖ Pretrained networks ❖ Image datastores ❖ Transfer learning ❖ Network evaluation.
Week 6	**Interpreting Network Behavior** Objective: Gain insight into how a network is operating by visualizing image data as it passes through the network. Apply this technique to different kinds of images. ❖ Activations ❖ Feature extraction for machine learning **Creating Networks** Objective: Build convolutional networks from scratch. Understand how information is passed between network layers and how different types of layers work. ❖ Training from scratch ❖ Neural networks ❖ Convolution layers and filters
Week 7	**Training a Network** Objective: Understand how training algorithms work. Set training options to monitor and control training. ❖ Network training ❖ Training progress plots

	❖ Validation **Improving Network Performance** Objective: Choose and implement modifications to training algorithm options, network architecture, or training data to improve network performance. ❖ Training options ❖ Directed acyclic graphs ❖ Augmented datastores
Week 8	**Performing Image Regression** Objective: Create convolutional networks that can predict continuous numeric responses. ❖ Transfer learning for regression ❖ Evaluation metrics for regression networks **Using Deep Learning for Computer Vision** Objective: Train networks to locate and label specific objects within images. ❖ Image application workflow ❖ Object detection **Classifying Sequence Data** Objective: Build and train networks to perform classification on ordered sequences of data, such as time series or sensor data. ❖ Long short-term memory networks ❖ Sequence classification ❖ Sequence preprocessing ❖ Categorical sequences **Generating Sequences of Output** Objective: Use recurrent networks to create sequences of predictions. ❖ Sequence to sequence classification ❖ Sequence forecasting