Certified Deep Learning Specialist Course (CDLS)

Course Outline

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INTRODUCTION

Many international firms are engaged in the development of technologies categorized under the field of Artificial Intelligence. The systems equipped with Artificial Intelligence do not require constant human intervention to carry out the designated process. Such an intelligent computing system has the ability to learn things on its own according to the situation.

Technologies such as deep learning, intelligent robots and neuro-linguistic programming under Artificial Intelligence have been aiding in the enhancement of the existing computing systems to produce high value prediction.

The global artificial intelligence market is expected to reach USD 35,870.0 million by 2025 from its direct revenue sources, growing at a CAGR of 57.2% from 2017 to 2025. And the Deep Learning market in particular is expected to be worth USD 1772.9 Million by 2022, growing at a CAGR of 65.3% between 2016 and 2022

The Asia Pacific regional market is expected to be the fastest-growing market for Deep Learning, owing to the improvements in information storage capacity, high computing power, and parallel processing. The major drivers for the growth of the Deep Learning market are various industry verticals such as advertisement, finance and automotive.

This course will focus on the implementation of one of the newest libraries for implementing Deep Learning, called the Tensor Flow. The certification leverages intuitive approach to build complex models with human like intelligence that will help to solve real-world problems using Machine Learning and Deep Learning techniques.

After the course, participants will have a good understanding to build intelligent computing models in Python Jupiter Notebook platform using Scikit Learn and Tensor Flow. Participants will appreciate that Deep Learning is showing promise in areas where the traditional Artificial Intelligence approaches have failed in the past.

JOB ROLES in NICF / TARGET AUDIENCE

- AI Engineer
- Business Analyst
- Data Analyst
- Data Scientist
- IHL Students

PRE-REQUISITES

Participants are preferred to have experience in software development, business domain or data/business analysis.

PROGRAM STRUCTURE

This is a 4-day intensive training program with the following assessment components.

Component 1. Written Examination

Component 2. Project Work Component (PWC)

These components are individual based. Participants will need to obtain 70% in both the components in order to qualify for this certification. If the participant fail one of the components, they will not pass the course and have to re-take that particular failed component. If they fail both components, they will have to re-take the assessment.

COURSE SESSION SCHEDULE

Day 1	**Session 1 (9:00 – 10:30)**	**Session 2 (10:40 – 12:40)**	**Session 3 (13:40 – 14:10)**	**Session 4 (14:10 – 18:10)**
	Machine Learning- An overview	Machine Learning- An overview	Machine Learning- An overview	Model Selection methods in Machine Learning
Day 2	**Session 1 (9:00 – 10:30)**	**Session 2 (10:40 – 12:40)**	**Session 3 (13:40 – 14:10)**	**Session 4 (14:10 – 18:10)**
	Libraries for scientific computation and data analysis	Libraries for scientific computation and data analysis	Libraries for scientific computation and data analysis	Artificial Neural Network
Day 3	**Session 1 (9:00 – 10:30)**	**Session 2 (10:40 – 12:40)**	**Session 3 (13:40 – 14:10)**	**Session 4 (14:10 – 17:40)**
	Theories under Deep Learning	Theories under Deep Learning	Theories under Deep Learning	Types of Neural Network (Supervised and Unsupervised)
Day 4	**Session 1 (9:00 – 10:00)**	**Session 2 (10:10 – 12:10)**	**Session 3 (13:10 – 16:10)**	**Session 4 (16:10 – 18:40)**
	Introduction to Tensor Flow	Introduction to Tensor Flow	Restricted Boltzmann Machines and Deep Belief Network	CDLS examination

COURSE OUTLINE

Unit 1. Machine Learning- An overview

- Machine Learning Categories
- Supervised Learning Algorithms
- Unsupervised Learning Algorithms
- Reinforcement Learning
- Machine Learning Challenges

Unit 2. Model Selection methods in Machine Learning

- Why model selection
- Terminologies in model selection
- Pessimistic biased
- Confidence intervals
- Cross-validation
- Bootstrapping
- Hyper parameter tuning

Unit 3. Libraries for scientific computation and data analysis

- Scikit Learn algorithm cheat sheet
- SciPy
- NumPy
- Matplotlib
- Scikit learn objects
- Pipeline and feature unions in pipeline
- Machine Learning vs Deep Learning
- Why Deep Learning
- FAQs in Machine Learning design

Unit 4. Artificial Neural Network

- Use of Neural Network
- Firing rule in Artificial Neural Network
- Neural Network Architecture
- Feed forward network
- Multilayer feed forward network
- Back Propagation

Unit 5. Theories under Deep Learning

- Traditional ML for classification
- Logistic Regression vs Neural Net
- Mean Square error and Cross entropy
- Supervised vs Unsupervised (Deep Learning vs Machine Learning)
- Activation function
- ReLU
- Cost function
- Learning Rate
- Gradient Descent and Stochastic Gradient Descent
- Standardisation or z-scores
- “One hot” encoding
- Softmax function

Unit 6. Types of Neural Network (Supervised and Unsupervised)

- Convolutional Neural Network (CNN)
- Recurrent Neural Network (RNN)
- Long Short Term Memory Network (LSTM)

- Autoencoders
    - Deep Autoencoders
    - Denoising Auto encoders
    - Corruption Techniques
    - Stacked Denoising Autoencoders

Unit 7. Introduction to Tensor Flow

- Introduction to Tensors
- Tensor Flow preliminaries
- Construction Phase
- Computational Data Flow graph

Unit 8. Restricted Boltzmann Machines and Deep Belief Network

- Restricted Boltzmann Machines
- Deep Belief Net

HANDS-ON

Participants will have guided hands-on sessions on building Machine Learning and Deep Learning models. During this session they will gain understanding of several algorithms in building a successful intelligent computing system.

The program consists of two hands-on sessions, three hours duration each.

Hands-on 1: Set up and configure Anaconda IDE and Python Jupiter notebook. Participants will build Machine Learning models in Python using Scikit-Learn framework.

Hands-on 2: Participants will build Tensor Flow models in Python using Scikit-Learn framework.

WRITTEN ASSESSMENT

As part of the written examination, each participant will be assessed individually on the last day of the training for their understanding of the subject matter and ability to evaluate, choose and apply them in specific context and also the ability to identify and manage risks. The assessment focuses on higher levels of learning in Bloom's taxonomy: Application, Analysis, Synthesis and Evaluation.

This written examination will primarily consist of 40 multiple choice questions spanning various aspects as covered in the program. It is an individual, competency-based assessment.

COURSE OUTCOME

- Understand the overview of Machine Learning techniques
- Understand the different model selection methods in Machine Learning
- Understand the basic types of Deep Neural Networks (MLP, CNN, RNN, LSTM)
- Design and build Machine Learning models in Python Jupyter notebooks using Scikit Learn framework
- Design and build an end to end model using Tensor Flow in Python Jupyter notebooks

Tools/Software used:

- Jupyter Notebook
- TensorFlow
- scikit-learn