Module Title : DEEP LEARNING FOUNDATION CERTIFICATE

Duration : 2 days

Overview

Deep Learning is the fastest-growing field in Machine Learning and highly crucial for Artificial Intelligence, using many-layered Deep Neural Networks (DNNs) to make sense of data and enable many practical machine assists. This course introduces students to Deep Learning as a subject within advanced Artificial Intelligence and provides several real-life problem sets that can be solved using Deep Learning neural networks.

Learning Objective

- Understand the intuition behind Artificial Neural Networks
- Understand the intuition behind Convolutional Neural Networks
- Apply Artificial Neural Networks in practice
- Apply Convolutional Neural Networks in practice
- Understand the intuition behind Recurrent Neural Networks
- Apply Recurrent Neural Networks in practice

Who Should Attend

Anyone interested to learn more about Deep Learning, or kickstart a career as a Data Scientist. This includes Students, Data Analysts, Developers, Business Owners, Engineers, Product Architects, Entrepreneurs or any individual who wishes to leverage on powerful Deep Learning tools to add value, wherever they are.

Prerequisites

Students must have knowledge in basic high-school mathematics

Required Software

Anaconda for Python (version 3.x) Optionally Sublime Text

Outline

Day 1

What is Deep Learning and what are Neural Networks?

- Deep Learning as a branch of AI

- Neural networks and their history and relationship to neurons
- Creating a neural network in Python

Artificial Neural Networks (ANN) Intuition

- Understanding the neuron and neuroscience
- The activation function (utility function or loss function)
- How do NN's work?
- How do NN's learn?
- Gradient descent
- Stochastic Gradient descent
- Backpropagation

Building an ANN

- Getting the python libraries
- Constructing ANN
- Using the bank customer churn dataset
- Predicting if customer will leave or not

Evaluating Performance of an ANN

- Evaluating the ANN
- Improving the ANN
- Tuning the ANN

Hands-On Exercise

- Participants will be asked to build the ANN from the previous exercise
- Participants will be asked to improve the accuracy of their ANN

Convolutional Neural Networks (CNN) Intuition

- What are CNN's?
- Convolution operation
- ReLU Layer
- Pooling
- Flattening
- Full Connection
- Softmax and Cross-entropy

Day 2

Building a CNN

- Getting the python libraries

- Constructing a CNN
- Using the Image classification dataset
- Predicting the class of an image

Evaluating Performance of a CNN

- Evaluating the CNN
- Improving the CNN
- Tuning the CNN

Hands-On Exercise

- Participants will be asked to build the CNN from the previous exercise
- Participants will be asked to improve the accuracy of their CNN

Recurrent Neural Networks (RNN) Intuition

- What are RNN's?
- Vanishing Gradient problem
- LSTMs
- Practical intuition
- LSTM variations

Building a RNN

- Getting the python libraries
- Constructing RNN
- Using the stock prediction dataset
- Predicting stock price

Evaluating Performance of a RNN

- Evaluating the RNN
- Improving the RNN
- Tuning the RNN

Hands-On Exercise

- Participants will be asked to build the RNNfrom the previous exercise
- Participants will be asked to improve the accuracy of their RNN

Day 3

Natural Language Processing and Word Embeddings

- Word representation
- Word embeddings
- Word2Vec

- Sentiment Classification

Sequence Models and Attention Mechanism

- Picking the next word or sentence
- Beam Search
- What is an Attention Model?
- Speech Recognition
- Trigger Word Detection
- Working with Advanced NLP Models - GPT - 3

Hands-On Exercise

- Participants will be asked to use attention-based sequence models and evaluate their effectiveness
- Participants will be asked to improve the accuracy of their attention-based models

Building a Deep Learning Neural Network (DQN)

- Getting the Python libraries
- Constructing the DQN
- Working with OpenAI Gym
- Optimising a DQN

Reinforcement Learning

- What is reinforcement learning?
- K-Armed Bandit Problem - exploration / exploitation trade-off
- Markov Processes
- Policies and value functions
- Dynamic programming
- Q learning and Deep Q learning

Hands-On Exercise

- Participants will be asked to build the DQN from the previous exercise
- Participants will be asked to improve the accuracy of their DQN

Evaluating Performance of a DQN

- Evaluating the DQN
- Improving the DQN
- Tuning the DQN