

Course Outline

AI/DL Curriculum Walkthrough

1. Deep Learning Intro
2. Program Overview
3. Pedagogy
4. Course Modules & Projects
5. Learning Journey.

Deep Learning

We are only about a year into the worldwide Deep Learning explosion, and only about 5 years into its widespread use outside of the research laboratory. But in this very short period of time, a confluence of factors has helped this become the technique of choice for a variety of AI problems. These factors are - the proliferation of tools (TensorFlow, PyTorch and the like), easy availability of GPUs, and a systematic increase in labeled data (tagged photos, voice interfaces and the like). And as every company is looking to understand how it can use Deep Learning to get an edge, practitioners in this area have become extremely valuable and sought after. Roles like Deep Learning Engineer and Computer Vision Engineer have gone mainstream, and the opportunities in this space seem limitless.

Overview

In this course, you will first build strong foundations in neural networks and deep learning. Then you will use the techniques you learned to solve their most common application areas, namely Computer Vision and Natural language processing. In the process, you will have worked on a series of projects in Python, TensorFlow and Keras; and will have used packages such as NLTK, numpy, matplotlib and scikit-learn.

Deep learning is the most sought after skill in the data science and AI community, and it requires an experienced hand to guide you in your learning journey. In this program, you will learn from the best in the world - faculty from IIT Bombay, who have worked with the inventors and pioneers of Deep Learning, and seasoned practitioners who will give you a flavour of 'on-the-ground' realities.

Deep Learning Modules

1. Neural Networks & Deep Learning
 - Neural Networks
 - Building blocks (feedforward, backpropagation, activation functions, hyperparameters, gradient descent, softmax, cross entropy loss, etc.)
 - Multi-layer (deep) neural networks
 - Implementing deep neural networks (learning rate, hyperparameter selection, weight initialization, etc.)
2. Computer Vision
 - Convolutional Neural Networks(CNN)
 - Image processing using CNN
 - Pre-processing, semantic segmentation, localization and detection
 - CNN architectures and Transfer Learning

3. Natural Language Processing

- Recurrent Neural Networks (RNN) & Long-short term memory (LSTM)
- Common NLP techniques (Bag-of-words, POS tagging, tokenization, stop words, etc.)
- Word embedding (word2vec, GloVe)
- Sentiment analysis, Machine translation

In the process, you will also build your foundations, and develop proficiency in a series of important tools.

Pre-requisites:

- Python for Data Science
- Linear Algebra - Vectors, Matrices, Tensors
- Optimization techniques like Gradient Descent
- Necessary statistics, probability and differential calculus