



Electronics & ICT Academy

(Under Ministry of Electronics and Information Technology (MeitY), Govt. of India)

Indian Institute of Technology Guwahati, Guwahati, Assam, Pin 781039

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Online Faculty Development Programme on “Machine Learning and Artificial Intelligence”

Date: 12 to 19 October, 2020

Date	Time	Topic
Day-1 (12/10/2020)	10:00 am to 10:30 am	Inaugural Session
	10:30 am - 12:00 noon	<ol style="list-style-type: none"> Recent Trends in Artificial Intelligence Introduction to Python and Python Programming <ul style="list-style-type: none"> Python Environment Setup Instructions for Installing Anaconda and Managing Environment Introduction to Python programming Platform Data Analytics <ul style="list-style-type: none"> Introduction to python packages Working with Numpy, Pandas, Matplotlib, Seaborn Working with Data, Data Preprocessing and Visualization
	12:00 noon - 01:00 pm	Query Handling
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Hands-on Practice
Day-2 (13/10/2020)	10:00 am - 12:00 noon	<ol style="list-style-type: none"> Machine Learning <ul style="list-style-type: none"> Introduction to Machine Learning End to end cycle of Machine learning Gradient descent algorithm Supervised learning methods <ul style="list-style-type: none"> Regression - Linear regression and its types
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Working with Dataset – Application (Hands – on)
Day-3 (14/10/2020)	10:00 am - 12:00 noon	<ul style="list-style-type: none"> Logistic regression Time Series Analysis
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Hands-on Practice
Day-4 (15/10/2020)	10:00 am - 12:00 noon	Machine Learning <ul style="list-style-type: none"> Unsupervised learning methods <ul style="list-style-type: none"> Support vector machines kNN
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Hands-on Practice
Day-5 (16/10/2020)	10:00 am - 12:00 noon	Deep Learning <ul style="list-style-type: none"> Artificial Neural Networks <ul style="list-style-type: none"> ML vs DL Introduction to Neural Networks Deep Neural Network – Classification Applications
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Deep Neural Network Implementation (Hands- On)

Day-6 (17/10/2020)	10:00 am - 12:00 noon	<ul style="list-style-type: none"> ▪ Conventional Neural Network <ul style="list-style-type: none"> • Introduction to CNN architectures • Solving computer vision problems using DCNN ▪ Natural Language Processing <ul style="list-style-type: none"> • Using Neural Networks to solve NLP problems • Recommendation Systems • Classic application of NLP
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm - 03:00 pm	Break
	03:00 pm - 05:00 pm	Hands-on Practice
Day-7 (18/10/2020)	10:00 am - 12:00 noon	<ul style="list-style-type: none"> ▪ Recurrent Neural Network using LSTM <ul style="list-style-type: none"> • Simple Recurrent Unit • Advanced Recurrent Unit <p>Working With GPU (Demo)</p> <ul style="list-style-type: none"> ▪ Introduction to NVIDIA GPUs for High Speed Computing ▪ Object Recognition Algorithms ▪ Live Object Detection using JETSON NANO ▪ Project problem Statement discussion
	12:00 noon - 01:00 pm	Query Handling and Evaluation
	01:00 pm – 03:00 pm	Break
	03:00 pm – 05:00 pm	Hands-on Practice
Day-8 (19/10/2020)	10:00 am - 01:00 noon	Project Work (Offline)
	01:00 pm – 03:00 pm	Break
	03:00 pm – 04:00 pm	Project Work (Offline)
	04:00 pm	Valedictory Session (Online)

Pre requisites of the Course

1. **Installation of Anaconda 3.7** Software for all the working systems/Laptops.
2. Computer system/Laptops with min 4GB RAM, all the peripheral devices with working connection.(Check the working of Mike, Speaker and camera of the system well in prior)
3. Operating systems **64 bit** windows 7/8/10.
(Working with 32 bit systems will pose problems for installing library packages)
4. A Good speed Internet connectivity is mandatory for installing packages and other hands on sessions.
5. Google account of the participants.

Note: The participants must have

- i) Prior Knowledge of basic concepts of programming.
- ii) Basics of Linear algebra, Differential calculus and probability.



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Course Outcome

Upon completion of the training, the trainees will be able to:

1. Gain **knowledge of machine learning tool sets** to tackle most real world problems
2. Prepare and Manipulate Data with Python
3. Understand the various **regression, classification and other ML algorithms**
4. Communicate visually and effectively with **Matplotlib and Seaborn**
5. Machine learning: Supervised and Unsupervised Learning algorithms
6. Apply the state of art Deep Learning algorithms: Multi-Layer Perceptron (MLP), Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), NLP applications.

Objective of the Course

This Course will help trainees to understand

1. Basic intuition to enabling factors of ML and DL
2. The end to end Machine Learning problem statement
3. Working with Data, Data Preprocessing and Visualization using Python
4. Optimization algorithms like Gradient descent algorithm
5. Regression analysis
6. Supervised ML algorithms like SVM, KNN etc.
7. Deep Learning – Single and Multi-layer perceptron
8. Computer vision problem solving through : CNN, Object detection algorithm
9. Solving Natural Language processing problems.
10. EDGE AI: Working with Embedded GPU board.

Assignments & Project

1. Assignments will be of the following type:

- MCQ based questionnaire.
- Programming Assignments (Problem statement will be provided).

2. At the end of the course “Project” will be assigned to the participants which will be based on the Practical Case Studies.
