21AML04	HARDWARE ARCHITECTURE FOR MACHINE LEARNING	L	T	P	C
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Course Objectives
- Learn about architectural techniques to design hardware for training and inference in machine learning systems
- Know more about Hardware platforms
- Know about different accelerators

UNIT I	INTRODUCTION TO MACHINE LEARNING	9 Hours

Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests

UNIT II	CONVOLUTIONAL NEURAL NETWORKS	9 Hours

CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning – Recurrent and Recursive Nets – Recurrent Neural Networks – Deep Recurrent Networks – Recursive Neural Networks – Applications.

UNIT III	HARDWARE PLATFORMS	9 Hours

Computing need for machine learning; Overview of hardware platforms for training and inference (CPU, GPU, GPU+DSP, FPGAs, ASIC)

UNIT IV	ARCHITECTURES	9 Hours

ASIC design for machine learning; GPU based acceleration for ML; FPGA based acceleration for ML; Hardware-software co-optimization for machine learning

UNIT V	APPLICATIONS	9 Hours

Images segmentation – Object Detection – Automatic Image Captioning – Image generation with Generative adversarial networks – Video to Text with LSTM models – Attention models for Computer - Software libraries (PyTorch)

UNIT VI	RECENT TRENDS	

Recent Hardware Platforms available

TOTAL PERIODS: 45

Course Outcomes:
At the end of the course, Students can able to
- Know about architectural techniques to design hardware for training and inference in machine learning systems
- Understand various Hardware platforms
- Know about different accelerators

Text books:
1. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.

Reference Books:

1. Huang, Hantao., Yu, Hao. Compact and Fast Machine Learning Accelerator for IoT Devices. Germany: Springer Singapore, 2018.