DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Value Added Course on "Machine Learning with Scikit-Learn, Keras and Tensorflow"

21.02.2022 to 26.02.2022

Machine Learning with Scikit-Learn, Keras and Tensorflow   42 HOURS

Objectives
- To understand the basic theory underlying machine learning and artificial intelligence.
- To formulate machine learning problems corresponding to different applications
- To make use of Jetson Nano for model selection, tuning parameters, collection and processing Datasets.
- To acquire knowledge about the utilization of Jetson nano, Deep learning models and video processing techniques in real time.
- To acquire knowledge about the utilization of Jetson nano, Deep learning models and audio processing techniques in real time.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.

UNIT 1: GETTING START WITH AI   **(7)**
What is Artificial Intelligence – Datasets – Data Science - Machine Learning walkthrough – Learning types – How to use google Colaboratory – Python Packages – Numpy, Pandas, Matplotlib - Neural Networks – Deep Learning

UNIT 2: PYTHON PACKAGES AND MACHINE LEARNING TECHNIQUES (7)
Detection – Classification – Segmentation – Estimation – AI Real-world applications - Python Packages – Scikit-Learn, Keras - Regression algorithms (Linear regression, Multi Linear regression, Logistic regression) – Ideas related to projects in Regression.

UNIT 3: MODEL GENERATION AND INTRODUCTION TO JETSON NANO(7)
Classification algorithms - Clustering algorithms – Training the Model / Model Generation using regression, classification, clustering - Ideas related to projects in Classification and Clustering - Introduction to Jetson Nano – Basic Configurations - How to collect bulk images – How to annotate the images – Setting up examples in Jetson Nano.

UNIT 4: OBJECT DETECTION & VIDEO CLASSIFICATION   **(7)**
Image Detection in Jetson Nano – Digit Recognition – Face Detection – Color Picker and Color Detection – Eye Detection – Driver Drowsiness Detection – Deployment / Inference using generated regression, classification, and clustering models in Jetson nano - Video Classification using colab.

UNIT 5: REAL TIME PROCESS IN AUDIO ANALYTICS (7)

TensorFlow – Setting up TensorFlow – Loss Functions – Epochs – Object detection using TensorFlow – Speech Recognition – Speech recognition-based guessing game – Basic Personal Voice Assistance – Audio Classification – Problem statement for team.

UNIT 6: REAL TIME PROJECTS (7)

Real time projects in Classification, Clustering, Regression, Object Identification and Anomaly detection - Delivery and presenting own projects by teams – Evaluation of projects – Doubts and discussions – Assessment.

OUTCOMES
At the end of the course, the students will be able to

CO1: Explain Artificial Intelligence architectures and figure out the problems regarding Computer Vision.

CO2: Illustrate different machine learning problems corresponding to different applications.

CO3: Make use of Jetson Nano for Model selection, tuning parameters, collection and processing datasets in real time.

CO4: Apply the concepts of Deep learning models for video processing using Jetson nano in real time.

CO5: Apply the concepts of Deep learning models for audio processing using Jetson nano in real time.

CO6: Apply the algorithms to a real-world problem by optimizing the models learned and report on the expected accuracy that can be achieved by applying the models.