J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC AUTONOMOUS)

(Accredited by NBA&NAAC, Approved by AICTE & Permanently Affiliated to JNTUH Hyderabad)

Yenkapally (Vi), Moinabad (M). P.O. Himayat Nagar, RR District, Hyderabad 500075

Department of Electronics and Computer Engineering

Value-Added Course on Computer Vision

Report

Module Number: 11

Key Topics Covered: Transfer Learning using pretrained models (VG16, ResNet)

Resource Person(s): Mrs. Anusha Manda and Mr. Bheemana Bhuvan

Date and Time of Session: 05.12.2025 and 10.00am to 01.00pm Duration: 3 hours
Mode of Delivery: Face to Face Lecture Delivery

Target Audience: 2nd, 3rd and 4th year students

Number of Participants: 45

Venue: A403 Classroom

Objectives of the Course Module:

- Introducing the concept of Transfer Learning and how pretrained deep neural networks can be leveraged for new tasks
- Explaining the architectures of popular pretrained models such as **VGG16** and **ResNet**, focusing on their key design principles
- Demonstrating how to adapt pretrained models for downstream tasks (e.g., classification, detection) through techniques like feature extraction and fine-tuning
- Developing practical skills in implementing Transfer Learning using frameworks such as TensorFlow, Keras, or PyTorch
- Evaluating model performance when using pretrained networks versus training from scratch

Session conducted on a Value-Added Course on Computer Vision for 2nd, 3rd and 4th year students of ECM on 05.12.2025

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Expected Learning Outcomes of the Module: 11

By the end of the module, students could:

1. Define Transfer Learning and explain why it is effective for deep learning tasks with limited data.
2. Describe the architectures and characteristics of VGG16 (deep but simple) and ResNet (residual connections enabling very deep networks).
3. Explain the difference between feature extraction and fine-tuning.
4. Implement Transfer Learning using pretrained models such as VGG16 and ResNet in Python frameworks.
5. Modify and customize pretrained networks by adding new classification layers or adjusting model depth.
6. Apply fine-tuning strategies (freezing layers, unfreezing upper layers, adjusting learning rates).
7. Train and evaluate models on custom datasets using Transfer Learning.
8. Compare results of pretrained models with non-pretrained baselines using metrics such as accuracy, precision, recall, and loss curves.
9. Select the most suitable pretrained model for a given problem based on dataset size, complexity, and hardware.
10. Identify potential issues (e.g., domain mismatch, overfitting) and apply solutions to optimize performance.

Summary:

Students appreciated the practical, project-based learning approach, clear explanations with industry relevance and real-time demonstrations and coding practice

05/12/2025

Signature of the HoD-ECM

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