



Course Title	: OBJECT DETECTION
Course Code	: 23AVI3304A
L-T-P-S Structure	: 4-0-4-4
Pre-requisite	:
Credits	: 7
Course Coordinator	: Madhu Oruganti
Team of Instructors	:
Teaching Associates	:
Syllabus :	CO1: Introduction to Object Detection: Overview of Computer Vision and Image Processing, Basics of Object Detection, Historical Context and Evolution, Applications of Object Detection CO2: Classical Object Detection Techniques: Feature Extraction (SIFT, SURF, HOG), Sliding Window Approach, Region-based Methods (Selective Search), DPM (Deformable Part-based Models) CO3: Deep Learning for Object Detection: Convolutional Neural Networks (CNNs), Region-based CNN (R-CNN), Fast R-CNN and Faster R-CNN, Single Shot Detectors (SSD), You Only Look Once (YOLO) CO4: Advanced Deep Learning Models: Mask R-CNN, RetinaNet, EfficientDet, CenterNet, Recent Advancements and State-of-the-Art Models CO5: Build and optimize robust object detection models through effective dataset preparation, data augmentation, training strategies, evaluation metrics (mAP, precision, recall), and error analysis techniques.
Text Books :	1. Object Detection and Recognition in Digital Images: Theory and Practice, by Boguslaw Cyganek and Przemyslaw Gancarski, 2013, John Wiley & Sons, Ltd. 2. Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville, 2016, MIT Press.
Reference Books :	1. Pattern Recognition and Machine Learning, Christopher Bishop, 2006, Springer. 2. Computer Vision: Algorithms and Applications, Richard Szeliski, 2010, Springer. 3. Learning OpenCV 3: Computer Vision in C++ with the OpenCV Library , Adrian Kaehler and Gary Bradski, 2016, O'Reilly Media. 4. Deep Learning for Computer Vision: Expert techniques to train advanced neural networks using TensorFlow and Keras, Rajalingappa Shanmugamani, 2018, Packt Publishing.
Web Links :	Convolutional Neural Networks for Visual Recognition: https://cs231n.github.io/ Papers with Code – Object Detection Collection (All Models): https://paperswithcode.com/task/object-detection OpenCV Official Documentation (Classical Methods + Preprocessing): https://docs.opencv.org/ Convolutional Neural Networks for Visual Recognition: https://cs231n.github.io/ Papers with Code – Object Detection Collection (All Models): https://paperswithcode.com/task/object-detection OpenCV Official Documentation (Classical Methods + Preprocessing): https://docs.opencv.org/
MOOCs :	1. Introduction to Computer Vision and Image Processing (IBM) — https://www.coursera.org/learn/introduction-computer-vision-watson-opencv Covers foundations: image processing, computer vision basics, and early aspects of detection. 2. Deep Learning for Object Detection (MathWorks) — https://www.coursera.org/learn/deep-learning-object-detection Focuses on training object detection models (modern deep-learning based) including metrics and evaluation. 3. YOLO Custom Object Detection with Colab GPU (Packt) — https://www.coursera.org/learn/packt-computer-vision-yolo-custom-object-detection-with-colab-gpu-ixaf4 Practical course on a state-of-the-art model (YOLO), dataset preparation, customization, training. 4. Deep Learning for Computer Vision Specialization (MathWorks/others) —

	<p>https://www.coursera.org/specializations/deep-learning-computer-vision More comprehensive, covers deep learning architectures, detection, anomaly detection, synthetic data.</p> <p>5. Computer Vision for Engineering and Science Specialization — https://www.coursera.org/specializations/computer-vision Covers overall computer vision: detection, tracking, motion.</p>
Course Rationale :	<p>Object detection has become a foundational capability in modern computer vision, enabling machines to identify, locate, and understand visual elements within images and videos. With rapid advancements from classical feature-based methods to deep learning–driven architectures, this domain supports critical applications such as autonomous driving, surveillance, robotics, and medical imaging. The course bridges historical techniques like SIFT, HOG, and DPM with modern CNN-based systems including R-CNN, YOLO, SSD, and EfficientDet. It emphasizes the importance of robust dataset preparation, annotation quality, augmentation strategies, and model optimization. Students gain practical insight into how detection systems are trained, evaluated, and deployed using metrics such as precision, recall, and mAP. By combining theory with real-world examples, the course develops a comprehensive understanding of end-to-end object detection pipelines. Ultimately, it prepares learners to build reliable, high-performance object detection systems for contemporary AI applications.</p>
Course Objectives :	<p>The objective of this course is to equip students with a deep understanding of both classical and modern object detection methodologies. Learners will analyze feature extraction techniques, region-based approaches, and foundational models that shaped the evolution of detection systems. They will explore advanced deep learning architectures such as Faster R-CNN, YOLO, SSD, and Mask R-CNN to understand how accuracy and efficiency are achieved. The course trains students to prepare high-quality datasets, apply augmentation, tune hyperparameters, and adopt best practices for model training. Students will also learn to evaluate systems using standard quantitative metrics and perform systematic error analysis. Emphasis is placed on developing practical skills that enable deployment-ready models. By the end of the course, learners will be able to design, implement, optimize, and assess advanced object detection models for diverse real-world tasks.</p>

COURSE OUTCOMES (COs):

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO1	Understand and explain the core concepts of object detection, its applications, and its historical development within the broader field of computer vision the fundamental concepts of object detection	PO2,PSO2,PO1	2
CO2	Apply various object detection algorithms to real-world scenarios and classical object detection methods including feature extraction (SIFT, SURF, HOG), sliding window approaches, and region-based techniques (Selective Search & DPM).	PO1,PO3,PSO1	3
CO3	Apply object detection models like Mask R-CNN, RetinaNet, EfficientDet, and CenterNet, exploring recent advancements and the state-of-the-art.	PO2,PO2,PSO2	3
CO4	Construct a real-world problem using object detection techniques for a common and impactful application Explore modern object detection through Convolutional Neural Networks (CNNs), including R-CNN, Fast/Faster R-CNN, Single-Shot Detectors (SSD), and You Only Look Once (YOLO) architectures	PO3,PSO1,PO2,PO3,PO2,PSO1	3

CO NO	Course Outcome (CO)	PO/PSO	Blooms Taxonomy Level (BTL)
CO5	Build and optimize robust object detection models through effective dataset preparation, data augmentation, training strategies, evaluation metrics (mAP, precision, recall), and error analysis techniques.	PO1,PO1,PSO1	4
CO6	Identify a tool for visualizing the object clusters for incorporating required object in the specified domain	PSO2,PO1,PO1,PO11,PSO1	4
CO7	Determine the performance of various object detection methods to obtain the accuracy, speed, and efficiency on a given dataset.	PSO1,PO1,PO11	4

COURSE OUTCOME INDICATORS (COIs)::

Outcome No.	Highest BTL	COI-1	COI-2	COI-3	COI-4
CO1	2	Btl-1 Able to define fundamental concepts of object detection and computer vision.	Btl-2 Able to explain the historical development and evolution of object detection techniques. Able to illustrate various applications of object detection in real-world scenarios		
CO2	3	Btl-1 Able to list classical feature extraction methods such as SIFT, SURF, and HOG.	Btl-2 Able to summarize sliding window and region-based approaches like Selective Search and DPM.	Btl-3 Able to apply classical object detection algorithms to basic real-world problems.	
CO3	3	Btl-1 Able to identify deep learning–based object detection models such as Mask R-CNN, RetinaNet, EfficientDet, and CenterNet.	Btl-2 Able to describe the architectural differences between classical and modern detection models.	Btl-3 Able to apply advanced deep-learning object detection models to practical datasets.	
CO4	3	Btl-1 Able to recall convolutional neural network concepts relevant to object detection.	Btl-2 Able to outline R-CNN, Fast R-CNN, Faster R-CNN, SSD, and YOLO architectures.	Btl-3 Able to construct an object detection pipeline for a real-world use case using modern deep-learning models	
CO5	4	Btl-1 Able to define dataset preparation requirements for object detection tasks.	Btl-2 Able to explain data augmentation strategies and evaluation metrics like	Btl-3 Able to implement training strategies for improving object	Btl-4 Able to analyze and optimize object detection models through error analysis

Outcome No.	Highest BTL	COI-1	COI-2	COI-3	COI-4
			mAP, precision, and recall	detection model performance.	and performance tuning.
CO6	4	Btl-2 Able to identify visualization tools suitable for object cluster analysis..	Btl-2 Able to explain how object cluster visualization supports domain-specific model development	Btl-3 Able to apply visualization tools to interpret object detection outputs	Btl-4 Able to examine and interpret object clusters to incorporate required objects for a given domain
CO7	4	Btl-1 Able to recall various object detection methods and evaluation criteria.	Btl-2 Able to explain the factors affecting accuracy, speed, and model efficiency.	Btl-2 Able to compare object detection models based on performance metrics.	Btl-4 Able to evaluate and defend the performance of object detection models on a given dataset.

PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES (POs/PSOs)

Po No.	Program Outcome
PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
PO11	Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PSO1	An ability to design and develop Artificial Intelligence technology into innovative products for solving real world problems
PSO2	An ability to design and develop Data Science methods for analyzing massive datasets to extract insights by applying AI as a tool.

Lecture Course DELIVERY Plan:

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
1	CO1	COI-1	Introduction to Computer Vision	Text Book : 1	PPT,Talk	End Semester Exam,SEM-EXAM1
2	CO1	COI-2	Image Formation, Pixels & Basic Image Operations	Text Book : 1	PPT,Talk	End Semester Exam,SEM-EXAM1
3	CO1	COI-2	Introduction to Object Detection	Text Book : 1	PPT,Talk	End Semester Exam,SEM-EXAM1

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
4	CO1	COI-1	Classification vs Localization vs Detection	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
5	CO1	COI-2	Historical Evolution of Object Detection	Text Book : 1	PPT, Talk	ALM, End Semester Exam, SEM-EXAM1
6	CO1	COI-2	Haar Cascades & Viola-Jones	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
7	CO1	COI-2	Applications of Object Detection	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
8	CO1	COI-2	Challenges in Object Detection	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
9	CO1	COI-2	Traditional vs Deep Learning Methods	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
10	CO1	COI-1	CO1 Summary + Quiz+ Moocs Review	Text Book : 1	PPT, Talk	ALM, MOOCs Review, SEM-EXAM1
11	CO2	COI-1	SIFT Theory	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
12	CO2	COI-3	SIFT Implementation	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
13	CO2	COI-3	SURF Theory	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
14	CO2	COI-3	SURF Implementation + Comparison with SIFT	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
15	CO2	COI-3	HOG Features	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
16	CO2	COI-3	Sliding Window Detection	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
17	CO2	COI-3	Selective Search – Region Proposals	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
18	CO2	COI-3	DPM Introduction	Text Book : 1	PPT, Talk	End Semester Exam, SEM-EXAM1
19	CO2	COI-3	DPM Training + Evaluation	Text Book : 1	PPT, Talk	ALM, End Semester Exam, SEM-EXAM1

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
20	CO2	COI-1	CO2 Revision + Mini-Lab +Moocs Review	Text Book : 1	PPT,Talk	ALM,End Semester Exam,MOOCs Review,SEM-EXAM1
21	CO3	COI-2	CNN Basics (Conv, Pooling, Feature Maps)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
22	CO3	COI-3	CNN Architectures (VGG, ResNet)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
23	CO3	COI-2	R-CNN – Theory & Workflow	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
24	CO3	COI-3	Fast R-CNN – ROI Pooling + Training	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
25	CO3	COI-3	Faster R-CNN – RPN Architecture	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
26	CO3	COI-3	SSD Architecture (Multi-Scale, Anchors)	Text Book : 2	PPT,Talk	ALM,End Semester Exam,SEM-EXAM2
27	CO3	COI-3	SSD Modelling & Training Pipeline	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
28	CO3	COI-3	SSD vs R-CNN vs Faster R-CNN – Performance Evaluation	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
29	CO3	COI-3	YOLOv1 Architecture	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
30	CO3	COI-3	YOLOv1 Modelling & Training	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
31	CO3	COI-3	YOLOv2 & YOLOv3 – Improvements Over YOLOv1	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
32	CO3	COI-1	CO3 Revision + Hands-on Training +Moocs	Text Book : 2	PPT,Talk	ALM,End Semester Exam,MOOCs Review,SEM-EXAM2
33	CO4	COI-2	Mask R-CNN Overview	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
34	CO4	COI-3	Mask R-CNN Architecture + Modelling + Training	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
35	CO4	COI-	RetinaNet Architecture + Focal Loss	Text Book : 2	PPT,Talk	End Semester Exam,SEM-

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
		3				EXAM2
36	CO4	COI-3	RetinaNet Modelling + Training	Text Book : 2	PPT,Talk	ALM,End Semester Exam,SEM-EXAM2
37	CO4	COI-3	EfficientDet Architecture (BiFPN, EfficientNet)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
38	CO4	COI-3	EfficientDet Modelling + Training	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
39	CO4	COI-3	DETR Architecture (Encoder, Decoder, Queries, Attention)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
40	CO4	COI-3	DETR Modelling + Training + Transfer Learning	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
41	CO4	COI-3	YOLOv4 → YOLOv9 Architecture + Training Enhancements	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
42	CO4	COI-1	CO4 Revision + Advanced Detector Comparison + Moocs Review	Text Book : 2	PPT,Talk	ALM,End Semester Exam,MOOCs Review,SEM-EXAM2
43	CO5	COI-2	Dataset Preparation (COCO, VOC, Custom)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
44	CO5	COI-3	Annotation Tools (LabelImg, CVAT, Roboflow)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
45	CO5	COI-3	Data Augmentation Techniques	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
46	CO5	COI-4	Model Building Using CNN & RNN	Text Book : 2	PPT,Talk	ALM,End Semester Exam,SEM-EXAM2
47	CO5	COI-4	Training Strategies (LR Schedules, Optimizers, Transfer Learning)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
48	CO5	COI-4	Evaluation Metrics (IoU, Precision, Recall, F1, mAP)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
49	CO5	COI-4	mAP Calculation & PR Curves	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
50	CO5	COI-4	Error Analysis (FP, FN, Misclassifications)	Text Book : 2	PPT,Talk	End Semester Exam,SEM-EXAM2
51	CO5	COI-	Optimization for Imbalanced Data	Text Book : 2	PPT,Talk	End Semester Exam,SEM-

Sess.No.	CO	COI	Topic	Book No[CH No][Page No]	Teaching-Learning Methods	Evaluation Components
		4	(Focal Loss, Weighted Loss)			EXAM2
52	CO5	COI-4	Final Model Evaluation + Project Presentation	Text Book : 2	PPT, Talk	End Semester Exam, Global Challenges, MOOCs Review, SEM-EXAM2

Lecture Session wise Teaching – Learning Plan

SESSION NUMBER : 1

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Handout Explanation	2	PPT	--- NOT APPLICABLE --
20	What is Computer Vision , Role of CV in AI	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 2

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Image Formation Basics	2	PPT	--- NOT APPLICABLE --
20	Pixel-Level Operations	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 3

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Definition of Object Detection	2	PPT	--- NOT APPLICABLE - --
20	Detection vs Other Vision Tasks	2	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 4

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Image Classification	2	PPT	--- NOT APPLICABLE - --
20	Localization & Detection	2	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	PPT	--- NOT APPLICABLE - --

SESSION NUMBER : 5

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Early Rule-Based Methods	2	PPT	One minute paper
20	Transition to Deep Learning Era	2	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
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SESSION NUMBER : 6

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Haar Feature Extraction	2	PPT	--- NOT APPLICABLE --
20	Cascade Classifier	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 7

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Industrial Use Cases	2	PPT	--- NOT APPLICABLE --
20	Safety & Monitoring Applications	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 8

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
20	Real-world Variations	2	PPT	--- NOT APPLICABLE --
20	Occlusions & Clutter	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 9

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Handcrafted Feature Detectors	2	PPT	--- NOT APPLICABLE --
20	Deep Learning-based Detectors	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 10

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Concept Recap	1	PPT	--- NOT APPLICABLE --
20	Quiz/Review Test	1	PPT	Quiz/Test Questions
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 11

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Keypoint Detection	2	PPT	--- NOT APPLICABLE --
20	Descriptor Computation SIFT Theory	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 12

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	SIFT Implementation Feature Extraction Pipeline	3	PPT	--- NOT APPLICABLE --
20	Feature Matching	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 13

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Brief of SURF Theory Hessian-Based Keypoints	3	PPT	--- NOT APPLICABLE --
20	SURF Descriptor	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
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SESSION NUMBER : 14

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Real-time SURF Execution	3	PPT	--- NOT APPLICABLE --
20	Comparison with SIFT	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 15

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Gradient-Based Features	3	PPT	--- NOT APPLICABLE --
20	Descriptor Construction	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 16

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
20	Window Scanning Technique	3	PPT	--- NOT APPLICABLE --
20	Multi-scale Detection	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 17

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Region Proposal Generation	3	PPT	--- NOT APPLICABLE --
20	Grouping Strategy	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 18

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Part-Based Detection	3	PPT	--- NOT APPLICABLE --
20	Model Structure	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 19

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Model Training	3	PPT	--- NOT APPLICABLE ---
20	Evaluation Metrics	3	PPT	Seminars
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 20

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Concept Recap, Moocs Review	1	PPT	--- NOT APPLICABLE ---
20	Hands-on Practice	1	PPT	Case Study
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 21

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Convolutions & Filters	2	PPT	--- NOT APPLICABLE ---
20	Pooling Operations	2	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 22

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	VGG Networks	3	PPT	--- NOT APPLICABLE - --
20	ResNet & Skip Connections	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 23

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Region Proposal-Based Detection, Multi-stage Pipeline	2	PPT	--- NOT APPLICABLE - --
20	Feature Extraction, Bounding Box Regression	2	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 24

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	ROI Pooling	3	PPT	--- NOT APPLICABLE - --
20	Unified Training	3	PPT	--- NOT APPLICABLE - --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 25

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Region Proposal Network	3	PPT	--- NOT APPLICABLE --
20	Fully Shared Features	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 26

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Multi-scale Feature Maps	3	PPT	--- NOT APPLICABLE --
20	Anchor Boxes	3	PPT	One minute paper
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 27

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--
20	Anchor Matching Strategy	3	PPT	--- NOT APPLICABLE - --
20	Training Pipeline	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 28

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Speed Differences	3	PPT	--- NOT APPLICABLE - --
20	Accuracy Differences	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 29

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Grid-Based Detection	3	PPT	--- NOT APPLICABLE - --
20	Single Network Prediction	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 30

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Bounding Box Prediction	3	PPT	--- NOT APPLICABLE - --
20	Training Loss Function	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 31

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Anchor Box Integration	3	PPT	--- NOT APPLICABLE - --
20	Multi-scale Predictions	3	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 32

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Model Recap , Mooc s Review	1	PPT	--- NOT APPLICABLE - --
20	Hands-on Practice	1	PPT	Debate

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 33

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Instance Segmentation	2	PPT	--- NOT APPLICABLE --
20	Mask Branch	2	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 34

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	ROI Align	3	PPT	--- NOT APPLICABLE --
20	Training Procedure	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 35

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Feature Pyramid Network	3	PPT	--- NOT APPLICABLE ---
20	One-Stage Detection	3	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 36

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Class Imbalance Handling	3	PPT	--- NOT APPLICABLE ---
20	Stable Training	3	PPT	Brain storming session
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 37

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	BiFPN	3	PPT	--- NOT APPLICABLE ---
20	Compound Scaling	3	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 38

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Data Preprocessing	3	PPT	--- NOT APPLICABLE --
20	Hyperparameter Tuning	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 39

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Transformers for Detection	3	PPT	--- NOT APPLICABLE --
20	Query-Based Predictions	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 40

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Set-Based Losses	3	PPT	--- NOT APPLICABLE --
20	Fine-Tuning	3	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 41

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Bag of Tricks	3	PPT	--- NOT APPLICABLE --
20	Structural Innovations	3	PPT	--- NOT APPLICABLE --
5	Conclusion	1	PPT	--- NOT APPLICABLE --

SESSION NUMBER : 42

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Advanced Detector Recap + Mooc Review	1	PPT	--- NOT APPLICABLE --
20	Detector Comparison	1	PPT	Case Study
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 43

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
20	COCO/VOC Standards	2	PPT	--- NOT APPLICABLE ---
20	Custom Dataset Creation	2	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 44

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	LabelImg Use	3	PPT	--- NOT APPLICABLE ---
20	CVAT/Roboflow Tools	3	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 45

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
20	Spatial Augmentation	3	PPT	--- NOT APPLICABLE ---
20	Photometric Augmentation	3	PPT	--- NOT APPLICABLE ---
5	Conclusion	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 46

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Detection Pipeline Setup	4	PPT	--- NOT APPLICABLE - --
20	Sequence Models in Vision	4	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 47

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	Learning Rate Scheduling	4	PPT	--- NOT APPLICABLE - --
20	Optimizer Selection	4	PPT	--- NOT APPLICABLE - --
5	Conclusion	1	Talk	--- NOT APPLICABLE - --

SESSION NUMBER : 48

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE - --
20	IoU, Precision, Recall	4	PPT	--- NOT APPLICABLE - --
20	F1 and mAP	4	PPT	--- NOT APPLICABLE - --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Conclusion	4	PPT	--- NOT APPLICABLE --

SESSION NUMBER : 49

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	AP Computation	4	PPT	--- NOT APPLICABLE --
20	PR Curve Analysis	4	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 50

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	False Positives/Negatives	4	PPT	--- NOT APPLICABLE --
20	Misclassification Patterns	4	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 51

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Handling Imbalance	4	PPT	--- NOT APPLICABLE --
20	Final Model Evaluation	4	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 52

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
20	Moocs Review	1	PPT	--- NOT APPLICABLE --
20	Review Global Challenges	1	PPT	--- NOT APPLICABLE --
5	Conclusion	1	Talk	--- NOT APPLICABLE --

Tutorial Course DELIVERY Plan:

NO Delivery Plan Exists

Tutorial Session wise Teaching – Learning Plan

No Session Plans Exists

Practical Course DELIVERY Plan:

Tutorial Session no	Topics	CO-Mapping
1	Implement basic image operations (grayscale conversion, thresholding, smoothing) on any sample image using OpenCV.	CO6

Tutorial Session no	Topics	CO-Mapping
2	Visualize pixel intensity distributions by generating histogram plots for RGB and grayscale images.	CO6
3	Build a region-of-interest (ROI) extractor that allows users to select and crop objects from an image.	CO6
4	Implement Haar Cascade detection for face, eyes, or license plates and analyze false positives.	CO6
5	Implement SIFT keypoint detection and visualize keypoints + descriptors.	CO6
6	Extract SURF features and compare their speed and robustness with SIFT using benchmark images.	CO6
7	Compute HOG features and use a sliding window classifier to detect pedestrians.	CO6
8	Implement Selective Search to extract region proposals and count proposed bounding boxes.	CO6
9	Train a simple CNN classifier and extend it to a localization model (class + bounding box regression).	CO6
10	Implement R-CNN inference pipeline using selective search region proposals + CNN feature extraction.	CO6
11	Train a Faster R-CNN model on a small custom dataset using a standard framework (PyTorch/TensorFlow).	CO6
12	Train an SSD model for multi-class detection and compare FPS vs Faster R-CNN.	CO6
13	Implement and train a YOLOv3/YOLOv5 model using a custom annotated dataset.	CO6
14	Evaluate RetinaNet using Focal Loss, comparing results with Faster R-CNN on class imbalance.	CO6
15	Perform end-to-end deployment of an object detection model in a real-time webcam inference system.	CO6
16	Implementation and analysis of project work	CO6
17	Implementation and analysis of project work	CO6
18	Implementation and analysis of project work	CO6
19	Implementation and analysis of project work	CO6
20	Implementation and analysis of project work	CO6

Practical Session wise Teaching – Learning Plan

SESSION NUMBER : 1

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	Talk	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 2

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	Talk	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 3

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 4

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 5

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 6

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 7

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 8

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 9

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--

SESSION NUMBER : 10

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 11

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 12

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	2	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 13

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	Talk	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	3	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 14

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 15

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 16

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 17

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 18

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--

SESSION NUMBER : 19

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 20

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

Skilling Course DELIVERY Plan:

Skilling session no	Topics/Experiments	CO-Mapping
1	Explain how image formation and sampling affect object detection accuracy.	CO7
2	Compare classification, localization, and object detection with practical examples.	CO7
3	Describe real-time detection challenges such as lighting, occlusion, and scale variations.	CO7
4	Illustrate the historical growth from Viola–Jones to modern CNN-based detectors.	CO7
5	Compare SIFT, SURF, and HOG in terms of invariance and computational efficiency	CO7
6	Explain the sliding-window detection idea and its limitations.	CO7
7	Discuss how Selective Search improves over exhaustive search.	CO7
8	State how Deformable Part Models (DPM) represent objects with mixtures of parts.	CO7
9	How does ROI Pooling in Fast R-CNN improve training and inference?	CO7
10	Compare SSD and YOLO in terms of speed and accuracy.	CO7
11	Explain how Region Proposal Networks (RPNs) work in Faster R-CNN.	CO7
12	Describe anchor boxes and their role in bounding-box regressions.	CO7
13	Explain the working of BiFPN in EfficientDet.	CO7
14	Discuss the role of Focal Loss RetinaNet.	CO7
15	Discuss the role of Focal Loss RetinaNet.	CO7
16	Project implementation	CO7

Skilling Session wise Teaching – Learning Plan

SESSION NUMBER : 1

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE -

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 2

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 3

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE ---
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 4

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE ---
20	Explanation on program	2	PPT	--- NOT APPLICABLE ---
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE ---
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE ---

SESSION NUMBER : 5

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE ---
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE ---
20	Explanation on program	2	PPT	--- NOT APPLICABLE ---
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE ---
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE ---

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--

SESSION NUMBER : 6

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	PPT	--- NOT APPLICABLE --

SESSION NUMBER : 7

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 8

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 9

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 10

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 11

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 12

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 13

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 14

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
				--

SESSION NUMBER : 15

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

SESSION NUMBER : 16

No Session Outcomes are mapped

Time(min)	Topic	BTL	Teaching-Learning Methods	Active Learning Methods
5	Attendance	1	Talk	--- NOT APPLICABLE --
5	Precap & environment setup	2	PPT	--- NOT APPLICABLE --
20	Explanation on program	2	PPT	--- NOT APPLICABLE --
50	Implementation of the experiment	4	PPT	--- NOT APPLICABLE --
20	Evaluation & viva	1	Talk	--- NOT APPLICABLE --

WEEKLY HOMEWORK ASSIGNMENTS/ PROBLEM SETS/OPEN ENDED PROBLEM-SOLVING EXERCISES etc:

Week	Assignment Type	Assignment No	Topic	Details	co
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COURSE TIME TABLE:

	Hour	1	2	3	4	5	6	7	8	9
Day	Component									
Mon	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--
Tue	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--
Wed	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--
Thu	Theory	---	---	H-S1	--	--	--	--	--	--
	Tutorial	---	---	--	--	--	--	--	--	--
	Lab	---	---	--	H-S1	H-S1	--	--	--	--
	Skilling	---	---	--	--	--	H-S1	H-S1	--	--
Fri	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--
Sat	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--
Sun	Theory	--	--	--	--	--	--	--	--	--
	Tutorial	--	--	--	--	--	--	--	--	--
	Lab	--	--	--	--	--	--	--	--	--
	Skilling	--	--	--	--	--	--	--	--	--

REMEDIAL CLASSES:

Supplement course handout, which may perhaps include special lectures and discussions that would be planned, and schedule notified according

SELF-LEARNING:

Assignments to promote self-learning, survey of contents from multiple sources.

S.no	Topics	CO	ALM	References/MOOCS
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DELIVERY DETAILS OF CONTENT BEYOND SYLLABUS:

Content beyond syllabus covered (if any) should be delivered to all students that would be planned, and schedule notified accordingly.

S.no	Advanced Topics, Additional Reading, Research papers and any	CO	ALM	References/MOOCS
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EVALUATION PLAN:

Evaluation Type	Evaluation Component	Weightage/Marks		Assessment Dates	Duration (Hours)	CO1	CO2	CO3	CO4	CO5	CO6	CO7
End Semester Summative Evaluation Total= 40 %	Lab End Semester Exam	Weightage	8		120							8
		Max Marks	50									50
	End Semester Exam	Weightage	24		120	4.8	4.8	4.8	4.8	4.8		
		Max Marks	100			20	20	20	20	20		
	SEM End Project	Weightage	8		120							8
		Max Marks	50									50
In Semester Formative Evaluation Total= 24 %	Global Challenges	Weightage	3		120							3
		Max Marks	100									100
	MOOCs Review	Weightage	4		120	1	1	1	1			
		Max Marks	100			25	25	25	25			
	Continuous Evaluation - Project	Weightage	5		120							5
		Max Marks	100									100
In Semester Summative Evaluation Total= 36 %	Continuous Evaluation - Lab Exercise	Weightage	5		120							5
		Max Marks	100									100
	ALM	Weightage	7		120	1.75	1.75	1.75	1.75			
		Max Marks	100			25	25	25	25			
	Project-Evaluation	Weightage	6		90							6
		Max Marks	50									50
	Lab In Semester Exam	Weightage	6		90							6
		Max Marks	50									50
	Semester in Exam-II	Weightage	9		90			4.5	4.5			
		Max Marks	50					25	25			
	Surprise Quiz	Weightage	6		90							6
		Max Marks	50									50
	Semester in Exam-I	Weightage	9		90	4.5	4.5					
		Max Marks	50			25	25					

ATTENDANCE POLICY:

Every student is expected to be responsible for regularity of his/her attendance in class rooms and laboratories, to appear in scheduled tests and examinations and fulfill all other tasks assigned to him/her in every course. In every course, student has to maintain a minimum of 85% attendance to be eligible for appearing in Semester end examination of the course, for cases of medical issues and other unavoidable circumstances the students will be condoned if their attendance is between 75% to 85% in every course, subjected to submission of medical certificates, medical case file and other needful documental proof to the concerned departments.

DETENTION POLICY :

In any course, a student has to maintain a minimum of 85% attendance and In-Semester Examinations to be eligible for appearing to the Semester End Examination, failing to fulfill these conditions will deem such student to have been detained in that course.

PLAGIARISM POLICY :

Supplement course handout, which may perhaps include special lectures and discussions

COURSE TEAM MEMBERS, CHAMBER CONSULTATION HOURS AND CHAMBER VENUE DETAILS:

Supplement course handout, which may perhaps include special lectures and discussions

Name of Faculty	Delivery Component of Faculty	Sections of Faculty	Chamber Consultation Day (s)	Chamber Consultation Timings for each day	Chamber Consultation Room No:	Signature of Course faculty:
Sandeep Chitreddy	L	1-MA	-	-	-	-
Sandeep Chitreddy	P	1-A	-	-	-	-
Sandeep Chitreddy	S	1-A	-	-	-	-
Gangamohan Paidi	P	1-B	-	-	-	-
Gangamohan Paidi	S	1-B	-	-	-	-

GENERAL INSTRUCTIONS

Students should come prepared for classes and carry the text book(s) or material(s) as prescribed by the Course Faculty to the class.

NOTICES

Most of the notices are available on the LMS platform.

All notices will be communicated through the institution email.

All notices concerning the course will be displayed on the respective Notice Boards.

Signature of COURSE COORDINATOR

(Madhu Oruganti)(9001)(AI&DS)

Signature of Department Prof. Incharge Academics & Vetting Team Member

Department Of AI&DS

HEAD OF DEPARTMENT:

Approval from: DEAN-ACADEMICS

(Sign with Office Seal)

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