Course Code	UDS21502J	Course Name	*REAL-WORLD COMPUTER VISION APPLICATIONS*	Course Category	C	Professional Core Course	L	T	P	C
							4	0	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	To teach the participants about computer vision and the role it plays in building artificial intelligence solutions, how the machine is trained to understand and interpret the visual world.																		
CLR-2 :	To build intelligent and automated real-world computer vision applications and use cases spanning healthcare, retail, energy verticals by intelligently analyzing different datasets collected from diverse data sources.																		
CLR-3 :	To teach the participants with wide variety of computer vision techniques such as digitization, histogram manipulation, warping, filtering, segmentation, restoration and compression.																		
CLR-4 :	To teach the participants to build computer vision applications involving optical character recognition for converting printed or handwritten text into a digital format.																		
CLR-5 :	To teach the participants about medical imaging that helps in mimicking the tasks performed by human vision.																		
CLR-6 :	To understand all that is involved in building a computer vision use case for tracking the predicting customer Instore wait time at the store using all the computer vision techniques out there																		

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Be exposed to the role of computer vision techniques play in building real-world artificial intelligence solution by training the machines to understand and interpret the visual world.	2	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-2 :	Have hands-on skills and knowledge, expertise in training a generative model by framing the problem as a supervised learning problem with two sub-models.	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-3 :	collect and utilize related computer vision tasks that involve identifying objects in digital photographs	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-4 :	Have a firm control on the concepts of augmented reality, the business benefits of augmented reality, its challenges of implementation etc.	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-5 :	Get hands-on skills, knowledge and expertise in creating a full scale Medical Image based on computer vision techniques	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*
CLO-6 :	Have have excellent capabilities of demonstrating their expertise in building a full scale Customer In-store Wait Time Usecase end to end	3	85	80	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*H*	*H*	*H*	*H*

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Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	SLO-1	**Unit 1: Role of Computer Vision in AI**	Deepface	Satellite to Map Image Translation Dataset	**Unit 9: Augmented Reality with Computer Vision.**	Data pipeline
	SLO-2	Computer Vision Overview	Yolo	How to Develop and Train a Pix2Pix Model	Augmented Reality with Computer Vision Overview	Model selection
S-2	SLO-1	Relationship between Computer Vision & AI	**Unit 4: Basic Image and Digital Image Processing**	How to Translate Images With a Pix2Pix Model	How does Augmented Reality work?	Model engineering
	SLO-2	Tasks in Computer Vision	Image Processing with OpenCV Overview	How to Translate Google Maps to Satellite Images	Sign Translation	Mode Outcome
S-3	SLO-1	Image Processing	Edge Detection and Image Gradients	**Unit 6: Facial Recognition with Computer Vision**	Text Detection	Mode Analysis
	SLO-2	Image Recognition	Dilation, Opening, Closing, And Erosion	Facial Recognition with Computer Vision Overview	Visual Tracking and Augmented Reality	Model Optimization
S-4	SLO-1	Object Detection	Perspective Transformation	Face Detection Algorithm	Implementation Steps	Model pipeline
	SLO-2	Object Segmentation	Image Pyramids	Face Detection Implementation	Evaluation	Data visualization
S-5 & S-6	SLO-1 SLO-2	Lab 1 :	Lab 4 :	Lab 7:	Lab 10 :	Lab 13:
S-7	SLO-1	Object Recognition	Cropping	Test Photographs	**Unit 10: Medical Image Analysis with Computer Vision**	User interface
	SLO-2	**Unit 2: Computer Vision AI Applications**	Scaling	Alternative to OpenCV	Medical Image Analysis with Computer vision overview.	**Unit 12: Customer In-store Wait Time Analytics**
S-8	SLO-1	Computer Vision in Health	Interpolations	**Unit 7: Object Detection with Computer Vision.**	Working of Medical Image Analysis	Customer In-store Wait time analysis
	SLO-2	Computer Vision in Retail	Re-Sizing	Object Detection with Computer	Common Imaging Techniques	Problem statement
S-9	SLO-1	Computer Vision in Energy	Thresholding	Object Detection with Computer Vision Overview	Computer vision models in Medical Imaging	Problem type
	SLO-2	Computer Vision in Oil and Gas	Adaptive Thresholding	Benefits of Object Detection	Role of AI in medical Imaging	Data engineering
S-10	SLO-1	Computer Vision in Automobile	Binarization	Working of Object Detection	Diagnostic Assistance	Data pipeline
	SLO-2	**Unit 3: Computer Vision Libraries**	Sharpening	Create a custom object detector	Screening and Triaging	Model selection
S-11 &	SLO-1 SLO-2	Lab 2 :	Lab 5 :	Lab 8:	Lab 11:	Lab 14:

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S-12						
S-13	SLO-1	OpenCV	Blurring	Use a Pretrained object Detector	Monitoring	Model engineering
	SLO-2	TensorFlow	Contours	Other object Detection methods	Charting	Mode outcome
S-14	SLO-1	CUDA	Line Detection Using Hough Lines	**Unit 8: Optical Character Recognition with Computer Vision.**	Applications of Medical Image Analysis	Model Analysis
	SLO-2	Viso Suite	Finding Corners	Optical Character Recognition Computer Vision Overview	**Unit 11: Computer Tracking understanding of Consumer Interaction and Improving Store Layout Optimization**	Model optimization
S-15	SLO-1	Matlab	Counting Circles And Ellipses	How does Optical Character Recognition work?	Customer Interaction and Store optimization	Model pipeline
	SLO-2	Keras	**Unit 5: Image Transformation using Generative Adversial Networks**	OCR Applications in the Real World	Problem statement	Data visualization
S-16	SLO-1	SimpleCV	Image Transformation overview	Text Recognition with Tesseract OCR	Problem type	User interface
	SLO-2	BoofCV	What Is the Pix2Pix GAN?	The Different Ways for Text Detection	Data engineering	
S-17 & S-18	SLO-1	Lab 3:	Lab 6:	Lab 9:	Lab 12:	Lab 15:
	SLO-2					

Learning Resources	1. The Computer Vision Workshop by Hafsa Asad, Vishwesh Ravi Shrimali, Nikhil SinghPublisher(s): Packt Publishing 2. Augmented Reality: Principles & Practice by Schmalstieg/Hollerer 3. Guide to Medical Image Analysis: Methods and Algorithms (Advances in Computer Vision and Pattern Recognition) by Klaus D. Toennies	**References:** 1. Computer Vision Theory and Projects in Python for Beginners by AI Sciences Publisher(s): Packt Publishing 2. Computer Vision: Python OCR and Object Detection Quick Starter by Abhilash Nelson

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	15%	20%	15%	20%	15%	20%	15%	20%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	15%	10%	15%	10%	15%	10%	15%	10%	15%
	Create										

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	Total	100 %	100 %	100 %	100 %	100 %

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr.Jothi, Periyasamy , Chief AI Architect DeepSphere.AI, CA, USA	Dr.S.Gopinathan, Associate Professor, University of Madras, Chennai	Mrs.Anitha Jasmine, SRMIST

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