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| **School: SET** | **Batch : 2019-2023** |
| **Program: B.Tech** | **Current Academic Year: 2019-20** |
| **Branch: ALL** | **Semester: VII** |
| **1** | **Course Code** | **CAL401** | **Course Name: Computer Vision Lab** |
| **2** | **Course Title** | **Computer Vision Lab** |
| **3** | **Credits** | **1** |
| **4** | **Contact Hours** **(L-T-P)** | **0-0-2** |
|  | **Course Status** | **Core** |
| 5 | Course Objective | To implement fundamental image processing techniques required for computer vision To develop applications using computer vision techniques  |
| 6 | Course Outcomes | Students will be able to have thorough Understanding of:CO-1 Define and show theFundamentals of Computer Vision techniques on images CO-2 Show the Image filtering and opening / closing operations on Color imagesCO- 3 Apply Image transformation techniques such as for real time and real world applications. CO- 4 Analyze various feature extraction techniques for different  Problem domains.CO-5 Evaluate Pattern Recognition Using Clustering,  Classification TechniquesCO-6 Build computer vision applications for real world  Problems. |
| 7 | Course Description | In this course students will learn basic principles of image formation, image processing algorithms, extracting the features and then analyzing the underlying patterns.  |
| 8 | Outline syllabus | CO Mapping |
|  | **Unit 1** | **Introduction to Computer Vision** |  |
| 1 | To create a program to display grayscale image using read and write operation. | CO1 |
| 2 | To create a vision program to find histogram value and display histograph of a grayscale and color image. | CO1 |
|  |  | Write a program for color image processing |  |
|  | **Unit 2** | **Image Formation Models** |  |
| 3 | To Implement smoothing or averaging filter in spatial domain | CO2 |
| 4 | Program for opening and closing of the image. | CO2 |
| 5 | To fill the region of interest for the image | CO2 |
|  | **Unit 3** | **Image Processing**  |  |
| 6 | To create a vision program for Non-Linear Filtering technique using edge detection | CO3, CO6 |
| 7 | To create a program to discretize an image using Fourier transformation. | CO3, CO6 |
| 8 | To create a vision program to determine the edge detection of an image using different operators. | CO3, CO6 |
|  | **Unit 4** | **Feature Extraction** |  |
| 9 | Program of sharpen image using gradient mask. | CO4 |
| 10 | Program for morphological operation: erosion and dilation. | CO4 |
| 11 | Write a program for image segmentation using local and global thresholding | CO4 |
|  | **Unit 5** | **Pattern Analysis** |  |
| 12 | Write a program to implement image classification. | CO5, CO6 |
| 13 | Write a program to implement image clustering. | CO5, CO6 |
|  | Mode of examination | Lab |  |
|  | Weightage Distribution | CA | MTE | ETE |  |
| 30% | 20% | 50% |  |
|  | **Text book/s\*** | 1. Milan Sonka, Vaclav Hlavac, Roger Boyle, ”Digital Image Processing and Computer Vision”Cengage Learning, 1st Edition, 20082. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill. |  |
|  | **Reference Books** | 1, Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall. 2. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992. 3. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.  |  |

CO and PO Mapping

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| S. No. | Course Outcome | Program Outcomes (PO) & Program Specific Outcomes (PSO) |
| 1. | CO-1 Define and show theFundamentals of Computer Vision techniques on images  | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |
| 2. | CO-2 Show the Image filtering and opening / closing operations on Color images | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |
| 3. | CO- 3 Apply Image transformation techniques such as for real time and real world applications.  | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |
| 4. | CO- 4 Analyze various feature extraction techniques for different Problem domains. | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |
| 5. |  CO-5 Evaluate Pattern Recognition Using Clustering, Classification Techniques  | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |
| 6. | CO-6 Build computer vision applications for real world  Problems.  | PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO9,PO10, PSO1,PSO2,PSO3 |

**PO and PSO mapping with level of strength for Course Name** Computer Vision **(Course Code** CSA-301**)**

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| **Subject** | **PO’s / PSO’s** | **PO****1** | **PO****2** | **PO****3** | **PO****4** | **PO****5** | **PO****6** | **PO****7** | **PO****8** | **PO****9** | **PO****10** | **PO****11** | **PO****12** | **PSO****1** | **PSO****2** | **PSO****3** |
| Computer VisionCAL-401 | CO1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 3 | 1 |
| CO2 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 1 |  1 | 2 | 1 | 3 | 3 | 3 | 2 |
| CO4 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 3 | 2 |
| CO5 | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 3 | 3 | 3 | 2 |
| CO6 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 1 | 3 | 2 | 1 | 3 | 3 | 3 | 3 |

**Average of non-zeros entry in following table (should be auto calculated).**

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| **Course Code** | **Course Name** | **PO 1** | **PO2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** | **PSO 3** |
| **CAL-401** | **Computer Vision** | 3.00 | 3.00 | 3.00 | 3.00 | 1.83 | 1.67 | 1.33 | 1.00 | 1.33 | 2.00 | 1.00 | 3.00 | 2.67 | 3.00 | 2.00 |

**Total- 32.83**

**Strength of Correlation**

**1.** Addressed to **Slight (Low=1) extent 2.** Addressed to **Moderate (Medium=2) extent**

**3.** Addressed to **Substantial (High=3) extent**