JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech CSE (AI)– IV-I Sem   **L   T   P   C**
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(20A30702b) AI FOR IMAGE ANALYSIS
(Professional Elective Course– IV)

Course Objectives:
- Discuss the format of images
- Explore the APIs of python related to image processing

Course Outcomes:
After completion of the course, students will be able to
- Understand the format of different type of images
- Apply the functionality of python for image processing
- Relate machine learning and image processing

UNIT I   Image Formation& 3-D Imaging   Lecture 8Hrs

Introduction to Image Formation:
Introduction, World and camera coordinates, Ideal Imaging: Perspective Projection, Real Imaging,
Radiometry of Imaging, Liner System Theory of Imaging, Homogeneous Coordinates
Introduction to 3-D Imaging: Basics, Depth from Triangulation, Depth from Time-of-Flight, Depth
from Phase: Interferometry, Shape from Shading, Depth from Multiple Projections: Tomography

UNIT II   Image Processing   Lecture 9Hrs
Introduction to Image Processing:
Images, Pixels, Image Resolution, PPI and DPI, Bitmap Images, Lossless Compression, Lossy
Compression, Image File Formats, **Color Spaces**: RGB, XYZ, HSV/HSL, LAB, LCH, YPbPr,
YUV, YIQ, **Advanced Image Concepts:** Bezire Curve, Ellipsoid, Gamma Correction, Structural
Similarity Index, Deconvolution, Homography, Convolution

UNIT III   Basics of Python and Scikit Image   Lecture 9Hrs
Basics of Python:
Variables and Data Types, Data Structures, Control Flow Statements, Conditional Statements,
Functions
Scikit Image:
Uploading and Viewing an Image, Getting Image Resolution, Looking at Pixel Values, Converting
Color Space, Saving an Image, Creating Basic Drawings, Doing Gamma Correction.
Rotating, Shifting, and Scaling Images, Determining Structural Similarity.

UNIT IV   Advanced Image Processing Using Open CV   Lecture 8Hrs
Blending Two Images, Changing Contrast and Brightness, Adding Text to Images, **Smoothing
Images:** Median Filter, Gaussian Filter, Bilateral Filter.
Changing the Shape of Images, Effecting Image Thresholding, Calculating Gradients, Performing
Histogram Equalization.

UNIT V   Image Processing Using Machine Learning & Real-   Lecture 8Hrs
                  Time Use Cases
Feature Mapping Using the SIFT Algorithm, Image Registration Using the RANSAC Algorithm:
estimate_ affine, residual lengths, processing the Images, The Complete code.
Image Classification Using Artificial Neural Networks, Image Classification Using CNNs,
Image Classification Using Machine Learning Approaches: Decision Trees,Support Vector
Machines, Logistics Regression,Code,Important Terms
Introduction to Real-Time Use Cases:
Finding Palm Lines, Detecting Faces, Recognizing Faces, Tracking Movements, Detecting Lanes

Textbooks:
1. Digital Image Processing by **Rafael C. Gonzalez,4th Edition, 2018**
2. Hands-On Image Processing with Python: Expert techniques for advanced image analysis and effective interpretation of image data,by Sandipan Dey, 2018

Reference Books:
1. Digital Image Processing-Bernd Jahne,2005

Online Learning Resources:
1. How to Implement Artificial Intelligence for Solving Image Processing Tasks | Apriorit
2. Image Processing for Engineering and Science | Coursera