**PSC Innovative Assignment**

**Title - Image Segmentation using Region and Edge based detection**

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**Instruction to run the code**

1. Install the libraries –
   1. Scikit-image – contains algorithms for image processing
   2. Numpy – package for scientific computing, contains N-dimensional array with sophisticated functions
   3. Opencv – library for computer vision, machine learning and image processing
   4. Matplotlib- library for creating static, animated, and interactive visualizations
   5. Scipy – library for mathematics, science, and engineering
2. Open the code in any python IDE
   1. The code majorly is divided into Region based and Edge based Detection
   2. Region Based detection
      1. The image is read using cv2 and converted to grayscale using *rgb2gray* from sckimage.color.
      2. There after the image is reshaped and mean is calculated which is further used to compute the threshold
   3. Edge Based detection
      1. Sobel operator for both horizontal and vertical using convolve function of scipy which performs multidimensional convolution(combine by passing through a filter) of the input array with a given kernel
      2. Prewitt operator for both horizontal and vertical using convolve function of scipy.
      3. Robert’s operator for both horizontal and vertical using convolve function of scipy.
      4. Canny edge of the image which performs
         1. Noise reduction – Gaussian blur
         2. Gradient calculation – sobel operator
         3. Non – maximum Suppression using edge direction in radians and pixel intensity(0-255)
         4. Double threshold to identify 3 different kinds of pixels – strong, weak, trivial
         5. Edge tracking by hysteresis to transform weak pixel to strong

All of these functions are done using *Canny* function of opencv.

* + 1. Canny edge detection of the live video

1. Download the image *cancer\_cells.jpg*
2. Run the code –
   1. Once the code runs output as images will show automatically and simultaneously in an orderly fashion of 5 seconds.
   2. Al last first webcam of your device will be accessed to send frames, to quit this *press ‘q’*.