Indian Institute of Technology Tirupati

EE5113 - Computer Vision

Programming Assignment– 1

Last Date for Submission: 4 Feb 2020

AIM :

To implement and understand the spatial filtering methods for image denoising, template matching and for finding gradients.

1. Spatial Filtering for Denoising:

Read the 'leena_noisy.jpg' and display the same. Generate Gaussian kernels of different sizes using Gaussian distribution function with zero-mean. Convolve the input image with Gaussian filter of different sizes varying sigma value. Report the inferences observed with the best kernel. How is it different from mean filtering? You need to write your own function for performing 2D convolution.

2. Spatial Filtering for Template Matching:

Template matching is to be done by correlating the target image with the template image to find the location of the target image in the template image. Follow the following steps to perform template matching.

- Read the template image 'where-is-waldo.jpg' and target image 'waldo.jpg', convert these images to grayscale images
- Perform normalized cross correlation between the two images (You need to write your own function for performing correlation).
- Display the correlation map (the size of correlation map should be same as template image).
- Consider the pixel with the highest correlation value and draw a rectangular box of size of the target image around it in the template image, and display the same.

Report all the intermediate results and inferences observed.

3. Spatial Filtering for computing image gradients:

Read the image 'image1.jpg' and display it. Specify Sobel operator for computing horizontal ($\mathbf{G}_x$) and vertical ($\mathbf{G}_y$) gradients. Convolve the input image with this kernel pair to find horizontal and vertical gradients using your own function. Compute the absolute magnitude of gradient by $|\mathbf{G}_x| + |\mathbf{G}_y|$. Apply appropriate thresholding on gradient magnitude to extract the key dominant edges. Report all the intermediate results obtained and inferences observed.