

Project: Superresolution

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For: EE392J – Digital Video Processing. Stanford University

Folder: Code

This folder contains Matlab code that was used to program the Superresolution project. This file describes the various functions that can be used by any user.

Files:

- **project.m:** This is the top-level file that should be used to test Superresolution algorithm. This Matlab file calls all the other required functions.
Input to file: name of .mat file. The .mat file should contain images in Luminance format in the array *img*. E.g. *img(:, :, 2)* will represent second LR image.
Some of the .mat files are in the folder '*image mat files*' and can be used with this file. Including '*image mat files*' in the include path of Matlab will be a good idea.
- **ConstructMultipleImagesWithShiftsfromOne.m:** this file creates '*img*' array (LR images) for a given rgb file. This file can be used to create .mat file that are input to project.m. In this file, one can specify the shifts. Default is set to shift the output LR images randomly.

Functions:

- **CalculateAngle:** calls CalculateAngleSub to calculate angles with different precision.
Input parameters: im1, im2
Output parameters: angle
- **CalculateAngleSub:** this function calculates the angles between two images by rotating one of the image and calculating the correlation values. The index of maximum correlation gives the angle between the input images.
Input parameters: im1, im2, N(range of angles to use for correlation)
Output parameters: angle
- **CalculateShift:** Calculates shifts between two images. Uses frequency domain method. The details are described in the project report and project presentation.
Input parameters: im1, im2
Output parameters: shift (delta x, delta y)
- **CreateHighResImage:** Calculates the HR image using Papoulis-Gerchberg algorithm
Input parameters: img, M (magnification factor). *img* is the array of LR images to be used for SR. The first of them is treated as reference image.
Output parameters: imH – High-resolution image
- **InsertLowResPixelsIntoHighResImage:** Updates the HR image with values from LR image based on its shift and rotation information.
Input parameters: imL (LR image), imH (HR image to be updated), delta – shift and rotation information
Output parameters: highResIm – High-resolution image

- **lowpassFilter:** Low-pass filter function.
Input parameters: im(input image), taps(#filter taps), fc – cutoff frequency.
Output parameters: im = output image.
- **WindowIt:** windows the input image using tukey window to smoothen the image boundary.
Input parameters: im(input image), beta(parameter to be passed to the tukey window)
Output parameters: im = output image.