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%Name: Shiska Raut
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clc;
clear;
close all;

folder_name = "Clear";
all_images = dir(fullfile(folder_name, '*.jpg'));

no_of_images = numel(all_images);
single_file = fullfile(folder_name, all_images(1).name);
single_image = imread(single_file);

% parameters for resizing image
R1 = 504;
C1 = 504;

% select layer number
height_no1 = 100;
height_no2 = 200;
height_no3 = 300;
height_no4 = 400;

% allocate space to store single layer
single_layers1(1:no_of_images, 1:C1) = 0;
single_layers2(1:no_of_images, 1:C1) = 0;
single_layers3(1:no_of_images, 1:C1) = 0;
single_layers4(1:no_of_images, 1:C1) = 0;

% projection angles
theta = 0:11:360;

% extract same single layer from each image
for i = 1:no_of_images
    single_file = fullfile(folder_name, all_images(i).name);
    single_image = imread(single_file);
    I_gray = rgb2gray(single_image);
    I_gray = imresize(I_gray, [R1 C1]);
    I_gray = medfilt2(I_gray,[5 5]);

    %imshow(I_gray);
    %impixelinfo;

    % extract and store layers at different heights
    single_layer = I_gray(height_no1,:);
    single_layers1(i,:) = single_layer;

    single_layer = I_gray(height_no2,:);
    single_layers2(i,:) = single_layer;

    single_layer = I_gray(height_no3,:);
    single_layers3(i,:) = single_layer;

    single_layer = I_gray(height_no4,:);
    single_layers4(i,:) = single_layer;
end

% transpose the layers
single_layers1_t = transpose(single_layers1); % IR transform only accepts format no of columns*no_of_images

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single_layers2_t = transpose(single_layers2);
single_layers3_t = transpose(single_layers3);
single_layers4_t = transpose(single_layers4);
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% perform inverse radon transform
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IR1 = iradon(single_layers1_t, theta);
IRC1 = imcomplement(IR1);
IR2 = iradon(single_layers2_t, theta);
IRC2 = imcomplement(IR2);
IR3 = iradon(single_layers3_t, theta);
IRC3 = imcomplement(IR3);
IR4 = iradon(single_layers4_t, theta);
IRC4 = imcomplement(IR4);
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% plot the reconstructed image
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figure;
subplot(2,2,1); imagesc(IRC1); title('Layer 100'); colormap gray;
subplot(2,2,2); imagesc(IRC2); title('Layer 200'); colormap gray;
subplot(2,2,3); imagesc(IRC3); title('Layer 300'); colormap gray;
subplot(2,2,4); imagesc(IRC4); title('Layer 400'); colormap gray;
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