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clc
clear all
close all

imageType = 2;

if (imageType == 1)
    folderName = 'Images/cast/';
    fileNamePrefix = 'cast-';
    fileName1 = 'left';
    fileName2 = 'right';
    fileNameExtension = '.jpg';
    rThreshold = 50000000;
    nccThreshold = 1.04;
elseif (imageType == 2)
    folderName = 'Images/Cones/';
    fileNamePrefix = 'Cones_im';
    fileName1 = '2';
    fileName2 = '6';
    fileNameExtension = '.JPG';
    rThreshold = 100000000;
    nccThreshold = 1.04;
else
    error('Cannot select image with the given image type.')
end

fullFileName1 = strcat(folderName, fileNamePrefix, fileName1,
    fileNameExtension);
fullFileName2 = strcat(folderName, fileNamePrefix, fileName2,
    fileNameExtension);
image1 = imread(fullFileName1);
image2 = imread(fullFileName2);

% we need doubles so that we can perform necessary calculations later
rgbImgList(:, :, :, 1) = double(image1);
rgbImgList(:, :, :, 2) = double(image2);
grayImgList(:, :, 1) = double(rgb2gray(image1));
grayImgList(:, :, 2) = double(rgb2gray(image2));

% Harris Corner Detection, Non-Max Suppression and NCC
[corrX, corrY] = getCorners(grayImgList(:, :, 1), grayImgList(:, :, 2),
    rThreshold, nccThreshold);

plotCorrelations(rgbImgList(:, :, :, 1), rgbImgList(:, :, :, 2), corrX,
    corrY);

% Calculate the fundamental matrix
[matchedPoints1, matchedPoints2] = getMatchedPoints(corrX, corrY);
F = estimateFundamentalMatrix(matchedPoints1, matchedPoints2);

% Perform RANSAC to find the inliers
sizeImageX = size(grayImgList(:, :, 1), 1);

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sizeImageY = size(grayImgList(:, :, 1), 2);
[inliersX, inliersY] = ransac(F, matchedPoints1, matchedPoints2,
    sizeImageX, sizeImageY);

figure
plotCorrelations(rgbImgList(:, :, :, 1), rgbImgList(:, :, :, 2), inliersX,
    inliersY);

grayImgList = uint8(grayImgList);
[disparityMapHorizontal, disparityMapVertical] =
    getDisparityMap(grayImgList(:, :, 1), grayImgList(:, :, 2));

figure
imshow(disparityMapHorizontal, [0 255]);
figure
imshow(disparityMapVertical, [0 255]);
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