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%to get the comparison between fivw different images of hands I take one
%hand image at at time by reading the hand image as 'myhand1', 'myhand2',
%'myhand3', 'myhand4',, 'myhand5', at five different times. in 5th line of
%code.
%reading the image of hand
image = imread('myhand5.jpeg');
%converting rgb image to grayscale image
G_image=rgb2gray(image);
G_image=double(G_image);
G_image=G_image-min(G_image(:));
G_image=G_image./max(G_image(:));
figure
subplot(1, 2, 1);
imshow(G_image);

%to find the pixel information in the image fo intensity change
impixelinfo();

%for creating the axes on the hand w.r.t feature lines
for index = 1:14
    %creating coordinate matrices for two points for 14 lines
    p1 = zeros(14,2);
    p2 = zeros(14,2);
    %to point the coordinates of two points
    [p1(index, :), p2(index, :)] = ginput(2);

    %join the points with a line
    line(p1(index, :),p2(index, :), ...
        'Marker', '*', 'Linewidth', 2, 'Color', 'g');

    %searching for gray color through pixel profile
    pixel_pro = improfile(gray, p1(index, :), p2(index, :));
    subplot(1, 2, 2);
    plot(pixel_pro);

    line_points_diff = diff(pixel_pro);
    %
    minindex = zeros(14);
    maxindex = zeros(14);
    minVal = zeros(14);
    maxVal = zeros(14);
    minVal(index) = min(line_points_diff);
    maxVal(index) = max(line_points_diff);
    minindex(index) = find(line_points_diff==minVal(index), 1, 'last');
    maxindex(index) = find(line_points_diff==maxVal(index), 1);

    % finding slopes
    len = length(pixel_pro);

    m1x = (((norm(p1(index, :) - p2(index, :)))/len)*maxindex(index));
    m1y = (norm(p1(index, :) - p2(index, :)));

    m2x = ((norm(p1(index, :) - p2(index, :)))/len)*minindex(index);
    m2y = norm(p1(index, :) - p2(index, :));

    m1 = (m1x/m1y);
    m2 = (m2x/m2y);

    %intializing start and end pixel matrices for storing values
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    start_pixel1 = zeros(14);
    start_pixel2 = zeros(14);
    start_pixel1(index) = ((m1*p1(index,2)) + (p1(index,1)*(1-m1)));
    start_pixel2(index) = ((m1*p2(index,2)) + (p2(index,1)*(1-m1)));
    end_pixel1 = zeros(14);
    end_pixel2 = zeros(14);
    end_pixel1(index) = ((m2*p1(index,2)) + (p1(index,1)*(1-m2)));
    end_pixel2(index) = ((m2*p2(index,2)) + (p2(index,1)*(1-m2)));
    %plotting the starting pixel and ending pixel
    subplot(1, 2, 1);
    line([start_pixel1(index) end_pixel1(index)], ...
        [start_pixel2(index) end_pixel2(index)], ...
        'Marker', '^', 'Linewidth', 1.5, 'Color', 'r');
    hold on;

end
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