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%===== findTemplate =====
%
% A script to find the location of a template object within a given image
% when some approxiamte location is known.
%
%===== findTemplate =====

%==[1] Perform a little smoothing of the image to aid the gradient descent.
%           It is good to also smooth the template a little bit. The image
%           should be smoothed noticeably, while the template just a bit.
%

% Choose template and image
I = I3;
t = templ;
pos = [480,820]; % Initial guess of position.

tI = imgaussfilt(t,2); % Filter template a little bit.
fI = imgaussfilt(I,5); % Filter image some.

tnsq = sqrt(sumsqr(tI)); % Compute "magnitude" of the template.
% Useful to incorporate into c.

nsteps = 50; % Number of steps in the gradient descent.

I_name = 'I3';
t_name = 'templ';
fprintf('Image: %s\n',I_name);
fprintf('Template: %s\n',t_name);
fprintf('Parameters:\n');
fprintf('(nsteps=%d,pos=[%d,%d])\n',nsteps,pos(1),pos(2));

%==[2] Plot the template and the image.

figure(3);
imshow(tI);
title(sprintf('Template:%s', t_name));
hold on;
plot( size(tI,2)/2, size(tI,1)/2, 'r+');
hold off;
% Placed a plus at the template center.

figure(2);
imagesc(I);
colormap('Gray');
title(sprintf('Image:%s',I_name));
hold on;
plot(pos(1), pos(2), 'go');

for ii=1:nsteps
    dpos = gradTempMatchQA(double(tI), double(fI), pos);
    pos = pos + dpos;
    plot(pos(1), pos(2), 'r. ');
    drawnow;
end

plot(pos(1), pos(2), 'rx');

fprintf('Final Point:[%f,%f]\n',pos(1),pos(2));

```

Image: I3
Template: templ
Parameters:
(nsteps=50,pos=[480,820])
Final Point:[574.484935,715.115290]

Template:templ



Image:I3

