Assignment A6: Image Features

CS 5320/6320
Spring 2016

Assigned: 8 February 2016

Due: 2 March 2016

For this problem, handin a lab report A6.pdf (include name, date, assignment and class number in pdf) which develops and studies the edge tracking.

Part I (CS5320): Implement Algorithm 5.2 from the text and test it as a feature detector on the images of a square and the glass building (given in the class webpage data as files square.jpg and glass-box.jpg). This includes examining the stability of feature detection over translation, rotation and scale.

Develop the Matlab functions implementing (1) Harris corner detection, (2) scale and position extrema as interest points, (3) gradient orientation histogram, and (4) a local max finder as described by the function headers below.

Part II (CS6320): Implement Algorithms 5.2 and 5.3 from the text and test and compare them as feature detectors on the images of a square and the glass building (given in the class webpage data as files square.jpg and glass-box.jpg). This includes examining the stability of feature detection over translation, rotation and scale.

Develop the Matlab functions implementing (1) Harris corner detection, (2) scale and position extrema as interest points, (3) gradient orientation histogram, and (4) a local max finder as described by the function headers below.

You should handin the report A6.pdf as well as the source code developed in the study. The code should conform to the style requested in the class materials.

In addition, please turn in a hardcopy of the report in class before the start of class on March 2, 2016.

Write a lab report in the format (please do not deviate from this format!) described in the course materials.

```
function R = CS5320_Harris(im,k)
% CS5320_Harris - corner detector
% On input:
%     im (mxn array): input gray level image
%     k (int): determines window side as 2*k+1
% On output:
%     R (mxn array): corner response
%       <=0: homogeneous
%       >0 and small: edge
%       large: corner
% Call:
%     R = Cs5320_Harris(im,1);
% Author:
%     T. Henderson
%     UU
%     Spring 2016
%

function [interest_pts,scale] = CS5320_LoG_interest(im,p)
% CS5320_LoG_interest - interest points from LoG scale-position maxima
% On input:
%     im (mxn array) gray level input image
%     p (float): percentage of max response to return
% On output:
%     interest_pts (mxn array): interest point response
%     scale (mxn array): max sigma scale at location
% Call:
%     [A_IP,A_scale] = CS5320_LoG_interest(A,0.9);
% Author:
%     T. Henderson
%     UU
%     Spring 2016
%
```

```
function H = CS5320_gradient_histogram(im,r,c,radius,w,thresh)
% CS5320_gradient_histogram - get histogram of gradient orientations
% On input:
%     im (mxn array): image
%     r (int): row of center of patch
%     c (int): col of center of patch
%     radius (float): radius of pixels to consider
%     w (Boolean): use magnitude of gradient as weight in histogram
%     thresh (float): minimum gradient magnitude to consider
% On output:
%     H (9x1 vector): orientation counts in 20-degree bins
% Call:
%     H = CS5320_gradient_histogram(A,8,8,3,0,0.1);
% Author:
%     T. Henderson
%     UU
%     Spring 2016
%

function im_lm = CS5320_local_max(im)
% CS5320_local_max - local maxima of image
% On input:
%     im (mxn array): input image
% On output:
%     im_lm (mxn array): non-zero values at local maxima
% Call:
%     A_lm = CS5320_local_max(A);
% Author:
%     T. Henderson
%     UU
%     Spring 2016
%
```