16-720 Assignment 1

Yiming Wu
wyiming@andrew.cmu.edu
Computer Vision
2015.09.21

1: What properties do each of the filter functions pick up?

(a) We can look into all the filters.

```
for scale = gaussianScales
    idx = idx + 1;
    filterBank{idx} = fspecial('gaussian', 2*ceil(scale*2.5)+1, scale);
end

for scale = logScales
    idx = idx + 1;
    filterBank{idx} = fspecial('log', 2*ceil(scale*2.5)+1, scale);
end

for scale = dxScales
    idx = idx + 1;
    f = fspecial('gaussian', 2*ceil(scale*2.5) + 1, scale);
    f = imfilter(f, [-1 0 1], 'same');
    filterBank{idx} = f;
end

for scale = dyScales
    idx = idx + 1;
    f = fspecial('gaussian', 2*ceil(scale*2.5) + 1, scale);
    f = imfilter(f, [-1 0 1]', 'same');
    filterBank{idx} = f;
end
```

Listing 1: Python example

1. The first 5 filters are all Gaussian filters(Gaussian lowpass filter) with scale from 1 to 16. Mainly they let low frequence signals pass, which blur the object and emphasize on the scene.
2. The second 5 filters are log(Laplacian of Gaussian filter) filters. They detect edges.
3. The third 5 filters are derivatives of Gaussian in x direction, which will detect edges in y direction mainly.
4. The last 5 filters are derivatives of Gaussian in y direction, which will detect edges in x direction mainly.

2: Quantitative Evaluation

(a) My *evaluateRecognitionSystem.m*.

```
load('../dat/traintest.mat','test_imagenames','test_labels','mapping');
load('vision.mat');
classNum = 8;
C = zeros(classNum);
testSize = size(test_labels, 2);
for k = 1:testSize
    i = test_labels(k);
    myGuess = guessImage(['../dat/', test_imagenames{k}]);
    index = strfind(mapping, myGuess);

    j = find(not(cellfun('isempty', index)));

    C(i,j) = C(i,j) + 1;
end

rate = trace(C) / sum(C(:)) * 100;
fprintf('accuracy=%d%',rate);
```

Listing 2: My evaluateRecognitionSystem.m