Part II : Problem 4: Code Snippets

1) getImageSetData :

```
function [ colorImages, grayscaleImages ] = getImageSetData( dirname,
fileformat )
%GETIMAGESETDATA It gets the multi-dimensional array of color image
data
% and grayscale image data. All images must be same size
%   Input
%       dirname: name of directory to search
%       fileformat: file format string for images to put into set
%   Output
%       colorImages: color data array
%       grayscaleImages: grayscale data array

dirString = strcat(dirname,fileformat);
setList = dir(dirString);
numImages = length(setList);
imnameStart = strcat(dirname,'/');

%get info on first image
firstColorImage = imread([imnameStart setList(1).name]);
firstGrayscaleImage = rgb2gray(firstColorImage);
colorImages = zeros([size(firstColorImage) numImages]);
grayscaleImages = zeros([size(firstGrayscaleImage) numImages]);

for i=1:numImages
   imname = [imnameStart setList(i).name];
   currentColorImage = imread(imname);
   currentGrayscaleImage = rgb2gray(currentColorImage);
   colorImages(:,:,:,i) = im2double(currentColorImage);
   grayscaleImages(:,:,i) = im2double(currentGrayscaleImage);
end

end
```

2) writeAverageGrayscaleImage :

```
function [] = writeAverageGrayscaleImage( dirname, fileformat,
outputImageName )
% This function writes and displays the average grayscale image
%   Input
%       dirname: name of directory to search
%       fileformat: file format string for images to put into set
%       outputImageName: name to use when writing output file

[~, grayscaleImages] = getImageSetData(dirname,fileformat);
averageGrayscaleImage = mean(grayscaleImages,3);
imwrite(averageGrayscaleImage,outputImageName,'JPEG');
figure
imshow(averageGrayscaleImage);
axis image;
end
```

3)writeAverageColorImage :

```
function [] = writeAverageColorImage( dirname, fileformat,
outputImageName )
%WRITEAVERAGEGRAYSCALEIMAGE This writes and displays the average color
image
%
%   Input
%       dirname: name of directory to search
%       fileformat: file format string for images to put into set
%       outputImageName: name to use when writing output file


[colorImages, ~] = getImageSetData(dirname,fileformat);
averageColorImage = mean(colorImages,4);
imwrite(averageColorImage,outputImageName,'JPEG');

figure
imshow(averageColorImage);
axis image;

end
```

4)writeStndDevImage :

```
function [] = writeStndDevImage( dirname, fileformat,
outputImageName )
%WRITESTNDDEVIMAGE This writes and displays the standard deviation
image and computes standard deviation matrix.
%
%   Input
%       dirname: name of directory to search
%       fileformat: file format string for images to put into set
%       outputImageName: name to use when writing output file


[~, grayscaleImages] = getImageSetData(dirname,fileformat);

%compute standard deviation
stndDevMatrix = std(grayscaleImages,1,3);

figure
imagesc(stndDevMatrix);
axis image;
colorbar;

minStndDev = min(stndDevMatrix(:));
maxStndDev = max(stndDevMatrix(:));
scaledStndDevMatrix = (stndDevMatrix-minStndDev)./(maxStndDev-
minStndDev);
imwrite(scaledStndDevMatrix,outputImageName,'JPEG');

end
```

Script to write all images :

1) set 1:

```
setname = 'set1';
dirname = strcat('imageSet/',setname);
fileformat = '/*.jpg';

colorImageName = strcat(setname,'color.jpg');
grayscaleImageName = strcat(setname,'grayscale.jpg');
stndDevImageName = strcat(setname,'grayscaleStndDev.jpg');

writeAverageGrayscaleImage(dirname,fileformat,grayscaleImageName);
writeAverageColorImage(dirname,fileformat,colorImageName);
writeStndDevImage(dirname,fileformat,stndDevImageName);
```

2) **set 2:**

```
setname = 'set2';
dirname = strcat('imageSet/',setname);
fileformat = '/*.jpg';

colorImageName = strcat(setname,'color.jpg');
grayscaleImageName = strcat(setname,'grayscale.jpg');
stndDevImageName = strcat(setname,'grayscaleStndDev.jpg');

writeAverageGrayscaleImage(dirname,fileformat,grayscaleImageName);
writeAverageColorImage(dirname,fileformat,colorImageName);
writeStndDevImage(dirname,fileformat,stndDevImageName);
```