Multimedia Systems Lecture 3

LECTURER

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Contents

Extended Contrast modification

- We can use the strechlim function to find the best range of colors to stretch using it.
- I = imread('gray.jpg');
- Lim = stretchlim(I);
- J = imadjust(I,Lim,[]);
- subplot(2,2,1),imshow(I),title('Original Image');
- subplot(2,2,2),plot(imhist(I)),title('Original Image Histogram');
- subplot(2,2,3),imshow(J),title('Contrast modified Image');
- subplot(2,2,4),plot(imhist(J)),title('Contrast Modified Histogram');
- We can reverse the order of numbers in the last parameter of imadjust.

Filters

- Image filters are used to apply various effects on images.
- The filter is a matrix of odd dimensions, here we will use only square filters.
- We apply a filter to an image using this formula
  - $I(x,y) = \sum_{u=-a}^{a} \sum_{v=-b}^{b} f(u,v) * I(x+u, y+v).$
- For every pixel we take the sum of products of the current pixel or a neighbor of it with the corresponding value in the filter matrix.
- This method of applying filters is called **Correlation**.
- If the sum of elements in the filter matrix equals 1 then the resulting image will have the same brightness value, if it is smaller than 1 then the result will be darker and bigger than 1 the result will brighter.

Noise

- We can add noise to an image using the imnoise function.
- We will use four types of noise:
  - Gausian noise: G = imnoise(I,'gaussian'0,0.05);
  - Salt and Pepper noise: SP = imnoise(I,'salt & pepper',0.02);
  - Possion noise: P = imnoise(I,'poisson');
  - Speckle noise: S = imnoise(I,'speckle');
- In the next slides we will try to use filters for removing this noise.

Average Filters

- To apply a filter in matlab we use two functions
  - fsepcial('type',parameters) we pass the filter type to this function and any parameters specified for this type.
  - filter2(filter,image) this function uses the output from the first one to apply the filter on the image.
- **Average Filters**
- We will apply the average filter on the noisy images to see how it works:
  - H = fspecial('average',5);
  - im = unit8(filter2(h,G))
  - Imshow(im)

Average Filters

- Now we try to do the same but with the salt & pepper noisy image
  - H = fspecial('average',5);
  - im = unit8(filter2(h,SP))
  - Imshow(im)
- We can do the same for poisson and speckle noises.
- **Median Filters**
- In this kind of the filters the value of each pixel is modified to equal the median of the pixel values in the specified window.

Median Filters

- Im2 = medfilt2(G,[3 3]);
- Imshow(Im2)
- Im2 = medfilt2(SP,[3 3]);
- Imshow(Im2)
- Im2 = medfilt2(P,[3 3]);
- Imshow(Im2)
- Im2 = medfilt2(S,[3 3]);
- Imshow(Im2)
- Which noise type is this filter the best to remove?

Adaptive Filter

- These filters use special statistics to calculate the value of each pixel based on surrounding pixels to decrease signal to noise ratio.
- im4=wiener2(G,[5 5]);
- imshow(im4);
- im4=wiener2(SP,[5 5]);
- imshow(im4);
- im4=wiener2(P,[5 5]);
- imshow(im4);
- im4=wiener2(S,[5 5]);
- imshow(im4);

Filters results

- These results are left for the students to find out by them selves and to encourage them to work at home instead of wasting time on facebook and social media……
- Compare the use of filters on different noise types and share the results with your teacher.

GIF

- A GIF image is a set of images stored in a single file displayed one by one creating the illusion of animation.
- These images are stored using indexed color model to reduce size.
- We cannot use imshow to display GIF images.
- GIF images are created using the imwrite function, the first and second parameters are the image's table and map.
- The third parameter is the file's name.
- Extra parameters include:
  - DelayTime: Transition time between images.
  - loopcount: specified when writing the first image, determines how many times to loop the images.
  - writemod: is used to append more images to the file.

GIF – example horizontal movement

- Im = imread('gray.jpg');
- Im1 = imresize(Im,[256 256]);
- for i=1:16:256
  - Im3(:,1:i+1) = Im1(:256-i:256);
  - [tbl map] = gray2ind(Im3,256);
  - if (i == 1)
    - Imwrite(tbl,map,'test.gif',DelayTime',0.24,'loopcount',2);
  - else
    - Imwrite(tbl,map,'test.gif','DelayTime',0.24,'writemode','append');
  - End
- end

Exercise

- Write a matlab script to create a vertical movement of an image.
- Write a matlab script to create a resizing movement of an image.

THE END
GOOD LUCK