BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY)
COLLEGE OF ENGINEERING, PUNE-43.

DEPARTMENT OF COMPUTER ENGINEERING

Day and Date:

Online Practical/ Oral Examination 2019-20

Exam No.: 2014390034

PRN: 1614110182

Name of Student: Aamir Hafiez

Subject: Image Processing and Pattern Recognition

Problem Statement: Implement program on arithmetic mean filter and ordered statistics filter

Description:

Arithmetic Mean Filter:

An arithmetic mean filter operation on an image removes short tailed noise such as uniform and Gaussian type noise from the image at the cost of blurring the image. The arithmetic mean filter is defined as the average of all pixels within a local region of an image.

The Arithmetic mean is defined as :

$x = 1/n (x1 + x2 + …….. + xn)$

Pixels that are included in the averaging operation are specified by a mask. The larger the filtering mask becomes the more predominant the blurring becomes and less high spatial frequency detail that remains in the image.

Order Statistics Filter:

In recent years significant advances have been made in the development of nonlinear image processing techniques. Such techniques are used in digital image filtering, image enhancement, and edge detection. One of the most important families of nonlinear image filters is based on order shztktics. The widely used median filter is the best known filter of this family. Nonlinear filters based on order statistics have excellent robustness properties in the presence of impulsive noise. They tend to preserve edge information, which is very important to human perception. Their computation is relatively easy and fast compared with some linear filters. All these features make them very popular in the imageprocessing community. Their theoretical analysis is relatively difficult compared with that of the linear filters. However, several new tools have been developed in recent years that make this analysis easier. In this review paper an analysis of their properties as well as their algorithmic computation will be presented.

Algorithm:

Arithmetic Mean Filter:

1. Read Image

2. store size of image (pixels) in row and col

3. iterate through row, for every row

3.1 iterate through col, for every col

3.1.2 iterate through window

calculate arithmetic mean and replace pixels with it

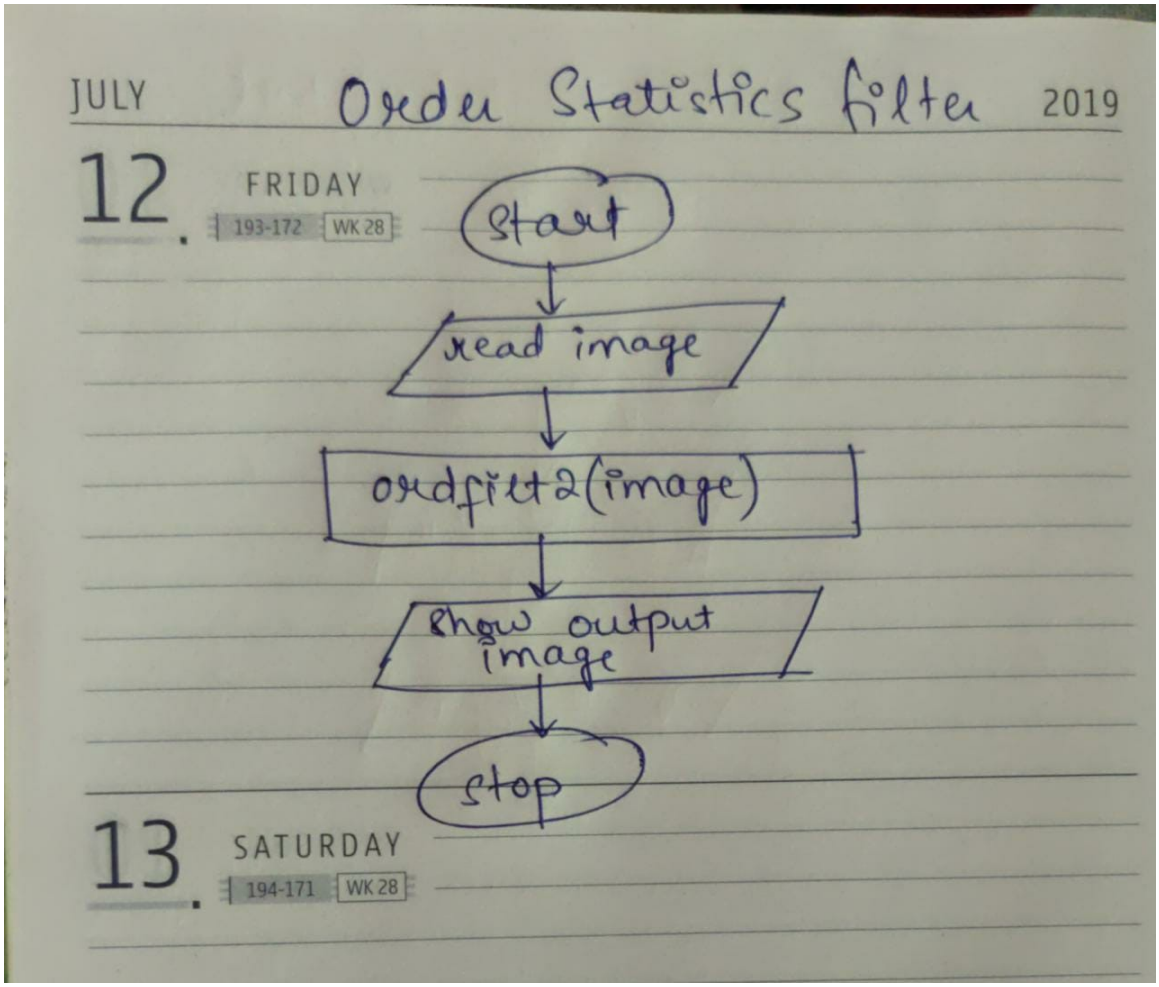
4. Show filtered Image

5. End

Order Statistics Filter:

1. Read Image
2. read image and convert to gray
3. use function ordfilt2 function and store this filtered image
4. show filtered image

Flow Chart:



2019 Arithemetic Mean filter JULY

WEDNESDAY 24
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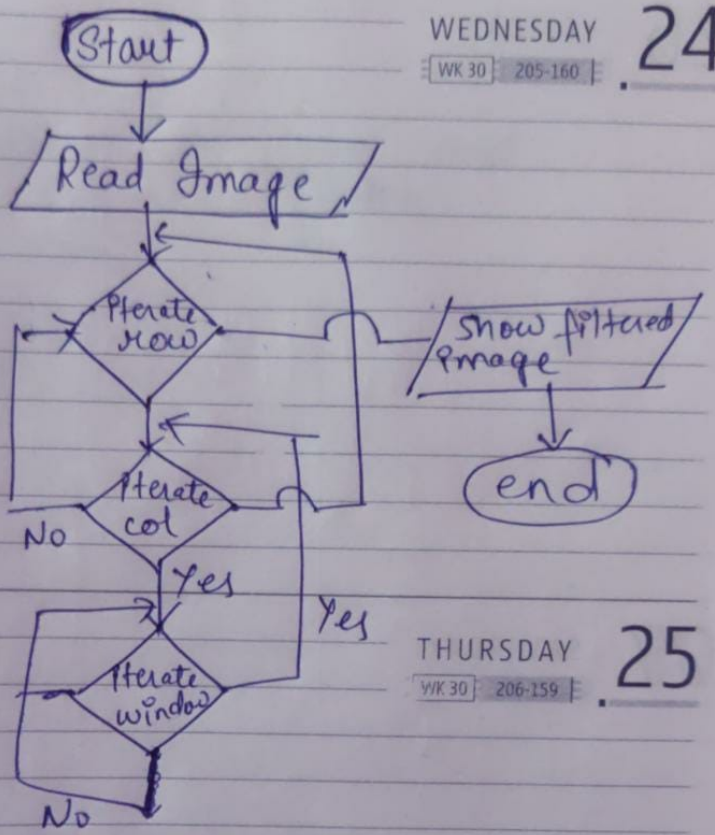

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Script/Code:

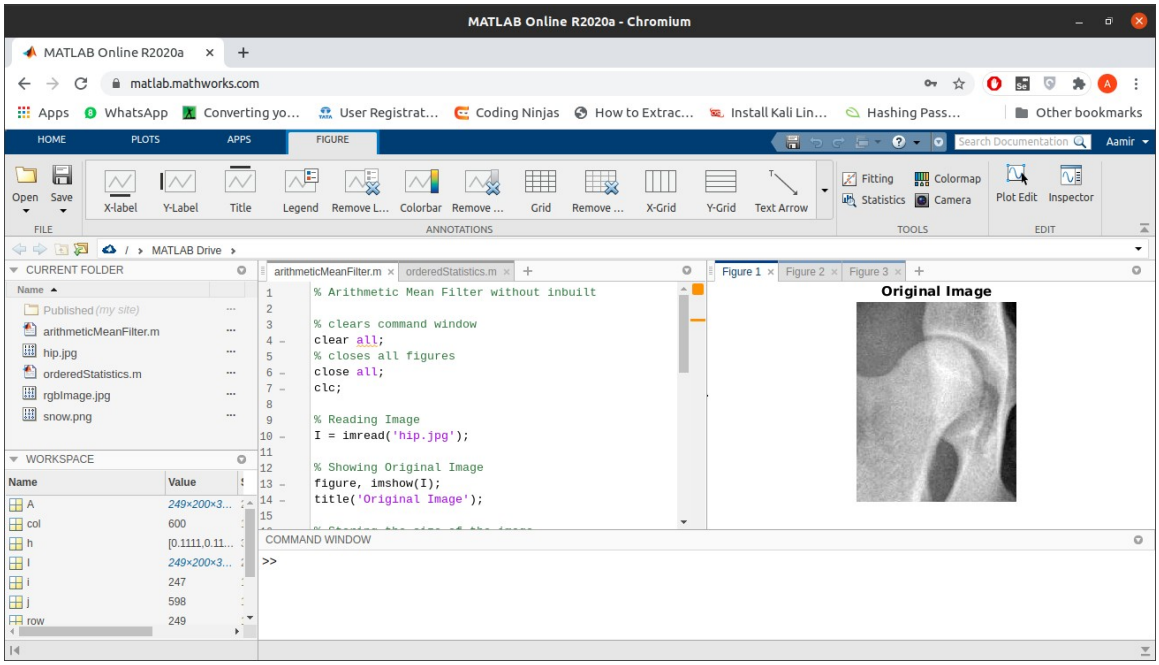
Arithmetic Mean Filter:

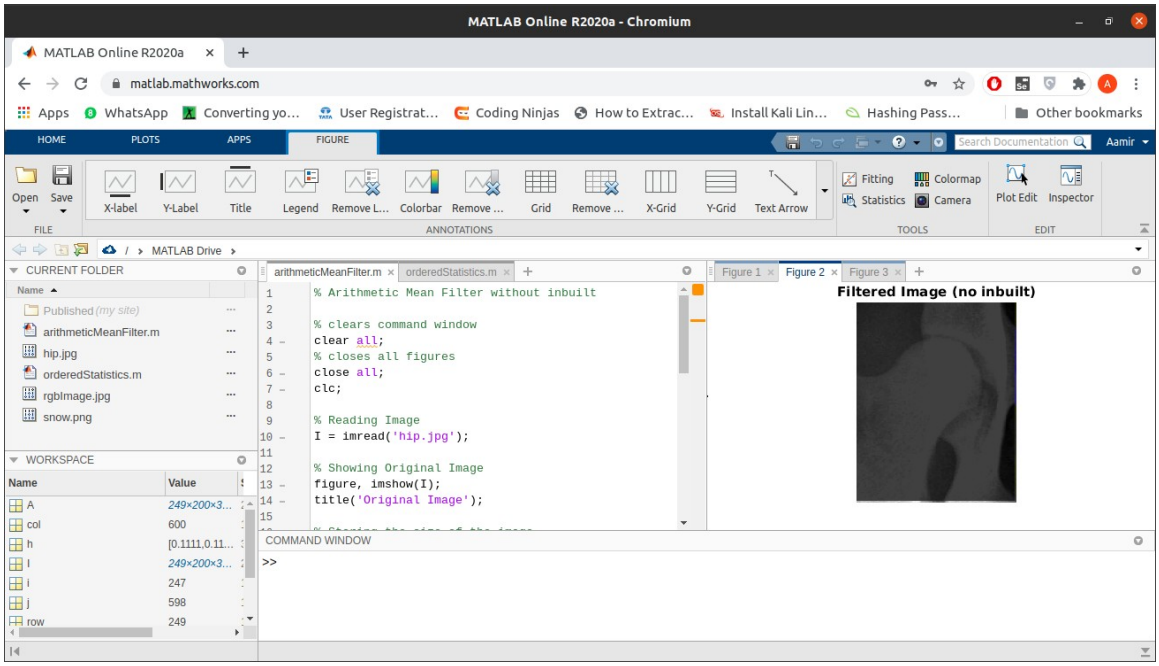
code-

```
% Arithmetic Mean Filter without inbuilt


% clears command window
clear all;
% closes all figures
close all;
clc;

% Reading Image
I = imread('hip.jpg');

% Showing Original Image
figure, imshow(I);
title('Original Image');

% Storing the size of the image
[row, col] = size(I);
for i=1:1:row-2 % Iterating rows
for j=1:1:col-2 % Iterating Columns
for u=1:1:2 % Iterating window
for v=1:1:2
%taking arithmetic mean
I(i,j)=I(i,j)+I(i+u,j+v);
I(i,j)=I(i,j)/4;
end
end
end
end
%showing final image
figure,imshow(I);
title('Filtered Image (no inbuilt)');



% Arithmetic mean filter With Inbuilt
Z = rgb2gray(imread('hip.jpg'));
```

```
h = fspecial('average',3);
A = imfilter(I,h);

%showing final image
figure, imshow(A);
title('Filtered Image (with inbuilt)');
```

Output -

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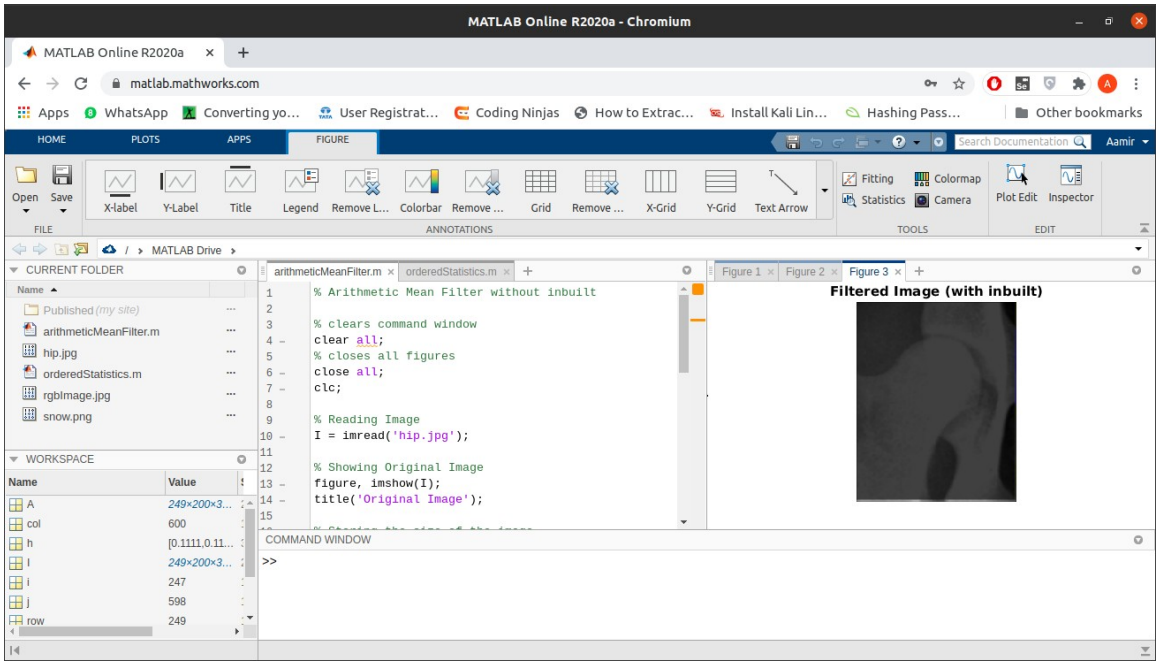
title('Original Image');
COMMAND WINDOW
>>
Figure 1
Figure 2
Figure 3
Filtered Image (no inbuilt)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% closes all figures
close all;
clc;
% Reading Image
I = imread('hip.jpg');
% Showing Original Image
figure, imshow(I);
title('Original Image');
COMMAND WINDOW
>>
Figure 1
Figure 2
Figure 3
Filtered Image (with inbuilt)

Order Statistics Filter:

code-

```
% Arithmetic Mean Filter without inbuilt


% clears command window
clear all;
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close all;
clc;

% Reading Image
I = imread('hip.jpg');

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I(i,j)=I(i,j)+I(i+u,j+v);
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end
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figure,imshow(I);
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```
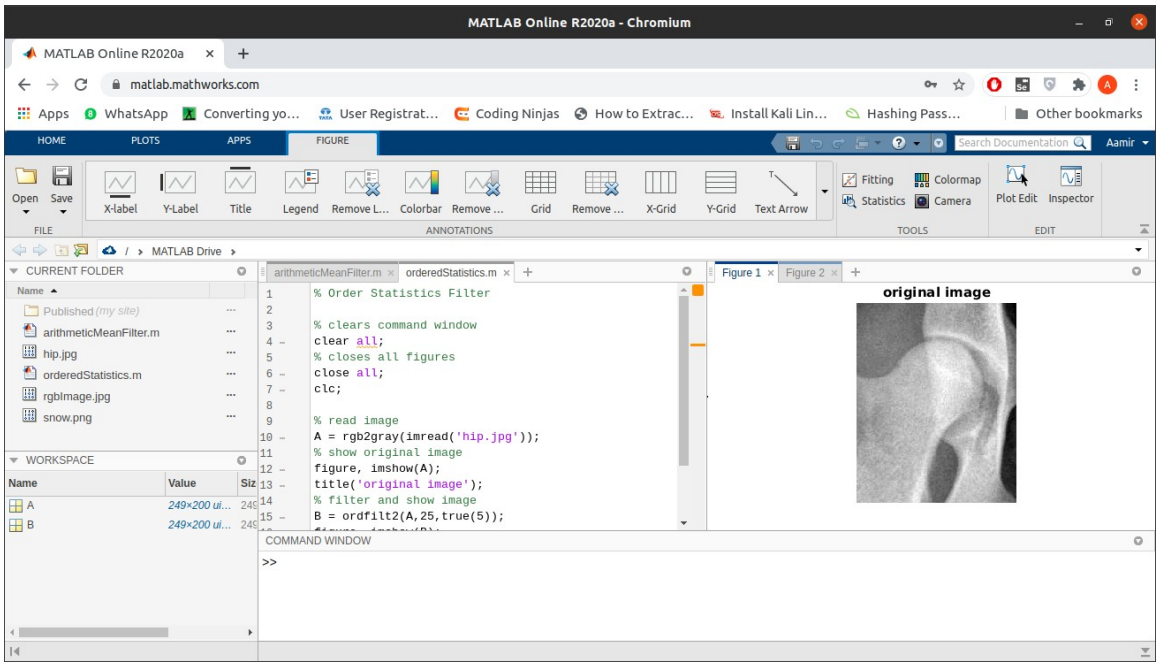
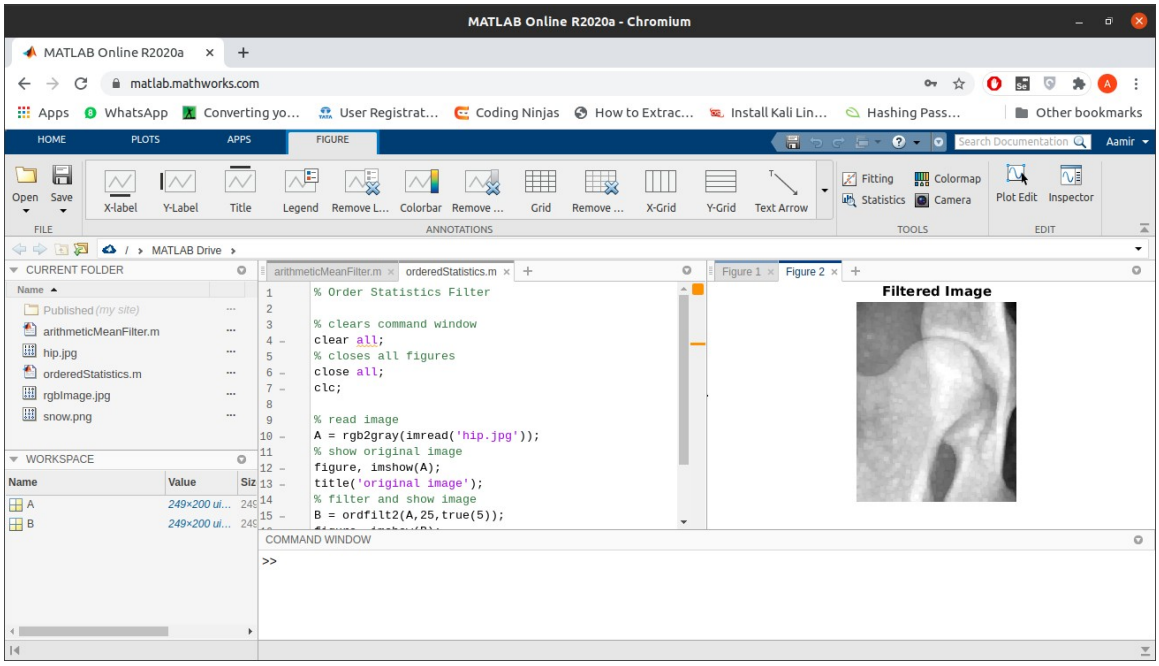

```
% Arithmetic mean filter With Inbuilt
Z = rgb2gray(imread('hip.jpg'));

h = fspecial('average',3);
A = imfilter(I,h);

%showing final image
figure, imshow(A);
title('Filtered Image (with inbuilt)');
```

Output-





Conclusion:

So order statistics filter and arithmetic mean filter has been implemented using matlab with algorithm and flowchart.