ASSIGNMENT 12

AIM 1:- Write a matlab program to insert Gaussian and impulse noise.

Code:-

```
clc;
clear all;
close all;
I=imread('original.tif');
imshow(I);

J = imnoise(I,'gaussian');
figure,
subplot(6,2,1),imshow(J),title('Gaussian Noise');
subplot(6,2,2),imhist(J),title('Gaussian Noise Histogram');
K = imnoise(I,'salt & pepper');
subplot(6,2,3),imshow(K),title('salt & pepper noise');
subplot(6,2,4),imhist(K),title('salt & pepper Noise Histogram');
n1 = imnoise2('exponential',256,256,15);
L=imnoise(I,'localvar',n1);
subplot(6,2,5),imshow(L),title('exponential noise');
subplot(6,2,6),imhist(L),title('Exponential Noise Histogram');
n2 = imnoise2('rayleigh',256,256,15,5);
M=imnoise(I,'localvar',n2);
subplot(6,2,7),imshow(L),title('rayleigh noise');
subplot(6,2,8),imhist(L),title('rayleigh Noise Histogram');
n3 = imnoise2('uniform',256,256,0,0.25);
N=imnoise(I,'localvar',n3);
subplot(6,2,9),imshow(N),title('uniform noise');
subplot(6,2,10),imhist(N),title('uniform Noise Histogram');
```

imnoise2.m:-

```
function R = imnoise2(type, M, N, a, b)
%IMNOISE2 Generates an array of random numbers with specified PDF.
%   R = IMNOISE2(TYPE, M, N, A, B) generates an array, R, of size
%   M-by-N, whose elements are random numbers of the specified TYPE
%   with parameters A and B. If only TYPE is included in the
%   input argument list, a  single random number of the specified
%   TYPE and default parameters shown below is generated. If only
%   TYPE, M, and N are provided, the default parameters shown below
%   are used.  If M = N = 1, IMNOISE2 generates a single random
%   number of the specified TYPE and parameters A and B.
```

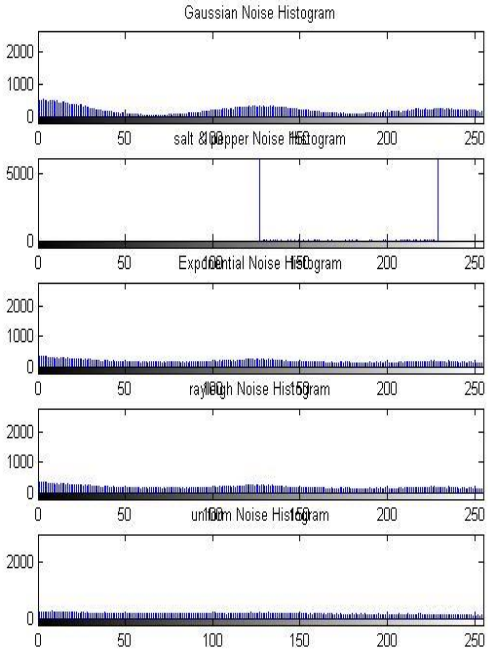
```
%
%   Valid values for TYPE and parameters A and B are:
%
%   'uniform'       Uniform random numbers in the interval (A, B).
%                   The default values are (0, 1).
%   'gaussian'      Gaussian random numbers with mean A and standard
%                   deviation B. The default values are A = 0, B =
1.
%   'salt & pepper' Salt and pepper numbers of amplitude 0 with
%                   probability Pa = A, and amplitude 1 with
%                   probability Pb = B. The default values are Pa =
%                   Pb = A = B = 0.05.  Note that the noise has
%                   values 0 (with probability Pa = A) and 1 (with
%                   probability Pb = B), so scaling is necessary if
%                   values other than 0 and 1 are required. The
noise
%                   matrix R is assigned three values. If R(x, y) =
%                   0, the noise at (x, y) is pepper (black).  If
%                   R(x, y) = 1, the noise at (x, y) is salt
%                   (white). If R(x, y) = 0.5, there is no noise
%                   assigned to coordinates (x, y).
%   'lognormal'     Lognormal numbers with offset A and shape
%                   parameter B. The defaults are A = 1 and B =
%                   0.25.
%   'rayleigh'      Rayleigh noise with parameters A and B. The
%                   default values are A = 0 and B = 1.
%   'exponential'   Exponential random numbers with parameter A.
The
%                   default is A = 1.
%   'erlang'        Erlang (gamma) random numbers with parameters A
%                   and B.  B must be a positive integer. The
%                   defaults are A = 2 and B = 5.  Erlang random
%                   numbers are approximated as the sum of B
%                   exponential random numbers.

%   Copyright 2002-2006 R. C. Gonzalez, R. E. Woods, & S. L. Eddins
%   Digital Image Processing Using MATLAB, Prentice-Hall, 2004
%   $Revision: 1.6 $  $Date: 2006/07/15 20:44:52 $

% Set default values.
if nargin == 1
   a = 0; b = 1;
   M = 1; N = 1;
elseif nargin == 3
   a = 0; b = 1;
end

% Begin processing. Use lower(type) to protect against input being
% capitalized.
```

```
switch lower(type)
case 'uniform'
   R = a + (b - a)*rand(M, N);
case 'gaussian'
   R = a + b*randn(M, N);
case 'salt & pepper'
   if nargin <= 3
      a = 0.05; b = 0.05;
   end
   % Check to make sure that Pa + Pb is not > 1.
   if (a + b) > 1
      error('The sum Pa + Pb must not exceed 1.')
   end
   R(1:M, 1:N) = 0.5;
   % Generate an M-by-N array of uniformly-distributed random
numbers
   % in the range (0, 1). Then, Pa*(M*N) of them will have values <=
   % a. The coordinates of these points we call 0 (pepper
   % noise). Similarly, Pb*(M*N) points will have values in the
range
   % > a & <= (a + b).  These we call 1 (salt noise).
   X = rand(M, N);
   c = find(X <= a);
   R(c) = 0;
   u = a + b;
   c = find(X > a & X <= u);
   R(c) = 1;
case 'lognormal'
   if nargin <= 3
      a = 1; b = 0.25;
   end
   R = exp(b*randn(M, N) + a);
case 'rayleigh'
   R = a + (-b*log(1 - rand(M, N))).^0.5;
case 'exponential'
   if nargin <= 3
      a = 1;
   end
   if a <= 0
      error('Parameter a must be positive for exponential type.')
   end
   k = -1/a;
   R = k*log(1 - rand(M, N));
case 'erlang'
   if nargin <= 3
      a = 2; b = 5;
   end
   if (b ~= round(b) | b <= 0)
      error('Param b must be a positive integer for Erlang.')
```

```
   end
   k = -1/a;
   R = zeros(M, N);
   for j = 1:b
      R = R + k*log(1 - rand(M, N));
   end
otherwise
   error('Unknown distribution type.')
end
```

Output:-


Gaussian Noise
salt & pepper noise
exponential noise
rayleigh noise
uniform noise


Gaussian Noise Histogram
2000
1000
0
0
50
200
250
5000
0
0
50
200
250
2000
1000
0
0
50
200
250
2000
1000
0
0
50
200
250
2000
0
0
50
100
150
200
250