Lab report of
Computer Vision Matlab of
Denoising and Error Metrics

Abstract

Vision has a wide variety of functions, of which object recognition is only one. We at the Computer Vision Community have focused our efforts on Object Recognition and try to provide methods that have no general purpose for vision formulation. Ironically, one consequence of this is that computer vision may not even be useful for object recognition. Provides an analysis of why computer vision has become synonymous with object recognition. Implications of this analysis are provided for object recognition and for the interpretation of neurophysiological evidence in the context of 'feature detectors'. Formulation of vision problem in terms of spatio-temporal features is proposed. It is used to matlab do image processing, signal data. The mean data to use as a remove noisy and blur. The proposed metric is very simple and can be implemented in four lines of Matlab code. The noise should be according to the proposed metric. Be independent of the original image. However, a direct measure of this dependence is impossible, because relatively low accuracy of the existing denoting method. Therefore the proposed metric input aims to increase the structural similarity between the noise image and the projected image noise around homogeneous areas and structures. Analogy between input noise image and denominated Image around the most structured areas and calculated as a linear correlation coefficient of two relative structural similarity maps. The proposed metric not only surpasses the current state of the art non-reference quality but also shows numerous experimental results. The metric is quantitative and qualitative, but handles temporary coherence better when used for video denoising.

Part 1: Generating Artificial Data

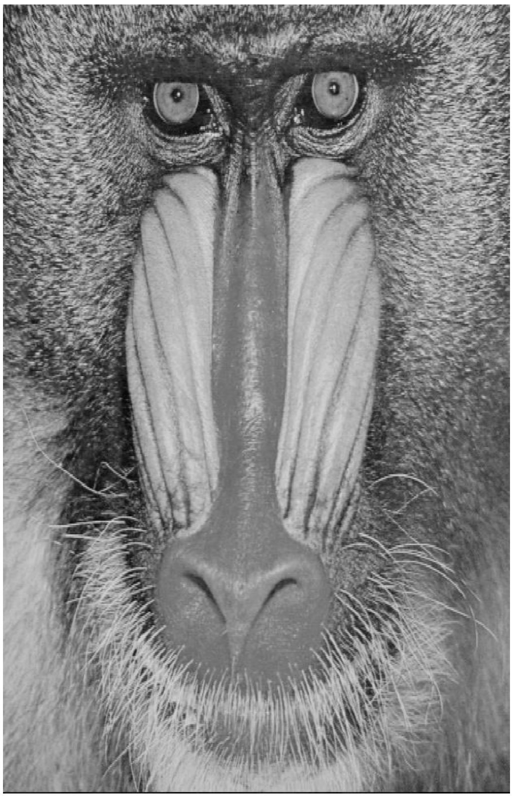
1) How would you shift the mean in the code above?

Ans- If K is an integer, it changes along with the first dimension of circuit A, whose magnitude is not equal to 1. If K is an integer vector, then each element of K represents the sum of the changes in the relative magnitude of A.

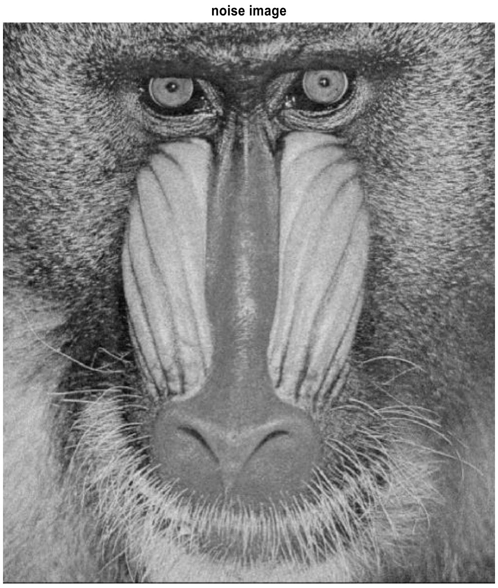
```
mg = imread('94940815mandrill.gif');

figure, imshow(mg);
Title ('original image');

[m,n] = size( mg );
g =uint8(zeros(size(mg )));
r = randn(m);
for i = 1:m
    for j =1:n
        g(i,j)=mg(i,j)+r(i,j)*10;
    end
end

 figure, imshow(g);
title('noise image');
```

- **Output Of original image**

orignal image



- **Output of noisy image**

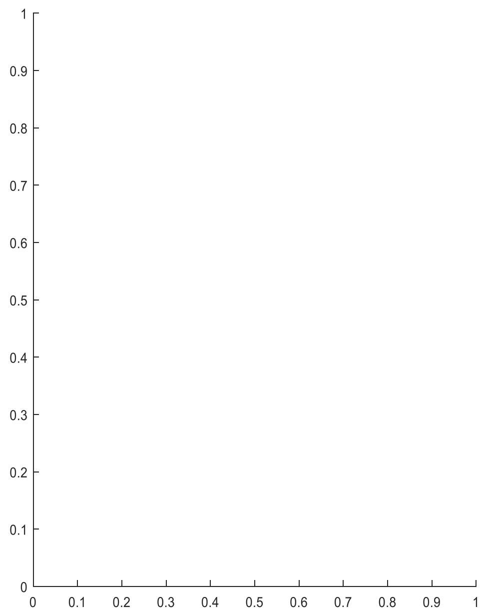


- **Optional challenge -Write your corruptImage function without for loops**

Code without loops

```
mg = imread('94940815mandrill.gif');

figure, imshow(mg);
title ('original image');
% after loading f g1
Fgl= ('corrupt image');
Subplot (1,2,1),
Imshow (fg1, [0 255] );
Subplot (1,2,2)
```

- **Output graph without loop**



Q-2 The dark areas (such as the eyes) were less affected by the noise, but this cannot be true: we corrupted the tone regardless of its original tone. Why does it appear like this?
Ans- In the dark area will less affected by the noise .in the original tone is corrupted because it is error by saving an image. The corrupted on tone due to frequency of signal to noisy signal. In corruption in Gaussian noise 15 to 50 Hz. Corrupted tone is depend on corrupted signal in Gaussian noise. The original meaning of "noise" is "unwanted signal"; unwanted power fluctuations in signals received by AM radio result in audible noise. Image Noise ranges from almost invisible spots in digital photography taken in good light to almost completely sound optical and radio astronomical images, allowing small amounts of information to be retrieved through sophisticated processing. Such noise level is not acceptable in photography because it is also impossible to detect the subject.

Part 2: Denoising

Q-3 Include a picture of the de-noised image in your lab report and comment on its apparent effectiveness.
According to equations-

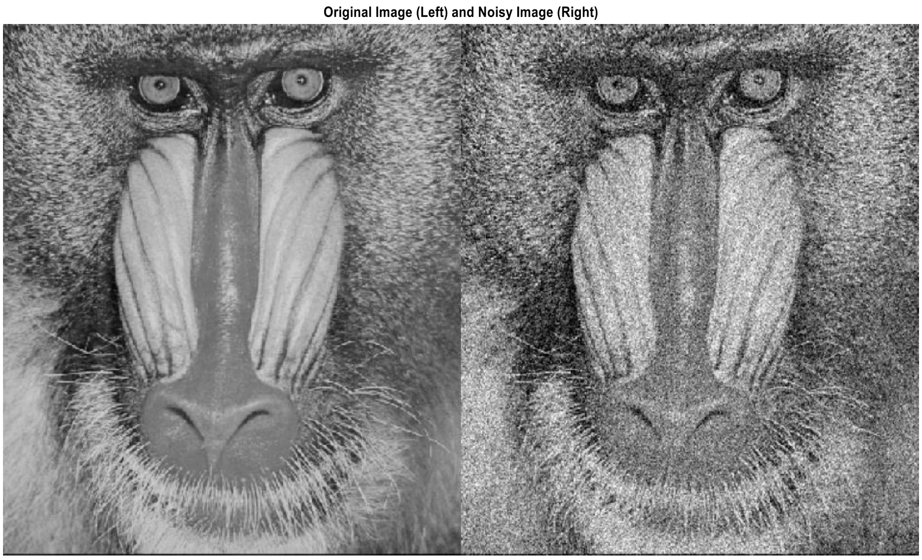
$$g(x,y) = \frac{1}{k}\sum_{i=0}^{k} gi(x,y)$$

Where y is the noisy image and x is original image k represent a Gaussian image Where y represents the observed noise image, x represents the unknown clean image, and k represents the standard white Gaussian noise (AWGN) with standard deviation n, which can be estimated in different ways in practical applications such as average absolute deviation. Block-based assessment and Principal Component Analysis (PCA) - based methods. The purpose of noise reduction is to reduce noise in natural images and to improve signal-to-noise ratio (SNR) while minimizing loss of original features. The function of denoisy image is denoiseImage (A,net) estimates denoised image B from noisy image A using a denoising deep neural network specified by net. The denoising method described for the one-dimensional case also applies to images and geometric images as well. The two dimensional denoising process involves the same three steps and uses a two dimensional wavelet device instead of one dimensional. For the threshold option, (size of (y)) is used instead of the length (y) if a fixed form threshold is used.

- **Coding of original image to de-noisy image**

```
I = imread ('94940815mandrill.gif');
noisyI = imnoise(I,'gaussian',0,0.02);
montage({I,noisyI})
title('Original Image (Left) and Noisy Image (Right)')
denoisedI = denoiseImage(noisyI,net);
imshow(denoisedI)
title('Denoised Image')
```

Output of image denoisy



We show corrupt images into 3 dimensional array we can write 3-d array using corrupt images.
A = 3*3 array

```
>> A = [1 2 2; 1 2 1; 0 1 0]

A =

     1     2     2
     1     2     1
     0     1     0
```

Part 3: Mean Absolute Deviation

According to equation 3

$$MAD = \frac{1}{L+M}\sum_{i=0}^{L}\sum_{J=0}^{M}|G(i,j)-f(i,j)|$$

Q-4 Discuss what MAD value you were able to achieve and the trend of your graph.
Ans-The mad value is achieve 1.463294022173298 this value is trend in a graph.
If X is a vector, then Mad is the mean or mean absolute deviation of the values in X.

If X is the matrix, then mad provides a row vector with the mean or mean absolute deviation of each column of X.

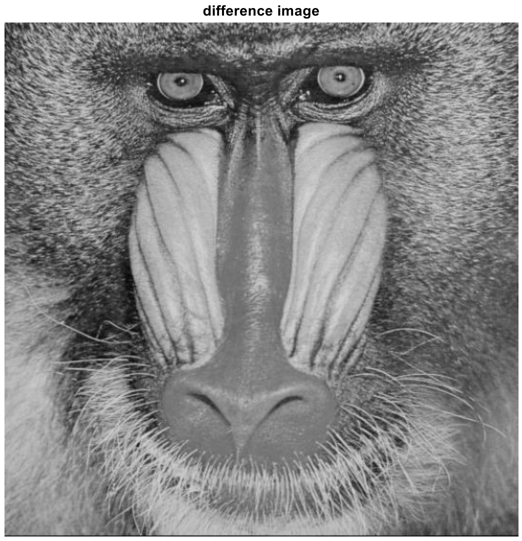
If x is a multidimensional array, then mad works with the first non-singleton size of x.

- **The equation of MAD is convert into code value between 2 to 100**

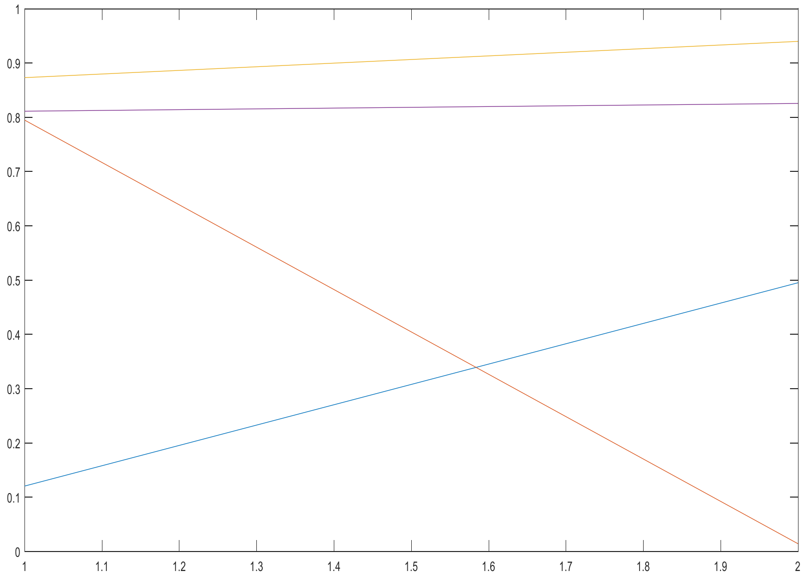
```
Mg = imread ('94940815mandrill.gif');
```

```
figure, imshow(mg);
title('original image');
 [M, n] = size (mg);
g =uint8 (zeros (size (mg)));
r = randn (m);
For i = 1: m
    For j =1: n
        G (i, j) =mg (i, j) +r (i, j)*10;
        Sum (sum ((i - mean (j, 1))));
        S = sum (I (:));
a = rand (2, 4);
Plot (a)
Mean (a)
    End
End
```

If compare of equation first and second output image difference is



- **Plot a graph**



- **Code of Mean deviation algorithm**

```
Rng ('default') % for reproducibility
x = normrnd (5,7,3,50);
xo = [x ];
r1 = std(xo)/std(x);
r2 = mad(xo)/mad(x);
r3 = mad(xo,1)/mad(x,1);
X = randn([2]);
plot(x)
```

Colon the value of 2-dimensional

```
ycol = mad(X,0,[10 30])
```

- **Output**

```
ycol =

     0     0
     0     0
```

Q-5 Define a Normal Distribution and describe its parameters.

Ans- The general distribution is also known as the Gaussian or Gaussian distribution. Distribution is widely used in the natural and social sciences. It is relatively generated by the central limit theory, which states that averages obtained from independent, uniformly distributed random variables form a normal distribution regardless of the type of sample distribution.

There are two type of parameter of normal distribution

- Mean
- Standard deviation

a- **Mean**- The average is used by researchers as a measure of the central trend. It can be used to describe the distribution of a measured variable as a ratio or interval. In the general distribution graph, the mean defines the maximum position and most data points are clustered around the mean. Any change in the mean value moves the curve along the X-axis to the left or right.

b- **Standard deviation-** The standard deviation measures the amplitude of data points relative to the average. It determines how far the data points are from the mean and indicates the distance between the mean and the observations. In the graph, the standard deviation determines the width of the curve and it expands or expands the width of the distribution along the x-axis. In general, a small standard deviation relative to the mean produces an angular curve, while a large standard deviation relative to the average produces a flat curve.

6. Give pseudo code for an algorithm that removes noise. It should take as input many images of the same scene and average them to produce a single noiseless image.

Ans-algorithm – [f] =img

Input:

Im = it is an image which is provided by depth noise

// code of noise removal algorithm

Block-divide (im, 5) //divide depth image into 5 * 5 blocks

For I = =1 to 120 blocks

Blocks- get block (i) get the current block

Index –find (block(i==0) // indices a 0 pixel block
If no -zero>0
Average-block // find average value in block
Same scene image(:0,:;); // take a noiseless image
end

This will compromise the level of detail in your digital or film photos and reduce this noise which will significantly improve your final image or print. The problem is that most methods for reducing or eliminating noise always soften the image. Some softness may be acceptable for images with mainly soft water or sky, but the leaves in the landscape may also suffer from conservative attempts to reduce noise. Each image frame used to calculate the mean was artificially damaged by an equally random noise. The number of image frames used to calculate the average image is indicated in parentheses at the top of the window. The RGB Histogram window is displayed to the right of the Average Image window and shows the red, green, and blue histograms of the average image. It is a pseudo code which is remove noise.

```
If "single"
    Print response
        "Single noise image"


If "multiple"
    Print response
        "I multiple noiseless image"
```

7-What is MAD? How can it be used to compare two images?

Ans- Mad stand for mean absolute deviation. Basically it is method of finding outliers. The word of outliers is called noise and pixel is replaced by image

- If X is a vector, then Mad is the mean or mean absolute deviation of the values in X.

- If X is the matrix, then mad provides a row vector with the mean or mean absolute deviation of each column of X.

- If x is a multidimensional array, then mad works with the first non-singleton size of x.
- To compare a MAD image to use function of Mean (Abs(X-Mean(X)) And Median (Abs(X-Mean(X)) this both function use to compare two images.

References

Ashish Bora, Eric Price, Alexandros G. Dimakis. AmbientGAN: Generative models from lossy measurements.

ICLR, 2018. Cerda-Company, Xim, P ´ arraga, C. Alejandro, and Otazu, Xavier. Which tone-mapping operator is the best?

A comparative study of perceptual quality. CoRR, abs/1601.04450, 2016.

Chaitanya, Chakravarty R. Alla, Kaplanyan, Anton S., Schied, Christoph, Salvi, Marco, Lefohn, Aaron,

Nowrouzezahrai, Derek, and Aila, Timo. Interactive reconstruction of Monte Carlo image sequences using are current denoising auto encoder. ACM Trans. Graph., 36(4):98:1–98:12, 2017. Dabov, K., Foi, A., Katkovnik, V., and Egiazarian, K. Image

denoising by sparse 3-D transform-domain collaborative filtering. IEEE Trans. Image Process., 16(8):2080–2095, 2007.

Good fellow, Ian, Pouget-Abadie, Jean, Mirza, Mehdi, Xu, Bing, Warde-Farley, David, Ozair, Sherjil, Courville,

Aaron, and Bengio, Yoshua. Generative Adversarial Networks. In NIPS, 2014.
Handoff, Sam, Sharlet, Dillon, Geiss, Ryan, Adams, Andrew, Barron, Jonathan T., Kainz, Florian, Chen, Jiawen, and Levoy, Marc. Burst photography for high dynamic

range and low-light imaging on mobile cameras. ACM Trans. Graph., 35(6):192:1–192:12, 2016.

He, Kaiming, Zhang, Xiangyu, Ren, Shaoqing, and Sun, Jian. Delving deep into rectifiers: Surpassing human level performance on imagenet classification. CoRR,

abs/1502.01852, 2015. Huber, Peter J. Robust estimation of a location parameter. Ann. Math. Statist., 35(1):73–101, 1964.