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A COMPARATIVE STUDY OF MEAN SQUARE ERROR, DIMENSIONS, SIGNAL TO NOISE RATIO OF COLORED AND NON COLORED CLUSTERED ORIGINAL IMAGES ALONG WITH COMPRESSED VERSION AFTER THE IMAGE SEGMENTATION AND FILTERING METHOD

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[ABSTRACT: Primarily author has already done one fundamental paper work on image clustering and segmentation but here in this paper author has continued that same type of work on clustered and segmented images as a mode of comparative study for author has chosen three different parameters like mean square error, peak SNR and dimensions of images (length, width, height). The author has all three parametric methods on one particular to justify the comparison. So this paper is a cumulative case of a comparative study for which author has chosen the above mentioned parameters to justify the best results of the clustered and segmented images.]

[KEYWORDS: RGB, LAB, GRAY, PREWITT, SOBEL, CANNY FILTERING, K-MEANS CLUSTERING METHOD.]

1. INTRODUCTION:

An image is a visual representation of a two dimensional data; an image can be formed by using million number of pixels which is an integrated unit of digital image analysis.
RGB image consists of these independent image one in each of the primary colors red, green and blue.

Gray scale image means one kind of black andwhite image with monochromatic nature of pixels.
LAB image means lightness channel A, channel B, its global color model where yAs we move our main criteria is clustering of image which is a method to define group of pixels; therefore the pixels in the group define a class in the segmented image , segmentation is a process of partitioning n image into parts or region.
Here in this method we have used very common filtering method for edge detection of contours they are prewitt, sobel and canny filtering.

Here prewitt filtering is a special filtering used in image processing to identify processes for subsequent processing of an image.
Canny filtering method is used for multistage edge detector based on the derivative of a Gaussian in order to compute the intensity of the gradients.
Sobel is an edge detector filter used as a gradient based method that look strong changes in the first derivative of the image.ou can specify any given color by giving numeric values.

1.1 WHAT IS KMEANS CLUSTERING:

K Means is a clustering algorithm. Clustering algorithms are unsupervised algorithms which means that there is no labelled data available. It is used to identify different classes or clusters in the given data based on how similar the data is. Data points in the same group are more similar to other data points in that same group than those in other groups.
K-means clustering is one of the most commonly used clustering algorithms. Here, k represents the number of clusters.
k-means is method of cluster analysis using a pre-specified no. of clusters. It requires advance knowledge of 'K'. k-means, using a pre-specified number of clusters, the method assigns records to each cluster to find the mutually exclusive cluster of spherical shape based on distance. Here k means clustering is just an example because syntaxes are easily available in matlab, and method of clustering is very easy. If you want to use any complex clustering method you can use it but results of image contour may be different for that reason signal to noise ratio of each contour of the image will be changed accordingly.

1.2WHAT IS MEAN SQUARE ERROR IN IMAGE PROCESSING

MSE (Mean Square Error) MSE is the most common estimator of image quality measurement metric. It is a full reference metric and the values closer to zero are the better. It is the second moment of the error. The variance of the estimator and its bias are both incorporated with mean squared error.

2.STEP BY STEP PROGRAMMING BY USING MATLAB:

a. Upload the image in mat-lab.
b. Find out the RGB, LAB, GRAY version of the image.
c. Performing K-means clustering then image segmentation of these 3 images [coloured and non coloured].
d. Perform prewitt, canny, sobel filtering the coloured and non coloured images.
e. Find out the signal to noise ratio, mean square error all dimensions of the filtered images and k-means clustered images.
f. Make a table of comparison of these parameters separately.

3. PROGRAMMING CODE:

3.1 MATLAB CODE FOR CLUSTERING AND SEGMENTATION:

```
x=imread('New photo.jpg');
subplot(2,2,1)
imresize(x,5);
I=imsegkmeans(x,2);
b=labeloverlay(x,I);
imshow(b);
```

```
title('clustering of color image');
subplot(2,2,2)
k=rgb2gray(x);
I=imsegkmeans(x,2);
b=labeloverlay(x,I);
imshow(b);
title('clustering of gray image');
subplot(2,2,3)
k=rgb2lab(x);
imresize(x,5);
I=imsegkmeans(x,2);
b=labeloverlay(x,I);
imshow(b);
title('clustering of lab image');
```

3.2 MATLAB CODE FOR IMAGE FILTERING METHOD

```
x=imread('New photo.jpg');
imshow(x)
k=rgb2gray(x);
subplot(2,2,1)
imresize(k,5);
I=imsegkmeans(k,2);
BW1=edge(I,'sobel');
imshow(BW1);
title(' image filtering by sonel');
subplot(2,2,2)
imresize(k,5);
I=imsegkmeans(k,2);
BW1=edge(I,'canny');
title(' image filtering by canny');
imshow(BW1);
subplot(2,2,3)
imresize(k,5);
I=imsegkmeans(k,2);
BW1=edge(I,'prewitt');
imshow(BW1);
title(' image filtering by prewitt');
```

3.3 MATLAB CODE FOR IMAGE COMPRESSION

```
x=imread('New photo.jpg');
A = rgb2gray(x);
subplot(2,2,1)
imshow(A);
```

```
title(['Original (',sprintf('Rank %d)',rank(double(A)))])
subplot(2,2,2)
[U1,S1,V1] = svdsketch(double(A),1e-2);
Anew1 = uint8(U1*S1*V1');
imshow(uint8(Anew1));
title(sprintf('Rank %d approximation',size(S1,1)))
subplot(2,2,3)
[U1,S1,V1] = svdsketch(double(A),1e-1);
Anew2 = uint8(U1*S1*V1');
imshow(Anew2);
title(sprintf('Rank %d approximation',size(S1,1)))
subplot(2,2,4)
[U3,S3,V3,apxErr]=svdsketch(double(A),1e-
1,'MaxSubspaceDimension',15);
Anew3 = uint8(U3*S3*V3');
imshow(Anew3)
title(sprintf('Rank %d approximation',size(S3,1)))
```

3.4 MATLAB CODE FOR SNR CALCULATION AND MEAN SQUARE ERROR CALCULATION:

3.3.1:PEAK-SNR:

```
ref=imread('ab3.jpg');
A=imnoise(ref,'salt & pepper',0.02);
[peaksnr,snr]=psnr(A,ref);
fprintf('\n the peak-snr value is%0.4f',peaksnr); the peak-snr value
is20.0557
```

3.3.2: MEAN SQUARE ERROR

```
ref = imread('ab3.jpg');
A = imnoise(ref,'salt & pepper', 0.02);
err = immse(A, ref);
fprintf('\n The mean-squared error is %0.4f\n', err);
 The mean-squared error is 616.9399
```

4. MOST POSSIBLE OUTCOMES OF IMAGES:

Original (Rank 293)

Rank 111 approximation

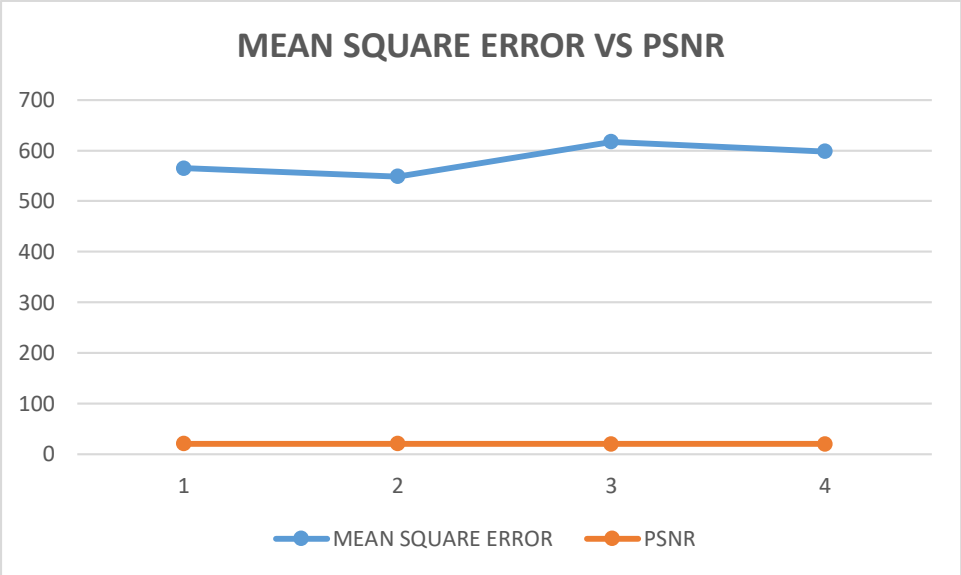
Rank 37 approximation

Rank 15 approximation

5.TABLE OF CALCULATIONS OF PEAK SNR, MEAN SQUARE ERROR AND DIMENSIONS:

TYPES OF IMAGES	DIMENSIONS			PEAK SNR	MEAN SQUARE ERROR
	LENGTH	HEIGHT	WIDTH		
RGB	370	370	293	20.5939	565.0096
GRAY	370	370	293	20.7918	548.4929
LAB	370	370	293	20.0557	616.9399
COMPRESSED	370	370	293	20.3531	598.1251

TYPES OF FILTERING	DIMENSIONS			PEAK SNR	MEAN SQUARE ERROR
	LENGTH	HEIGHT	WIDTH		
PREWITT	370	370	293	19.9726	643.5172
CANNY	370	370	293	19.8815	658.1471
SOBEL	370	370	293	19.9402	652.8568



6. DISCUSSION ON RESULTS:

As we have seen that in case of image filtering (prewitt, canny,sobel) the values of peak SNR is less so image has become little bit of noisy but mean square error(MSE) is high ; so filtering here for this images has not displayed us very good results. Here we have used prewitt , sobel , canny filtering as an edge detection technology to detect the image border.

7. FUTURE SCOPE OF WORK:

Here author has used three different parameters to justify the comparative study but in future author wants that more very important parameters should be applied for comparison for which more study of different journals is required.

8. CONCLUSION:

In this paper author has displayed three parameters along-with one form of compressed version of the image; where as several other forms of compressed version are also available. Readers of this paper are requested to think about more such parameters and try those parameters with several other edge detection methods of filtering like 'log' or 'Robert' filtering for filtering purpose.

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