INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad-500 043

Project Based Learning

(Prototype / Design Building)

External Evaluation Report

Title of your Idea : **SEGMENTED IMAGE COMPRESSION USING 2D-DCT**

Thrust Area / Sector : **Image Processing**

Branch : **Electronics and Communication Engineering.**

Year / Semester : **3rd year, V semester.**

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1. **Background of the Idea:**

In recent years, with the development of computer technology, the development of computer vision has made great progress. Computer vision has also brought advanced technology for digital image processing. Digital image processing has developed from such disciplines as data processing and automatic control to the field of image acquisition research, such as image transmission, storage, conversion, display, understanding and development into a new discipline.

According to the different stages of digital image processing, digital image processing can be divided into three stages: image processing, image analysis and image understanding.

Image segmentation technology is a key step in the process of digital image processing, and plays an important role in image processing technology.

Digital image segmentation technology is mainly based on the similarity of some aspects and functions of the image itself to reshape the image. In the process of image segmentation, planning at a certain rate can improve the clarity of image pixels, and the image quality can be significantly improved.

2. **Literature Survey:**

Tai K. The application of digital image processing technology in glass bottle crack detection system

This paper aimed to establish a glass bottle crack detection system based on digital image processing to help manufacturers improve the quality of products. The noise of the picture was suppressed and the edge of the image was smoothed by means of averaging and median filtering. Then we drew grey histogram to set the threshold, and made binarization processing of the image. Finally, the crack on the binary image was detected and judged to obtain the result that whether the glass bottle had cracks.

Taimori A, Razzazi F, Behrad A, et al. A novel forensic image analysis tool for discovering double JPEG compression

This paper introduced a novel and robust forensic image analysis tool in order to discover the traces left by double JPEG compression.t proposed a dimensionality reduction algorithm dedicated to the information visualization task. Our visualizer consists of a combination of linear and non-linear schemes which discovers the complex structure of single/double compressed data better than the modern techniques.The results revealed that utilizing coder information and behavior for discovering double compression traces can considerably improve the performance in comparison to other methods. This intuition

may encourage a trend toward advising source coder-specific mechanisms to approach an appropriate court-friendly performance.

Coronel L, Badoy W, Namoco C. Identification of an efficient filtering-segmentation technique for automated counting of fish fingerlings

Combination A (Local Normalization and Iterative Selection) provides significantly very high in correcting non-uniform lighting in an image, noise reduction and feature identification compare with other combinations of filtering and segmentation techniques.

In terms of counting accuracy, Combination A obtained an average Precision, Recall and F measure of as high as 99.80%, 97.90% and 98.83% which outperformed other combinations, respectively.

Mi C , Zhang Z , He X , et al. Two-stage classification approach for human detection in camera video in bulk ports.

The first stage classification has a greater detection accuracy than the second-stage classification, which means F&B posture human has more specification HOG features than side human. Thee two-stage classification method proposed in this paper has a detection accuracy of more than 97%, which is higher than using traditional SVM. In conclusion, the improved classification approach purposed in this paper is more feasible and advanced

3. Problem Statement:

With the development of science and technology, image processing technology has been applied in many fields. Image segmentation technology in digital imaging has good applications in transportation, biomedical, remote sensing engineering, fire prediction and detection.

However, there are some problems in the application of digital image segmentation technology, such as wide frequency, low compression data and limited processing speed.

4. Proposed Solution:

Tough the image segmentation has various applications and benefits it lacks at a few aspects i.e. The size of a segmented image can further be compressed and the process can be made faster. In this paper we have proposed a better compression technique to tackle one of its drawbacks, We have used a lossless technique to compress the image obtained. The technique used is 2D-DCT transform.

5. Prototype of Proposed System

Flowchart :

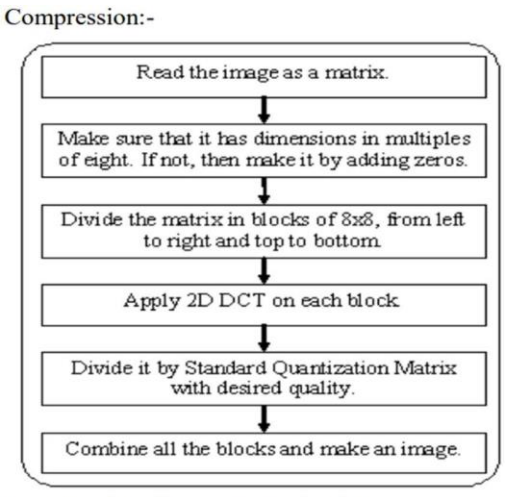


Fig.3. Flowchart of Compression using 2D DCT

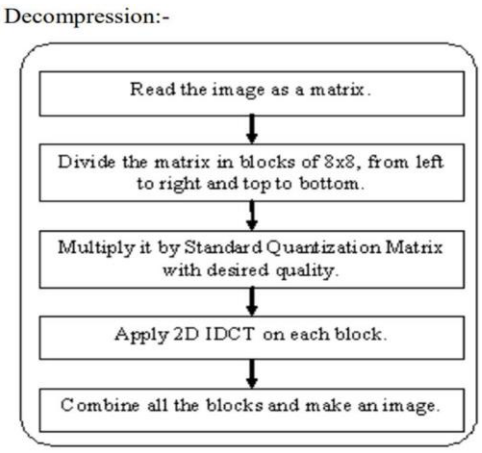


Fig.4. Flowchart of Recovery using 2D IDCT

6. Detailed description of prototype / project:

Software used:

MATLAB Software

Algorithm:

MATLAB code for image segmentation

```
close all;
clear all;
clc
%Gray level Thresolding
a=imread(&#39;b.jpg&#39;);
level=graythresh(a);
c= im2bw(a,level);
subplot(1,2,1), imshow(a),title(&#39;original image&#39;);
subplot(1,2,2), imshow(c),title(&#39;threshold image&#39;);
%edge detection
a=imread(&#39;jump.jfif&#39;);
a=rgb2gray(a);
c=edge(a,&#39;roberts&#39;);
d=edge(a,&#39;sobel&#39;);
e=edge(a,&#39;prewitt&#39;);
f=edge(a,&#39;canny&#39;);
g=edge(a,&#39;log&#39;);
subplot(2,3,1), imshow(a),title(&#39;original image&#39;);
subplot(2,3,2), imshow(c),title(&#39;roberta image&#39;);
subplot(2,3,3), imshow(d),title(&#39;sobel image&#39;);
subplot(2,3,4), imshow(e),title(&#39;prewitt image&#39;);
subplot(2,3,5), imshow(f),title(&#39;canny image&#39;);
subplot(2,3,6), imshow(g),title(&#39;log image&#39;);
%descrete wavelet tranform (wavelet decompsition)
a=imread(&#39;jump.jfif&#39;);
subplot(2,2,1), imshow(a),title(&#39;original image&#39;);
[LL LH HL HH]=dwt2(im2double(a),&#39;haar&#39;);
subplot(2,2,2), imshow([LL LH ; HL HH],[]),title(&#39;Wavelet Decomposition&#39;);
[LL1 LH1 HL1 HH1]=dwt2(im2double(LL),&#39;haar&#39;);
c=[LL1 LH1 ; HL1 HH1];
subplot(2,2,3), imshow([c LH ; HL HH],[]),title(&#39;2nd level Wavelet Decomposition&#39;);
%Morphological processing
a=imread(&#39;jump1.jpg&#39;);
subplot(2,2,1), imshow(a),title(&#39;original image&#39;);
s=strel(&#39;line&#39;,3,3);
dilated=imdilate(a,s);
subplot(222), imshow(dilated);
eroded=imerode(a,s);
subplot(223), imshow(eroded);
```

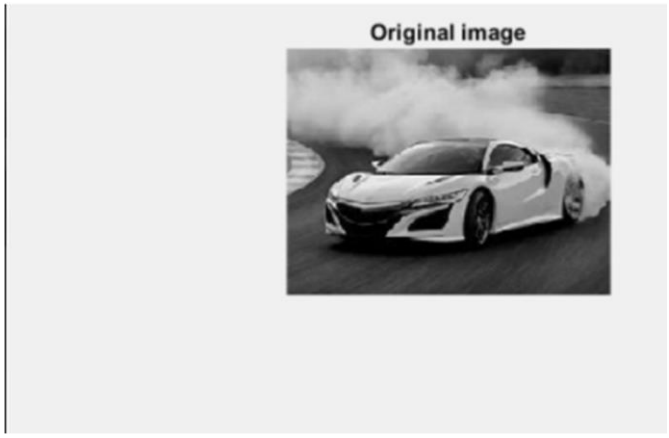
MATLAB code for 2D-DCT compression

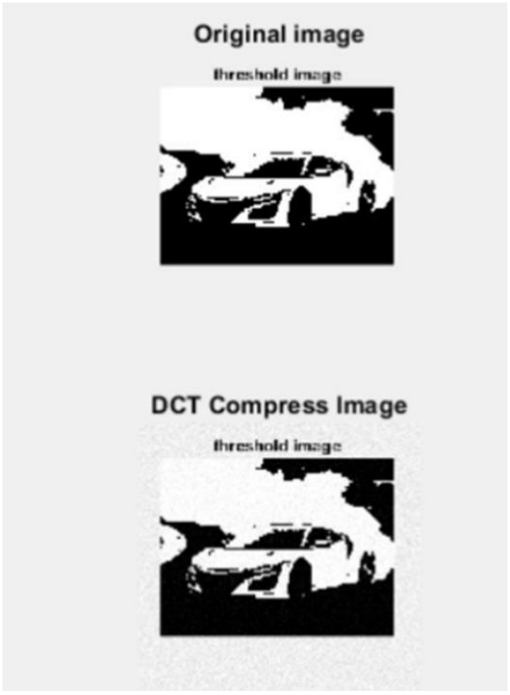
```
clc;
clear all;
```

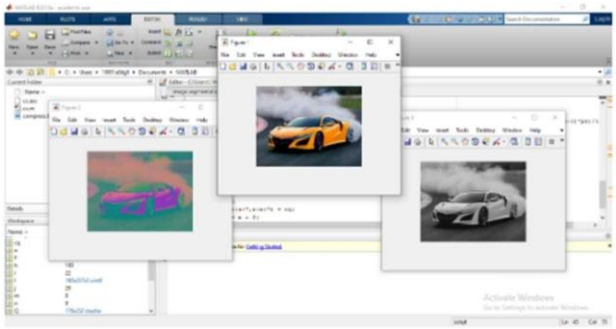
```
close all;
I = imread(&#39;lena512.jpg&#39;);
figure, imshow(I);
% Y = I;
YCbCr = rgb2ycbcr(I);
figure, imshow(YCbCr);
Y = YCbCr(:,:, 1);
figure, imshow(Y);
[h, w] = size(Y);
r = h/8;
c = w/8;
s = 1;
q50 = [16 11 10 16 24 40 51 61;
       12 12 14 19 26 58 60 55;
       14 13 16 24 40 57 69 56;
       14 17 22 29 51 87 80 62;
       18 22 37 56 68 109 103 77;
       24 35 55 64 81 104 113 92;
       49 64 78 87 103 121 120 101;
       72 92 95 98 112 100 103 99];
% COMPRESSION
for i=1:r
    e = 1;
    for j=1:c
        block = Y(s:s+7,e:e+7);
        cent = double(block) - 128;
        for m=1:8
            for n=1:8
                if m == 1
                u = 1/sqrt(8);
              else
                u = sqrt(2/8);
              end
              if n == 1
                v = 1/sqrt(8);
              else
                v = sqrt(2/8);
              end
              comp = 0;
              for x=1:8
                for y=1:8
                    comp = comp + cent(x, y)*(cos((((2*(x-1))+1)*(m-
1)*pi)/16))*(cos((((2*(y-1))+1)*(n-1)*pi)/16));
                end
              end
               F(m, n) = v*u*comp;
            end
        end
        for x=1:8
            for y=1:8
               cq(x, y) = round(F(x, y)/q50(x, y));
            end
        end
        Q(s:s+7,e:e+7) = cq;
        e = e + 8;
    end
    s = s + 8;
 end
```

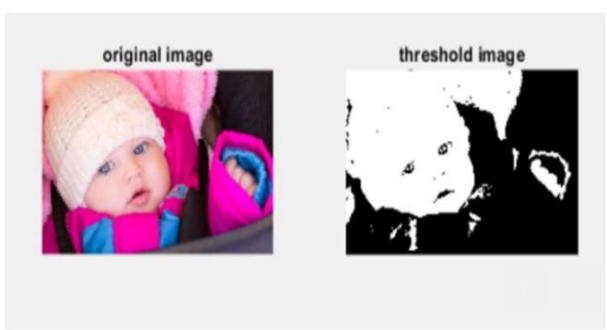
```
% % % % % % % % % % % % % %
% % DECOMPRESSION
% % % % % % %
s = 1;
for i=1:r
    e = 1;
    for j=1:c
        cq = Q(s:s+7,e:e+7);
        for x=1:8
            for y=1:8
                DQ(x, y) = q50(x, y)*cq(x, y);
            end
        end
         for m=1:8
            for n=1:8
                if m == 1
                    u = 1/sqrt(8);
                else
                    u = sqrt(2/8);
                 end
                if n == 1
                    v = 1/sqrt(8);
                else
                    v = sqrt(2/8);
                end
                comp = 0;
                for x=1:8
                    for y=1:8
                        comp = comp + u*v*DQ(x, y)*(cos((((2*(x-1))+1)*(m-1)*pi)/16))*(cos((((2*(y-1))+1)*(n-
1)*pi)/16));
                    end
                end
                  bf(m, n) = round(comp)+128;
              end
            end
            Org(s:s+7,e:e+7) = bf;
            e = e + 8;
        end
        s = s + 8;
     end
imwrite(Y, &#39;F:\workouts\phd\jpeg\input.jpg&#39;);
imwrite(uint8(Org), &#39;F:\workouts\phd\jpeg\output.jpg&#39;);
return
```

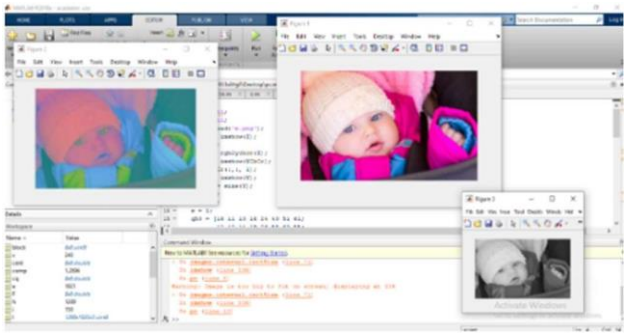
7. Final version of prototype / product :











8. References:

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- **Li Yuqian, Su Guangda. High-speed implementation of adaptive image segmentation based on neighborhood processors. Electronic Technology Application, vol. 042, no. 002, pp. 99-101, 2016.**
- **Wang Wei, Zeng Xiaoneng. Research and application of image segmentation technology. Computer Age, no. 001, pp. 26-28, 2015.**

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