影像處理 HW6

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1.

```
m=512; n=512;
fin=fopen('lenna.raw','r');
X=fread(fin,m*n,'uint8=>uint8'); fclose(fin);
Y=reshape(X,m,n);
A = Y ;
[M,N] = size(A) ;
nx = 8 ; ny = 8 ;
m = M/nx ; n = M/ny ;
l = size (A) ./ [m n];
T = mat2cell (A, repmat (m, l(1), 1), repmat (n, l (2), 1));
M = cellfun(@mean,T,'un',0) ;
M = cellfun(@mean,M,'un',0) ;
M = cell2mat(M)
```

Result(lenna.raw):

M =

159.1489	135.8430	137.1511	138.6235	130.9504	127.8376	134.4500	141.4268
114.7898	109.6130	115.5845	109.2646	109.2239	95.5630	80.2715	72.3013
135.2363	127.6821	134.1689	119.2703	82.3789	104.7578	100.0669	81.2192
143.4956	164.8689	151.1375	94.7310	126.7112	96.9834	87.6392	116.8193
133.0820	185.1099	168.4966	167.4128	153.5842	147.3169	155.3281	149.1877
149.4238	129.7444	186.3132	131.9800	103.3191	90.1890	142.1013	180.1355
164.0115	129.8452	118.4692	105.8286	134.3345	151.0945	143.8657	129.0601
98.0784	94.2476	152.7112	159.4309	169.1680	200.1360	139.6064	98.5386

Result(peppers.raw):

M =

145.9402	130.9912	121.2903	81.8962	72.5574	66.4946	112.3782	173.2654
128.0085	96.3965	145.2668	116.5662	129.3799	145.5708	159.0298	182.8020
126.4966	119.8313	176.0042	181.6545	159.7109	123.0051	98.3911	144.8235
105.8423	104.1228	125.8704	103.7930	148.4663	121.5942	90.2336	102.8489
138.7617	111.5784	115.3672	138.7490	155.8506	138.8228	117.6892	78.4956
167.7949	133.4980	126.0498	127.9866	152.8992	139.0693	130.0681	82.0938
167.9846	136.2161	125.3281	126.2874	115.6333	103.2832	89.8103	114.9148
143.0720	162.6130	160.2227	170.6460	101.3962	101.0098	69.7861	131.1726

2.

```
M = M - 128
B = dct2(M)
```

Result(lenna.raw):

M =

31.1489	7.8430	9.1511	10.6235	2.9504	-0.1624	6.4500	13.4268
-13.2102	-18.3870	-12.4155	-18.7354	-18.7761	-32.4370	-47.7285	-55.6987
7.2363	-0.3179	6.1689	-8.7297	-45.6211	-23.2422	-27.9331	-46.7808
15.4956	36.8689	23.1375	-33.2690	-1.2888	-31.0166	-40.3608	-11.1807
5.0820	57.1099	40.4966	39.4128	25.5842	19.3169	27.3281	21.1877
21.4238	1.7444	58.3132	3.9800	-24.6809	-37.8110	14.1013	52.1355
36.0115	1.8452	-9.5308	-22.1714	6.3345	23.0945	15.8657	1.0601
-29.9216	-33.7524	24.7112	31.4309	41.1680	72.1360	11.6064	-29.4614

B =

18.5450	51.3830	-3.0998	-12.0206	-17.0034	4.0535	21.2230	14.3843
-72.7869	54.3963	22.9491	-10.9296	13.6346	-5.8225	-15.7166	-6.5054
-11.7811	-45.3235	-41.9779	53.9869	9.1858	25.8519	18.4200	-6.9156
75.1769	-17.2131	55.1895	-41.9147	21.5929	5.2327	-11.2205	11.3551
72.2681	-17.2814	-41.2937	6.9175	-7.6151	-23.8235	-7.2068	-6.8961
-2.4541	16.3536	58.5939	18.9091	9.7034	-11.5849	3.7377	10.6617
17.0988	-7.4243	4.6338	-40.6107	-1.2787	31.0323	16.3761	0.4155
40.7576	-11.8521	-9.6247	27.6966	-13.5902	13.8015	-18.2722	-26.3855

Result(peppers.raw):

M =

17.9402	2.9912	-6.7097	-46.1038	-55.4426	-61.5054	-15.6218	45.2654
0.0085	-31.6035	17.2668	-11.4338	1.3799	17.5708	31.0298	54.8020
-1.5034	-8.1687	48.0042	53.6545	31.7109	-4.9949	-29.6089	16.8235
-22.1577	-23.8772	-2.1296	-24.2070	20.4663	-6.4058	-37.7664	-25.1511
10.7617	-16.4216	-12.6328	10.7490	27.8506	10.8228	-10.3108	-49.5044
39.7949	5.4980	-1.9502	-0.0134	24.8992	11.0693	2.0681	-45.9063
39.9846	8.2161	-2.6719	-1.7126	-12.3667	-24.7168	-38.1897	-13.0852
15.0720	34.6130	32.2227	42.6460	-26.6038	-26.9902	-58.2139	3.1726

B =

-9.6659	54.2475	-3.3057	-16.0193	40.1134	-3.9065	31.4679	12.3407
-1.5345	-79.5664	38.4933	-30.3804	-1.6835	-1.7538	14.3255	29.2697
0.3866	14.7912	90.5982	-71.0260	6.6381	-0.7145	6.7397	-23.6982
-27.2468	0.8572	50.9130	58.8169	-14.7106	14.3058	-24.9035	17.6613
-53.6297	17.1722	11.4075	-14.3277	-4.4411	-16.5544	-8.4883	-10.4122
-45.8647	28.3122	24.0203	-11.0882	11.2095	-21.1151	-0.9291	6.2736
20.6143	36.4111	-18.7863	-20.7617	5.9771	-0.0346	-7.5462	-8.0285
9.6065	22.7362	-11.2282	-16.4377	20.8426	8.7972	-3.6957	-13.0438

3.

Result(lenna.raw):

B2 =

1.1591	4.6712	-0.3100	-0.7513	-0.7085	0.1013	0.4161	0.2358
-6.0656	4.5330	1.6392	-0.5752	0.5244	-0.1004	-0.2619	-0.1183
-0.8415	-3.4864	-2.6236	2.2495	0.2296	0.4535	0.2670	-0.1235
5.3698	-1.0125	2.5086	-1.4453	0.4234	0.0601	-0.1403	0.1831
4.0149	-0.7855	-1.1160	0.1235	-0.1120	-0.2186	-0.0700	-0.0896
-0.1023	0.4672	1.0653	0.2955	0.1198	-0.1114	0.0331	0.1159
0.3490	-0.1160	0.0594	-0.4668	-0.0124	0.2565	0.1365	0.0041
0.5661	-0.1288	-0.1013	0.2826	-0.1213	0.1380	-0.1774	-0.2665

Result(peppers.raw):

B2 =

-0.6041	4.9316	-0.3306	-1.0012	1.6714	-0.0977	0.6170	0.2023
-0.1279	-6.6305	2.7495	-1.5990	-0.0648	-0.0302	0.2388	0.5322
0.0276	1.1378	5.6624	-2.9594	0.1660	-0.0125	0.0977	-0.4232
-1.9462	0.0504	2.3142	2.0282	-0.2884	0.1644	-0.3113	0.2849
-2.9794	0.7806	0.3083	-0.2559	-0.0653	-0.1519	-0.0824	-0.1352
-1.9110	0.8089	0.4367	-0.1733	0.1384	-0.2030	-0.0082	0.0682
0.4207	0.5689	-0.2409	-0.2386	0.0580	-0.0003	-0.0629	-0.0795
0.1334	0.2471	-0.1182	-0.1677	0.1861	0.0880	-0.0359	-0.1318

4.

```
function Vect=ZigZagscan(X)
[~, N]=size(X);
Vect=zeros(1,N*N);
Vect(1)=X(1,1);
v=1;
for k=1:2*N-1
    if k<=N
        if mod(k,2)==0
        j=k;
        for i=1:k
        Vect(v)=X(i,j);
        v=v+1;j=j-1;
        end
        else
        i=k;
        for j=1:k
        Vect(v)=X(i,j);
        v=v+1;i=i-1;
        end
        end
    else
        if mod(k,2)==0
        p=mod(k,N); j=N;
        for i=p+1:N
        Vect(v)=X(i,j);
        v=v+1;j=j-1;
        end
        else
        p=mod(k,N);i=N;
        for j=p+1:N
        Vect(v)=X(i,j);
        v=v+1;i=i-1;
        end
        end
    end
end
```

```
Q4 = ZigZagscan(B2)
```

Result(lenna.raw):

```
Columns 1 through 15

  1.1591    4.6712   -6.0656   -0.8415    4.5330   -0.3100   -0.7513    1.6392   -3.4864    5.3698    4.0149   -1.0125   -2.6236   -0.5752   -0.7085

Columns 16 through 30

  0.1013    0.5244    2.2495    2.5086   -0.7855   -0.1023    0.3490    0.4672   -1.1160   -1.4453    0.2296   -0.1004    0.4161    0.2358   -0.2619

Columns 31 through 45

  0.4535    0.4234    0.1235    1.0653   -0.1160    0.5661   -0.1288    0.0594    0.2955   -0.1120    0.0601    0.2670   -0.1183   -0.1235   -0.1403

Columns 46 through 60

 -0.2186    0.1198   -0.4668   -0.1013    0.2826   -0.0124   -0.1114   -0.0700    0.1831   -0.0896    0.0331    0.2565   -0.1213    0.1380    0.1365

Columns 61 through 64

  0.1159    0.0041   -0.1774   -0.2665
```

Result(peppers.raw):

```
Columns 1 through 15

 -0.6041    4.9316   -0.1279    0.0276   -6.6305   -0.3306   -1.0012    2.7495    1.1378   -1.9462   -2.9794    0.0504    5.6624   -1.5990    1.6714

Columns 16 through 30

 -0.0977   -0.0648   -2.9594    2.3142    0.7806   -1.9110    0.4207    0.8089    0.3083    2.0282    0.1660   -0.0302    0.6170    0.2023    0.2388

Columns 31 through 45

 -0.0125   -0.2884   -0.2559    0.4367    0.5689    0.1334    0.2471   -0.2409   -0.1733   -0.0653    0.1644    0.0977    0.5322   -0.4232   -0.3113

Columns 46 through 60

 -0.1519    0.1384   -0.2386   -0.1182   -0.1677    0.0580   -0.2030   -0.0824    0.2849   -0.1352   -0.0082   -0.0003    0.1861    0.0880   -0.0629

Columns 61 through 64

  0.0682   -0.0795   -0.0359   -0.1318
```

5.

```
function process(file, m, n)
    QT = [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];
    fin=fopen(file,'r');
    X=fread(fin,m*n,'uint8=>uint8'); fclose(fin);
    Y=reshape(X,m,n);
    Y=Y';
    dc = 0;
for i=1:8:m
    for j=1:8:n
        tmp = Y(i:i+7, j:j+7);
        tmp = dct2(tmp-128);
        tmp = round(tmp ./ QT);
        vec = zigzag(tmp);
        xx = 1;
        while(xx<=64)
            if(xx==1)
                s = vec(xx) - dc;
                num = strlength(dec2bin(abs(s), 1));
                if(64*ceil((i-1)/8)+ceil((j-1)/8)==100 || 64*ceil((i-1)/8)+ceil((j-1)/8)==1999)
                    fprintf("(%d, %d)", num, s);
                end
            else
                cnt = 0;
                while(xx<=64 && vec(xx)==0)
                    cnt = cnt+1;
                    xx = xx+1;
                end
             if(xx==65)
                 if(64*ceil((i-1)/8)+ceil((j-1)/8)==100 || 64*ceil((i-1)/8)+ceil((j-1)/8)==1999)
                     fprintf(", EOB");
                 end
             else
                 t = vec(xx);
                 num = strlength(dec2bin(abs(t), 1));
                 if(64*ceil((i-1)/8)+ceil((j-1)/8)==100 || 64*ceil((i-1)/8)+ceil((j-1)/8)==1999)
                     fprintf(", (%d, %d, %d)", cnt, num, vec(xx));
                 end
             end
         end
         xx = xx+1;
    end
    if(64*ceil((i-1)/8)+ceil((j-1)/8)==100 || 64*ceil((i-1)/8)+ceil((j-1)/8)==1999)
        fprintf("\n");
    end
    dc = tmp(1, 1);
end
end
```

```
%第五題
process("lenna.raw",512,512);
```

Result(lenna.raw):

(1, 0), EOB
(4, 9), (0, 2, -3), (0, 2, -3), (0, 1, 1), (0, 3, -6), (0, 2, 2), (0, 1, -1), (0, 2, 2), (0, 2, -3), (0, 1, 1), (2, 2, 2), (0, 1, -1), (4, 1, 1), EOB

Result(peppers.raw):

(1, 1), (1, 1, -1), EOB
(1, 1), (0, 1, -1), (0, 1, -1), EOB