

```

1 pkg load image
2 pkg load signal
3
4 function yuv = rgb_to_yuv(rgb)
5     rgb = im2double(rgb)*255;
6     c = [
7         0.299, 0.587, 0.114;
8         -0.14713, -0.28886, 0.436;
9         0.615, -0.51499, -0.10001;
10    ];
11
12    r = rgb(:,:,1); g = rgb(:,:,2); b = rgb(:,:,3);
13    yuv = zeros(size(rgb));
14
15    yuv(:,:,1) = r*c(1,1) + g*c(1,2) + b*(c(1,3));
16    yuv(:,:,2) = r*c(2,1) + g*c(2,2) + b*(c(2,3)) + 128;
17    yuv(:,:,3) = r*c(3,1) + g*c(3,2) + b*(c(3,3)) + 128;
18 endfunction
19
20 function rgb = yuv_to_rgb(yuv)
21     y = yuv(:,:,1);
22     u = yuv(:,:,2) - 128;
23     v = yuv(:,:,3) - 128;
24
25     rgb = zeros(size(yuv));
26
27     rgb(:,:,1) = y + 1.13983*v;
28     rgb(:,:,2) = y - 0.39465*u - 0.58060*v;
29     rgb(:,:,3) = y + 2.03211*u;
30
31     rgb = uint8(rgb);
32 endfunction
33
34 function res = do_dct(img)
35     res = img;
36     res = im2double(res);
37
38     for i = 1:3
39         res(:,:,i) = blockproc(res(:,:,i), [8 8], @dct2);
40     endfor
41 endfunction
42
43 function res = do_idct(img)
44     res = img;
45     res = apply_on_resaped(res, @double);
46     #res = im2double(res);
47
48     for i = 1:3
49         res(:,:,i) = blockproc(res(:,:,i), [8 8], @idct2);
50     endfor
51 endfunction
52
53 function show_images(rows, columns, varargin)
54     for i = 1:size(varargin)(2)
55         subplot(rows, columns, i);
56         imshow(varargin{i});
57     endfor
58 endfunction
59
60 function r = apply_on_resaped(m, f)
61     rep = @(m) reshape(m, 1, []);
62     derep = @(rm) reshape(rm, size(m));
63     r = derep(f(rep(m)));
64 endfunction
65
66 function res = quantization(img, quality)
67     res = img;
68     R = 100-quality+1;
69     Q = 1 + (transpose(0:7)*ones(1,8)+ones(8,1)*(0:7))*R;
70
71     for i = 1:3
72         res(:,:,i) = blockproc(res(:,:,i), [8 8], @(x) x./Q);
73     endfor
74
75     res = apply_on_resaped(res, @int16);

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76 endfunction
77
78 function res = dequantization(img, quality)
79     res = img;
80     R = 100-quality+1;
81     Q = 1 + (transpose(0:7)*ones(1,8)+ones(8,1)*(0:7))*R;
82
83     for i = 1:3
84         res(:,:,i) = blockproc(res(:,:,i), [8 8], @(x) x.*Q);
85     endfor
86 endfunction
87
88 function do_task(image, Q)
89     steps = {
90         @rgb_to_yuv
91         @do_dct
92         @(img) quantization(img,Q)
93         @(img) dequantization(img,Q)
94         @do_idct
95         @yuv_to_rgb
96     };
97
98     base = compressed = image;
99     for i = 1:size(steps)
100         compressed = steps{i}(compressed);
101     endfor
102
103     show_images(1, 2, base, compressed);
104 endfunction
105
106 function click(ed)
107     Q = str2num(get(ed, 'string'))
108
109     if sum(size(Q) - ones(size(size(Q)))) != 0
110         set(ed, 'string', 'no');
111         return
112     endif
113
114     if Q < 1 || 100 < Q
115         set(ed, 'string', 'no');
116         return
117     endif
118
119     img_source = imread('s2_inft_lab7_img1.png');
120     do_task(img_source, Q);
121
122 endfunction
123
124 fi = figure;
125 ed = uicontrol(fi, 'Style', 'edit',
126     'String', '',
127     'position', [0 0 60 30]
128 );
129
130 bu = uicontrol(fi, 'Style', 'pushbutton',
131     'string', 'do things',
132     'position', [80 0 80 30],
133     'callback', 'click(ed)'
134 );

```

