

「彩色影像處理」期中作業

一、 題目

影像色彩轉換：

- (1)先將一幅 RGB 彩色影像縮小至 500pix 高，顯示該彩色影像。
- (2)參考講義 5-26，以 sRGB 格式轉換至 XYZ 色空間，再轉換至 LAB 色空間。色彩轉換不得使用現成函式。
- (3)分別以 8-bit 灰階顯示 L^* ， a^* ， b^* 三個圖。8-bit 灰階 $L=2.55*L^*$ ， $a=a^*+128$ ， $b=b^*+128$ 。
- (4)進一步將 a^* ， b^* 轉換至 C^* ， h 。8-bit 灰階 $C=2*C^*$ ， $h=(255/360)*h$ 。
- (5)顯示上列所有圖案之灰階值方圖，並計算 R,G,B, L^* ， a^* ， b^* ， C^* 的平均值與標準差。

二、 程式註解

```
function varargout = hist(varargin)
% HIST MATLAB code for hist.fig
%
%   HIST, by itself, creates a new HIST or raises the existing
%   singleton*.
%
%
%   H = HIST returns the handle to a new HIST or the handle to
%   the existing singleton*.
%
%
%   HIST('CALLBACK',hObject,eventData,handles,...) calls the
local
%   function named CALLBACK in HIST.M with the given input
arguments.
%
%
%   HIST('Property','Value',...) creates a new HIST or raises
the
%   existing singleton*. Starting from the left, property value
pairs are
%   applied to the GUI before hist_OpeningFcn gets called. An
%   unrecognized property name or invalid value makes property
application
%   stop. All inputs are passed to hist_OpeningFcn via
varargin.
%
```

```

%      *See GUI Options on GUIDE's Tools menu. Choose "GUI allows
only one
%      instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help hist

% Last Modified by GUIDE v2.5 19-Nov-2015 17:02:18

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                  'gui_Singleton',   gui_Singleton, ...
                  'gui_OpeningFcn', @hist_OpeningFcn, ...
                  'gui_OutputFcn',  @hist_OutputFcn, ...
                  'gui_LayoutFcn',  [] , ...
                  'gui_Callback',    []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT

```

```

% --- Executes just before hist is made visible.
function hist_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles     structure with handles and user data (see GUIDATA)
% varargin    command line arguments to hist (see VARARGIN)

% Choose default command line output for hist
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes hist wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command line.
function varargout = hist_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles     structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

```

```

% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
%由電腦中選取圖片 開始
[FileName,PathName]=uigetfile({'*.bmp'; '*.jpg'; '*.png'; '*..*'}, '選取
一幅圖像'); %選取圖像格式只能為bmp jpg png
set(handles.editShowPath, 'String', [PathName,FileName]);
%將選取圖片之路徑顯示在Static Text上
if isequal([FileName,PathName],[0,0])
%判斷是否沒有讀到圖檔
    msgbox('請換圖片!') %沒有讀到圖檔則顯示('請換圖片!')
    return;
end
%由電腦中選取圖片 結束
handles.image=imread([PathName,FileName]);
%將在此路徑、名稱的圖片讀取出來
axes(handles.axes1);imshow(handles.image);title('原圖');
%將圖片show在axes1上，並且顯示標題為('原圖')
k= imresize(handles.image,[500 500]);
%將圖片大小調整為(500*500)
[frameHeight, frameWidth, frameDepth] = size(k);
%讀取圖片的長寬、深度
L = zeros(frameHeight, frameWidth);
a = zeros(frameHeight, frameWidth);
b = zeros(frameHeight, frameWidth);
c = zeros(frameHeight, frameWidth);
h = zeros(frameHeight, frameWidth);
%宣告陣列大小為(frameHeight, frameWidth)
axes(handles.axes2);imhist(k(:, :, 1));title('R直方圖');
%將圖片的直方圖show在axes2上，並且顯示標題為('R直方圖')
axes(handles.axes3);imhist(k(:, :, 2));title('G直方圖');
%將圖片的直方圖show在axes2上，並且顯示標題為('R直方圖')
axes(handles.axes4);imhist(k(:, :, 3));title('B直方圖');
%將圖片的直方圖show在axes2上，並且顯示標題為('R直方圖')
double x;double y;double z;double X;double Y;double Z;double L1;

```

```

for m=1:frameHeight
for l=1:frameWidth
    R=k(m,l,1);
    G=k(m,l,2);
    B=k(m,l,3);
    R=double(R); %將圖片的R轉為double格式在做處理
    G=double(G); %將圖片的G轉為double格式在做處理
    B=double(B); %將圖片的B轉為double格式在做處理
    x = (R / 255); %將圖片的R正規劃
    x = double(x^(2.2)); %將圖片的R做*TRC轉換
    y = double(G / 255); %將圖片的G正規劃
    y = double(y^(2.2)); %將圖片的G做*TRC轉換
    z = double(B / 255); %將圖片的B正規劃
    z = double(z^(2.2)) ; %將圖片的B做*TRC轉換
    X = double(0.4124*x + 0.3576*y + 0.1805*z); %RGB做線性轉換轉成XYZ
    Y = double(0.2126*x + 0.7152*y + 0.0722*z); %RGB做線性轉換轉成XYZ
    Z = double(0.0193*x + 0.1192*y + 0.9505*z); %RGB做線性轉換轉成XYZ
    d = 1 / 3;
    %RGB轉成L* a* b* 開始
    X = double(X / 0.9504);
    Z = double(Z / 1.0889);
    L1 = double((116 * Y^(d) - 16));
    a1 = double(500 * (X^(d) - Y^(d)));
    b1 = double(200 * (Y^(d) - Z^(d)));
    %RGB轉成L* a* b* 結束
    % L* a* b*轉成灰階L* a* b* 開始
    L(m, l) = (2.5 * L1);
    a(m, l) = (128 + (a1));
    b(m, l) = (128 + (b1));
    % L* a* b*轉成灰階L* a* b* 結束
    c(m, l) = 2 * sqrt(a1*a1 + b1*b1); % a* b*轉成灰階 c*
    h1 = atan(b1 / a1) * 180 / 3.14; % a* b*轉成 h*
    if h1<0 % 避免 h*為負
        h1 = h1 + 360;
    end
    h(m, l) = 255 / 360 * h1; % h*轉成灰階h*結束
end
end

```

```

axes(handles.axes5);imshow(L/255);title('L');imwrite(L/255,'L.bmp');
%將圖片L show在axes5上，並且顯示標題為('L')
axes(handles.axes6);imshow(a/255);title('a');imwrite(a/255,'a.bmp');
%將圖片a show在axes6上，並且顯示標題為('a')
axes(handles.axes7);imshow(b/255);title('b');imwrite(b/255,'b.bmp');
%將圖片b show在axes7上，並且顯示標題為('b')
axes(handles.axes8);imshow(c/255);title('c');imwrite(c/255,'c.bmp');
%將圖片c show在axes8上，並且顯示標題為('c')
axes(handles.axes9);imshow(h/255);title('h');imwrite(h/255,'h.bmp');
%將圖片h show在axes9上，並且顯示標題為('h')

L = imread('L.bmp');
axes(handles.axes10); imhist(L); title('L直方圖');
%將圖片L直方圖 show在axes10上，並且顯示標題為(' L直方圖')
a = imread('a.bmp');
axes(handles.axes11); imhist(a); title('a直方圖');
%將圖片a直方圖 show在axes10上，並且顯示標題為(' a直方圖')
b = imread('b.bmp');
axes(handles.axes12); imhist(b); title('b直方圖');
%將圖片b直方圖 show在axes10上，並且顯示標題為(' b直方圖')
c = imread('c.bmp');
axes(handles.axes13); imhist(c); title('c直方圖');
%將圖片c直方圖 show在axes10上，並且顯示標題為(' c直方圖')
h = imread('h.bmp');
axes(handles.axes14); imhist(h); title('h直方圖');
%將圖片h直方圖 show在axes10上，並且顯示標題為(' L直方圖')
%算平均值 並且顯示其值 開始
set(handles.text1,'string',mean(reshape(k(:,:,1),500*500,1)));
set(handles.text2,'string',mean(reshape(k(:,:,2),500*500,1)));
set(handles.text3,'string',mean(reshape(k(:,:,3),500*500,1)));
set(handles.text4,'string',mean(reshape(L(:,:),500*500,1)));
set(handles.text5,'string',mean(reshape(a(:,:),500*500,1)));
set(handles.text6,'string',mean(reshape(b(:,:),500*500,1)));
set(handles.text7,'string',mean(reshape(c(:,:),500*500,1)));
set(handles.text8,'string',mean(reshape(h(:,:),500*500,1)));
%算平均值 並且顯示其值 結束

```

%算標準差 並且顯示其值 結束

```
kk=double(k);
```

```
LL=double(L);
```

```
aa=double(a);
```

```
bb=double(b);
```

```
cc=double(c);
```

```
hh=double(h);
```

```
set(handles.text16,'string',std(reshape(kk(:, :, 1), 500*500, 1)));
```

```
set(handles.text17,'string',std(reshape(kk(:, :, 2), 500*500, 1)));
```

```
set(handles.text18,'string',std(reshape(kk(:, :, 3), 500*500, 1)));
```

```
set(handles.text19,'string',std(reshape(LL(:, :), 500*500, 1)));
```

```
set(handles.text20,'string',std(reshape(aa(:, :), 500*500, 1)));
```

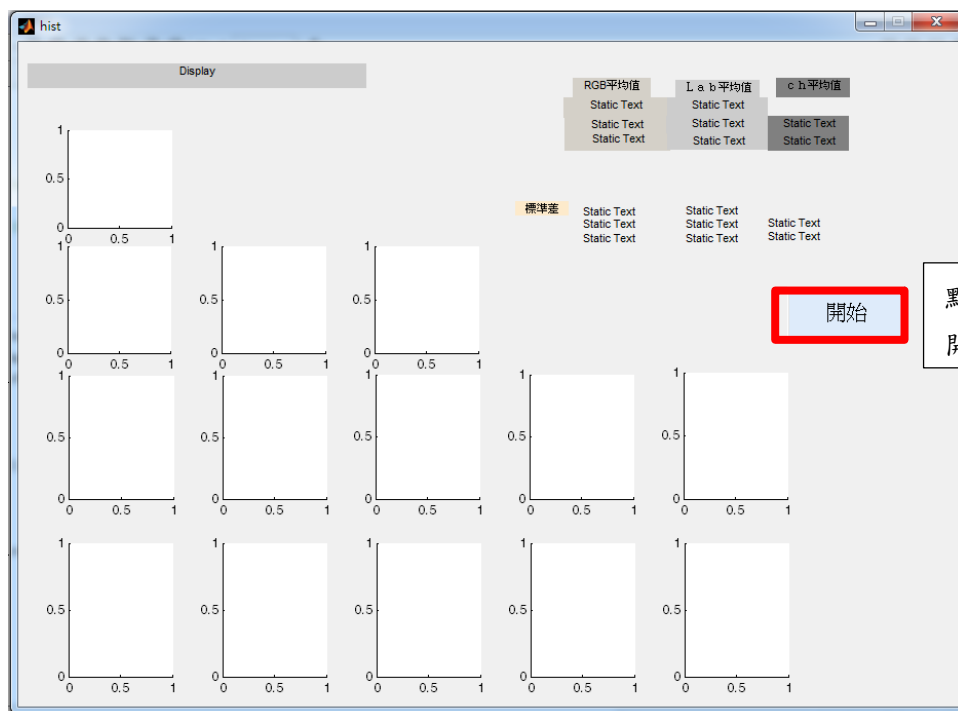
```
set(handles.text21,'string',std(reshape(bb(:, :), 500*500, 1)));
```

```
set(handles.text22,'string',std(reshape(cc(:, :), 500*500, 1)));
```

```
set(handles.text23,'string',std(reshape(hh(:, :), 500*500, 1)));
```

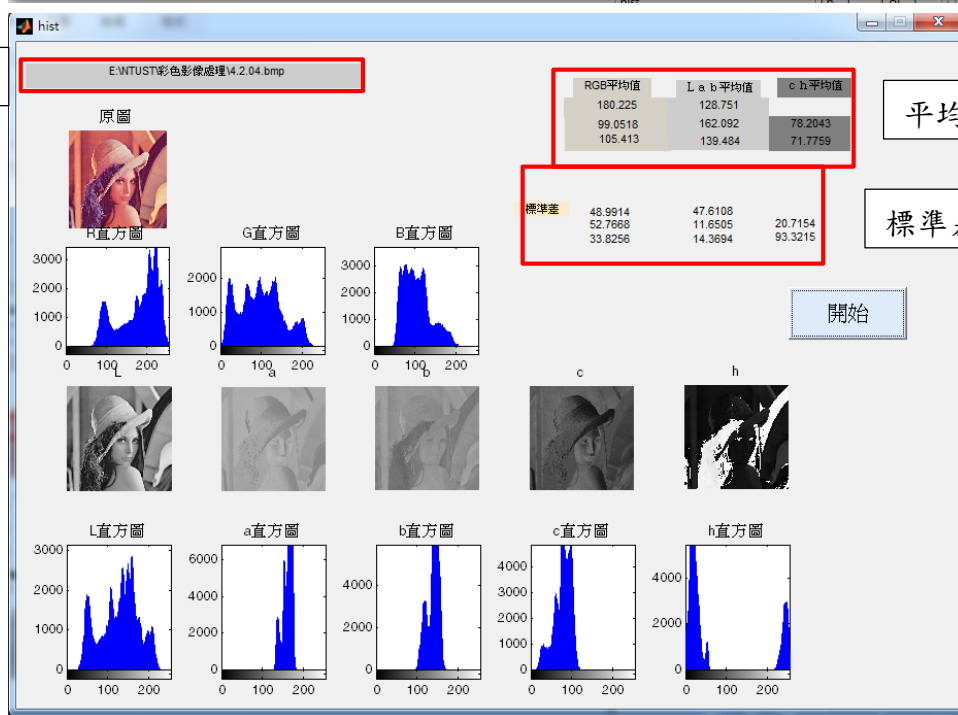
%算標準差 並且顯示其值 結束

三、 執行成果影像範例



點紅色框框處
開始執行程式

路徑



平均值

標準差

