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function varargout = Question1(varargin)
% QUESTION1 MATLAB code for Question1.fig
%     QUESTION1, by itself, creates a new QUESTION1 or raises the
%     existing
%     singleton*.
%
%     H = QUESTION1 returns the handle to a new QUESTION1 or the
%     handle to
%     the existing singleton*.
%
%     QUESTION1('CALLBACK',hObject,eventData,handles,...) calls the
%     local
%     function named CALLBACK in QUESTION1.M with the given input
%     arguments.
%
%     QUESTION1('Property','Value',...) creates a new QUESTION1 or
%     raises the
%     existing singleton*. Starting from the left, property value
%     pairs are
%     applied to the GUI before Question1_OpeningFcn gets called. An
%     unrecognized property name or invalid value makes property
%     application
%     stop. All inputs are passed to Question1_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 Question1

% Last Modified by GUIDE v2.5 17-Nov-2019 20:09:13

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                  'gui_Singleton',   gui_Singleton, ...
                  'gui_OpeningFcn', @Question1_OpeningFcn, ...
                  'gui_OutputFcn',  @Question1_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

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% End initialization code - DO NOT EDIT

% --- Executes just before Question1 is made visible.
function Question1_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 Question1 (see VARARGIN)

% Choose default command line output for Question1
handles.output = hObject;
DisplayColor(hObject, handles);
DisplayOriginImage(hObject, handles);
DisplayNewImage(hObject, handles);
% Update handles structure
guidata(hObject, handles);

% UIWAIT makes Question1 wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command line.
function varargout = Question1_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;

function DisplayColor(hObject, handles)
    hsv1 = get(handles.hsv1, 'value');
    hsv2 = get(handles.hsv2, 'value');
    h = 50;
    w = 50;
    color = ones(h, w, 3);
    color(:, :, 1) = hsv1 * ones(h, w);
    color(:, :, 2) = hsv2 * ones(h, w);
    axes(handles.axes3);
    imshow(hsv2rgb(color));

function DisplayOriginImage(hObject, handles)
    type = get(handles.listbox1, 'value');
    type = string(type);
    path = '.\Data\' + type + '.jpg';
    I = imread(path);
    axes(handles.axes1);
    imshow(I);

function DisplayNewImage(hObject, handles)
    type = get(handles.listbox1, 'value');

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        hsv1 = get(handles.hsv1, 'value');
        hsv2 = get(handles.hsv2, 'value');
        s = string(type);
        path = './Data\' + s + '.jpg';
        I = imread(path);
        I = im2double(I);
        a_point = [87 312;209 514;143 377;491 791;1225 2493;218 581;86
620;84 242];
        rect = [11 189 138 464;10 312 244 682;9 316 195 623;152 968 602
1685;1 2166 1665 3470;1 459 390 775;26 410 300 784;14 185 158 405];
        R = ((50/255)^(type < 4)) * ((70 / 255) ^ (type < 6 & type > 3)) *
((100 / 255) ^ (type > 5));
        a = [I(a_point(type, 2), a_point(type, 1), 1) I(a_point(type, 2),
a_point(type, 1), 2) I(a_point(type, 2), a_point(type, 1), 3)];
        D = (I(:, :, 1)-a(1)).^2+(I(:, :, 2)-a(2)).^2+(I(:, :, 3)-a(3)).^2;
        mask = D<=R*R;
        roi = false(size(mask));
        roi(rect(type, 3):rect(type, 4), rect(type, 1):rect(type, 2)) = 1;
        mask = mask & roi;
        hsv_I = rgb2hsv(I);
        hsv = hsv_I(:, :, 1);
        hsv(mask>0) = hsv1;
        hsv_I(:, :, 1) = hsv;
        hsv = hsv_I(:, :, 2);
        hsv(mask>0) = hsv2;
        hsv_I(:, :, 2) = hsv;
        NewI = hsv2rgb(hsv_I);
        axes(handles.axes2);
        imshow(NewI);

% --- Executes on slider movement.
function hsv1_Callback(hObject, eventdata, handles)
% hObject      handle to hsv1 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      structure with handles and user data (see GUIDATA)
    DisplayColor(hObject, handles);
    DisplayOriginImage(hObject, handles);
    DisplayNewImage(hObject, handles);
% Hints: get(hObject,'Value') returns position of slider
%        get(hObject,'Min') and get(hObject,'Max') to determine range
%        of slider

% --- Executes during object creation, after setting all properties.
function hsv1_CreateFcn(hObject, eventdata, handles)
% hObject      handle to hsv1 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      empty - handles not created until after all CreateFcns
%               called

% Hint: slider controls usually have a light gray background.
if isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor',[.9 .9 .9]);
end

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% --- Executes on slider movement.
function hsv2_Callback(hObject, eventdata, handles)
% hObject      handle to hsv2 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      structure with handles and user data (see GUIDATA)
    DisplayColor(hObject, handles);
    DisplayOriginImage(hObject, handles);
    DisplayNewImage(hObject, handles);
% Hints: get(hObject,'Value') returns position of slider
%        get(hObject,'Min') and get(hObject,'Max') to determine range
%        of slider

% --- Executes during object creation, after setting all properties.
function hsv2_CreateFcn(hObject, eventdata, handles)
% hObject      handle to hsv2 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      empty - handles not created until after all CreateFcns
%              called

% Hint: slider controls usually have a light gray background.
if isequal(get(hObject,'BackgroundColor'),
    get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor',[.9 .9 .9]);
end

% --- Executes on selection change in listbox1.
function listbox1_Callback(hObject, eventdata, handles)
% hObject      handle to listbox1 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      structure with handles and user data (see GUIDATA)
    DisplayOriginImage(hObject, handles);
    DisplayNewImage(hObject, handles);
% Hints: contents = cellstr(get(hObject,'String')) returns listbox1
%        contents as cell array
%        contents{get(hObject,'Value')} returns selected item from
%        listbox1

% --- Executes during object creation, after setting all properties.
function listbox1_CreateFcn(hObject, eventdata, handles)
% hObject      handle to listbox1 (see GCBO)
% eventdata    reserved - to be defined in a future version of MATLAB
% handles      empty - handles not created until after all CreateFcns
%              called

% Hint: listbox controls usually have a white background on Windows.
%        See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
    get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

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end



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