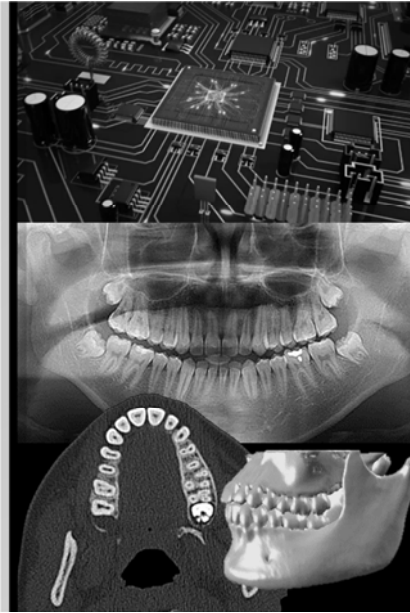


# 計算機概論 *for Dentist* BUILD YOUR FIRST APPLICATION II (GRAPHIC USER INTERFACE)

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## 請先下載本週上課資料

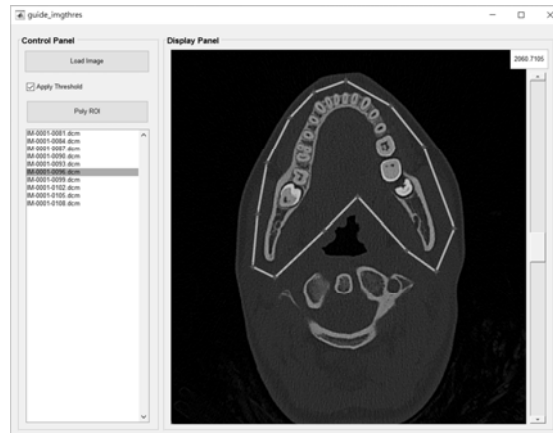
- 下載網址 [http://www.ym.edu.tw/~cflu/CFLu\\_course\\_DoDCompArch.html](http://www.ym.edu.tw/~cflu/CFLu_course_DoDCompArch.html)
- 下載第15週 [ 上課資料 ] [CAmaterials\\_L15.zip](#)

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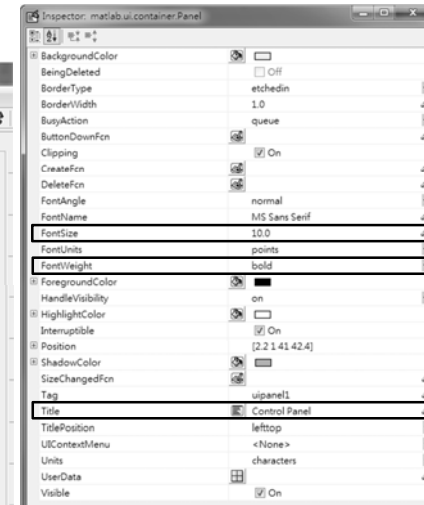
## 使用GUIDE建立GUI

- 可讀取與切換多張DICOM影像
- 可即時測試不同 thresholding 數值
- 可進一步加上roipoly的手動圈選效果



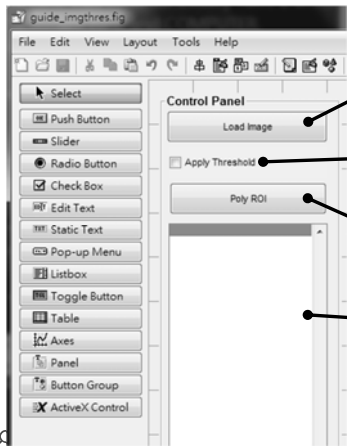
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## UI PANEL



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## UI PANEL



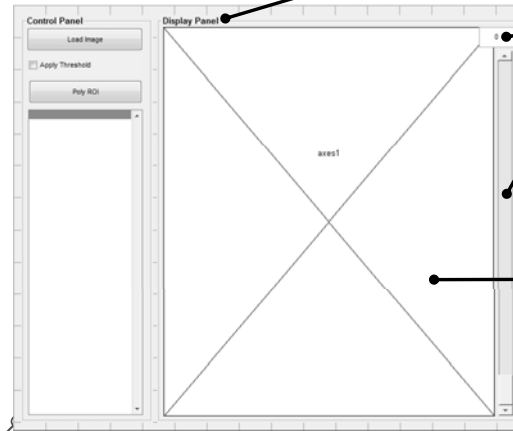
- String: Load Image  
Tag: loadimage
- String: Apply Threshold  
Tag: applythres
- String: Poly ROI  
Tag: roipoly
- String:  
Tag: imglist

所有放置在panel中的物件  
都會繼承在該panel之下!

請試著移動panel看看~

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## LAYOUT OF GUI



Title: Display Panel  
FontSize: 10, FontWeight: bold

String: 0  
Tag: editthres

Tag: sliderthres

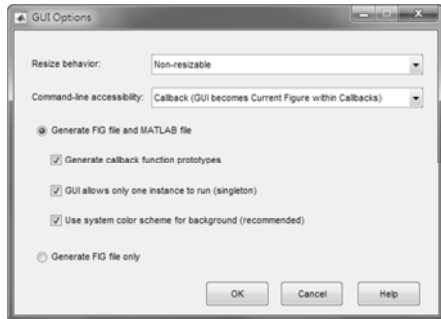
Visible: off

請按左圖設定完成GUI版面!

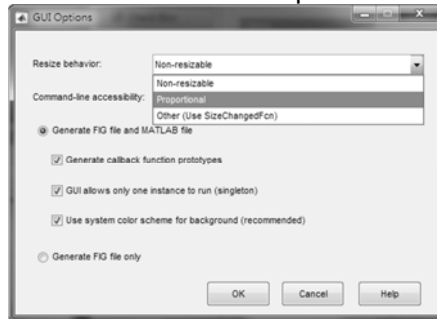
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## RESIZE FIGURE

guide環境 → Tools → GUI Options



Resize behavior → Proportional



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## CREATE IMAGE OBJECTS

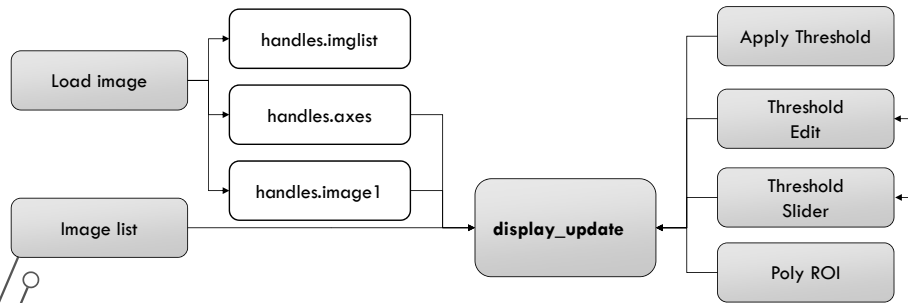
```

55 % Choose default command line output for guide_imgthres
56 handles.output = hObject;
57
58 Original image
59 handles.image1 = image('parent',handles.axes1,...
60 'Xdata',[],'Ydata',[],'Cdata',[]);
61
62 Thresholding mask
63 handles.image2 = image('parent',handles.axes1,...
64 'Xdata',[],'Ydata',[],'Cdata',[],'alphanodata',0.3);
65
66 % Update handles structure
67 guidata(hObject, handles);
    
```

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## GUI FLOW



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## FILE LIST



1. Press [Load Image].
2. Select a folder with all images to load.
3. Update the file list of handles.imglist
4. Display selected image on handles.image1

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## LOAD IMAGES

```

105 function loading_Callback(hObject, eventdata, handles)
106 % hObject handle to loading (see GCBO)
107 % eventdata reserved - to be defined in a future version of MATLAB
108 % handles structure with handles and user data (see GUIDATA)
109
110 % select a directory with DICOM images
111 dirname=uigetdir;
112 dirinfo=dir([dirname filesep '*.dcm']);
113 % read image using for-loop
114 handles.Data.img=[];
115 liststr={};
116 for i=1:length(dirinfo)
117     handles.Data.img(:,:,i)=dicomread([dirname filesep dirinfo(i).name]);
118     liststr(i)=dirinfo(i).name;
119 end
  
```

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## UPDATE LIST, AXES, IMAGE

```

121 % update handles.imglist
122 set(handles.imglist,'String',liststr,'Value',1)
123 % update handles.axes1 and handles.image1
124 [row,col]=size(handles.Data.img);
125 set(handles.axes1,'Xlim',[1 col],'Ylim',[1 row],'Ydir','reverse')
126 set(handles.image1,'XData',[1 col],'YData',[1 row],...
127     'CDataMapping','scaled')
128 set(handles.image2,'XData',[1 col],'YData',[1 row])
  
```

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## UPDATE SLIDERS, DISPLAY

```
129 % update handles.sliderthres
130 - set(handles.sliderthres,'min',min(handles.Data.img(:)),...
131     'max',max(handles.Data.img(:)))
132
133 % Update handles structure This line is mandatory if any change
134 - guidata(hObject, handles); of handles was made
135 - display_update %update display Call display block
```

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## GUIDATA

guidata Store or retrieve application data.

guidata(H, DATA) stores the specified data in the figure's application data.

H is a handle that identifies the figure - it can be the figure itself, or any object contained in the figure.

DATA = guidata(H) returns previously stored data, or an empty matrix if nothing was previously stored.

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## UPDATE DISPLAY

Update the selected DICOM image

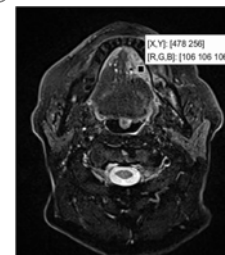
```
206  function display_update define function name
207  % update display based on the values of uicontrols
208  % retrieve the handles
209  handles=guidata(gcf); retrieve handles from current figure
210
211 num=get(handles.imglist,'value');
212 set(handles.image1,'CData',handles.Data.img(:,:,num))
213  colormap(gray) Set up colormap
```

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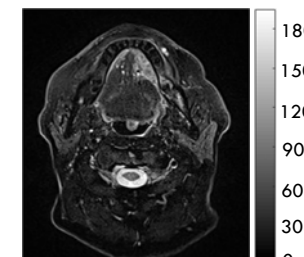
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## IMAGE DISPLAY

Can be R.G.B 3 layers/values



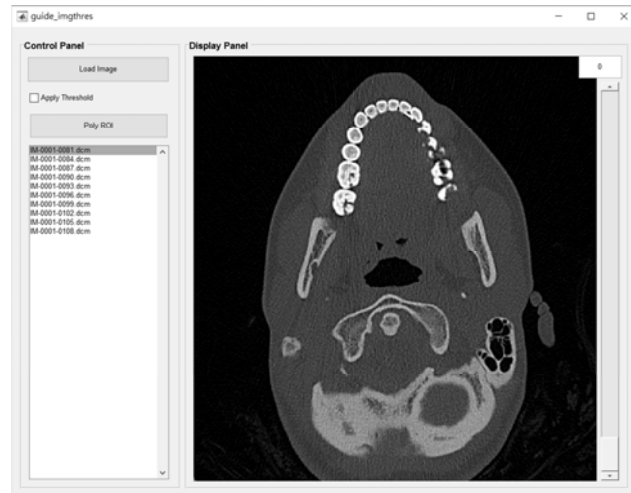
or single layer/value with a colormap



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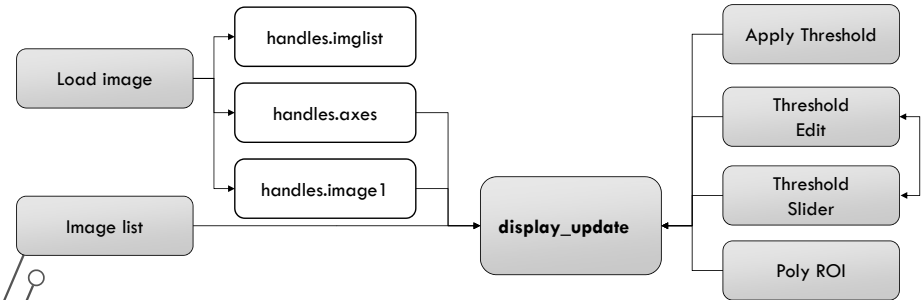
Try it!



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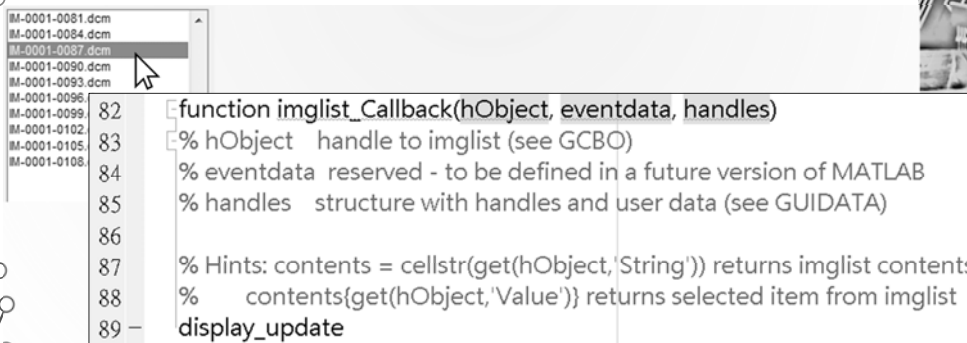
## GUI FLOW



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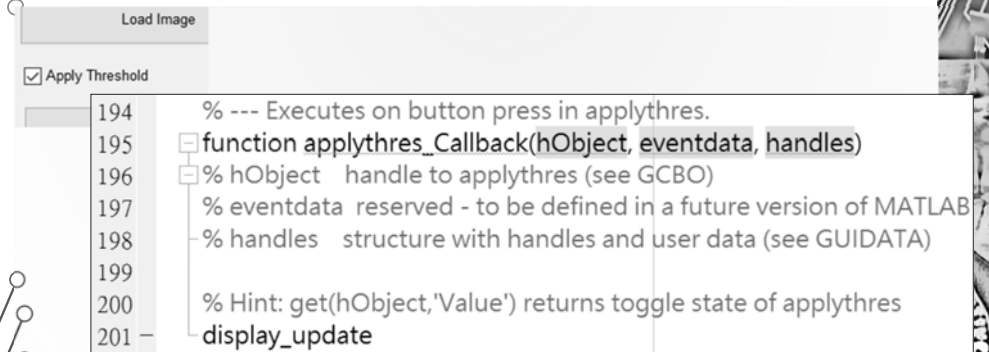
## SWITCH IMAGES USING FILE LIST



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## APPLY THRESHOLD



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## ADJUST THRESHOLD

```
146 function sliderthres_Callback(hObject, eventdata, handles)
147 % hObject handle to sliderthres (see GCBO)
148 % eventdata reserved - to be defined in a future version of MATLAB
149 % handles structure with handles and user data (see GUIDATA)
150
151 % Hints: get(hObject,'Value') returns position of slider
152 % get(hObject,'Min') and get(hObject,'Max') to determine range of
153 value=get(handles.sliderthres,'value');
154 set(handles.editthres,'string',num2str(value));
155 display_update
```

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## ADJUST THRESHOLD

```
173 function editthres_Callback(hObject, eventdata, handles)
174 % hObject handle to editthres (see GCBO)
175 % eventdata reserved - to be defined in a future version of MATLAB
176 % handles structure with handles and user data (see GUIDATA)
177
178 % Hints: get(hObject,'String') returns contents of editthres as text
179 % str2double(get(hObject,'String')) returns contents of editthres
180 value=get(handles.editthres,'string');
181 set(handles.sliderthres,'value',str2num(value))
182 display_update
```

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## ROI POLY

```
139 function roipoly_Callback(hObject, eventdata, handles)
140 % hObject handle to roipoly (see GCBO)
141 % eventdata reserved - to be defined in a future version of MATLAB
142 % handles structure with handles and user data (see GUIDATA)
143 handles.Data.roi=roipoly;
144 % Update handles structure
145 guidata(hObject, handles);
146 display_update
```

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## UPDATE DISPLAY

Step 1: Display selected DICOM image

Step 2: Update the thresholding image

Step 3: Try to apply roipoly mask to the thresholding image

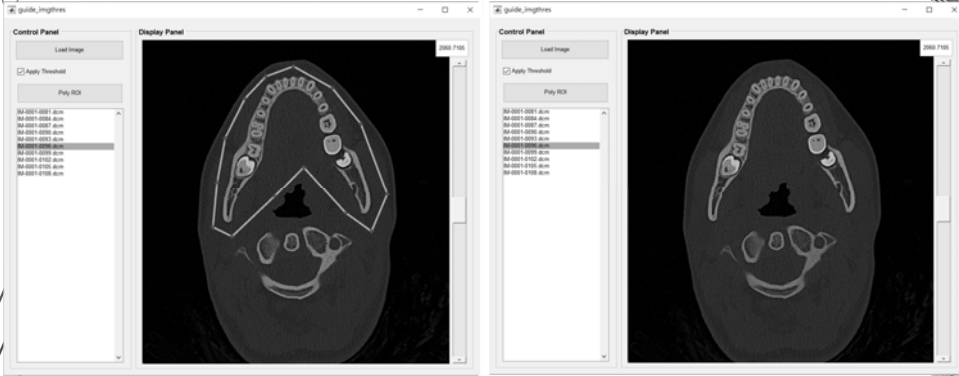
請開啟 C:\material\_L15\guide\_imgthres.m  
學習 display\_update 段落 206~243 行

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TRY IT!

開啟並執行C:\material\_L15\guide\_imgthres.m



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THE END

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