

Background and Operational Description

This program estimates a patient's mean arterial pressure (MAP) given the systolic and diastolic pressures. A widely used approximation of the MAP is $(1/3)*P_{\text{systolic}} + (2/3)*P_{\text{diastolic}}$. The units of the MAP is the same as those of the specific systolic and diastolic pressures.

User will be prompted to enter systolic and diastolic pressures in mm Hg and press a "Calculate" button to cause the calculation and display of the MAP. This also disables the input edit boxes until the "Clear" button is pressed. The reason for this behavior is to prevent the calculated MAP from getting out of synchronization with the input edit boxes.

In Matlab, there is no obvious way to clear the output in response to the user placing the focus on the input edit boxes. The GUI systems in other languages (like MFC/C++ and Eclipse/Java) can have callbacks activated in response to edit boxes receiving the focus.

User Interface Description

Three static text labels (sysLabel, diaLabel and mapLabel) that label the inputs and output.

Two edit boxes (sysEdit and diaEdit) for user input in mm Hg.

A static text control (mapText) for MAP output in mm Hg.

A push button (calcButton) that causes calculation and display of output and disabling of the input edit boxes when clicked.

A push button (otherButton) that clears and re-enables the input edit boxes and clears the output text box.

Algorithms

OpeningFcn

Set up application data storage for systolic, diastolic and mean arterial pressures (Psys , Pdia and Pmap) in handles structure.

sysEdit_Callback

Get edit box String, convert it to type double and store as Psys in handles structure.
Create formatted echo text (sysStr) using sprintf.
Set edit box String to echo text.
Update guidata with new handles structure.

diaEdit_Callback

Get edit box String, convert it to type double and store as Pdia in handles structure.
Create formatted echo text (diaStr) using sprintf.
Set edit box String to echo text.
Update guidata with new handles structure.

calcButton_Callback

Disable input edit boxes.
Calculate and store MAP as Pmap in handles structure.
Create formatted output text.
Set output static text (mapText) String to formatted text.
Update guidata with new handles structure.

otherButton_Callback

Reset output static text (mapText) String to blank text (empty string).
Re-enable input edit boxes.

Source Code

```
0001 function varargout = mapCalc(varargin)
0002 % MAPCALC M-file for mapCalc.fig
0003 %
0004 % ...Snip (opening comments and initialization code deleted)...
0032 %
0033 % --- Executes just before mapCalc is made visible.
0034 function mapCalc_OpeningFcn(hObject, eventdata, handles, varargin)
0035 % This function has no output args, see OutputFcn.
0036 % hObject    handle to figure
0037 % eventdata  reserved - to be defined in a future version of MATLAB
0038 % handles    structure with handles and user data (see GUIDATA)
0039 % varargin   command line arguments to mapCalc (see VARARGIN)
0040
0041 % Choose default command line output for mapCalc
0042 handles.output = hObject;
0043
0044 % Added Code: set up appdata storage of systolic and diastolic pressures.
0045
0046 handles.Psys = 0.0; % Systolic pressure in mm Hg.
0047 handles.Pdia = 0.0; % Diastolic pressure in mm Hg.
0048 handles.Pmap = 0.0; % MAP in mm Hg, may be used later.
0049
0050 % Update handles structure
0051 guidata(hObject, handles);
0052
0053 % UIWAIT makes mapCalc wait for user response (see UIRESUME)
0054 % uiwait(handles.figure1);
0055
0056
0057 % --- Outputs from this function are returned to the command line.
0058 function varargout = mapCalc_OutputFcn(hObject, eventdata, handles)
0059 % varargout  cell array for returning output args (see VARARGOUT);
0060 % hObject    handle to figure
0061 % eventdata  reserved - to be defined in a future version of MATLAB
0062 % handles    structure with handles and user data (see GUIDATA)
0063
0064 % Get default command line output from handles structure
0065 varargout{1} = handles.output;
0066
0067
0068 function sysEdit_Callback(hObject, eventdata, handles)
0069 % hObject    handle to sysEdit (see GCBO)
0070 % eventdata  reserved - to be defined in a future version of MATLAB
0071 % handles    structure with handles and user data (see GUIDATA)
0072
0073 % Hints: get(hObject,'String') returns contents of sysEdit as text
0074 %        str2double(get(hObject,'String')) returns contents of sysEdit as a double
0075
0076 % Get entered text and convert to double.
0077 handles.Psys = str2double(get(hObject,'String'));
0078
0079 % Create formatted echo string.
0080 sysStr = sprintf('%g', handles.Psys);
0081
0082 % Echo the formatted input.
0083 set(hObject, 'String', sysStr);
0084
0085 % Update central handles structure.
0086 guidata(hObject, handles);
0087
0088
0089 % --- Executes during object creation, after setting all properties.
0090 function sysEdit_CreateFcn(hObject, eventdata, handles);
0091 % hObject    handle to sysEdit (see GCBO)
0092 % eventdata  reserved - to be defined in a future version of MATLAB
0093 % handles    empty - handles not created until after all CreateFcns called
0094
0095 % Hint: edit controls usually have a white background on Windows.
```

```

0096 %           See ISPC and COMPUTER.
0097 if ispc
0098     set(hObject,'BackgroundColor','white');
0099 else
0100     set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
0101 end
0102
0103
0104 function diaEdit_Callback(hObject, eventdata, handles)
0105 % hObject    handle to diaEdit (see GCBO)
0106 % eventdata reserved - to be defined in a future version of MATLAB
0107 % handles    structure with handles and user data (see GUIDATA)
0108
0109 % Hints: get(hObject,'String') returns contents of diaEdit as text
0110 %         str2double(get(hObject,'String')) returns contents of diaEdit as a double
0111
0112 % Get entered text and convert to double.
0113 handles.Pdia = str2double(get(hObject,'String'));
0114
0115 % Create formatted echo string.
0116 diaStr = sprintf('%g', handles.Pdia);
0117
0118 % Echo the formatted input.
0119 set(hObject, 'String', diaStr);
0120
0121 % Update central handles structure.
0122 guidata(hObject, handles);
0123
0124
0125 % --- Executes during object creation, after setting all properties.
0126 function diaEdit_CreateFcn(hObject, eventdata, handles)
0127 % hObject    handle to diaEdit (see GCBO)
0128 % eventdata reserved - to be defined in a future version of MATLAB
0129 % handles    empty - handles not created until after all CreateFcns called
0130
0131 % Hint: edit controls usually have a white background on Windows.
0132 %           See ISPC and COMPUTER.
0133 if ispc
0134     set(hObject,'BackgroundColor','white');
0135 else
0136     set(hObject,'BackgroundColor',get(0,'defaultUicontrolBackgroundColor'));
0137 end
0138
0139
0140 % --- Executes on button press in calcButton.
0141 function calcButton_Callback(hObject, eventdata, handles)
0142 % hObject    handle to calcButton (see GCBO)
0143 % eventdata reserved - to be defined in a future version of MATLAB
0144 % handles    structure with handles and user data (see GUIDATA)
0145
0146 % Disable input.
0147 set(handles.sysEdit, 'Enable', 'off');
0148 set(handles.diaEdit, 'Enable', 'off');
0149
0150 % Calculate and save map.
0151 handles.Pmap = 0.333*handles.Psys + 0.667*handles.Pdia;
0152
0153 % Create formatted ouptput string.
0154 mapStr = sprintf('%.0f', handles.Pmap);
0155
0156 % Display the formatted input.
0157 set(handles.mapText, 'String', mapStr);
0158
0159 % Update central handles structure.
0160 guidata(hObject, handles);
0161
0162
0163 % --- Executes on button press in otherButton.
0164 function otherButton_Callback(hObject, eventdata, handles)
0165 % hObject    handle to otherButton (see GCBO)
0166 % eventdata reserved - to be defined in a future version of MATLAB

```

```
0167 % handles    structure with handles and user data (see GUIDATA)
0168
0169 % Clear output
0170 set(handles.mapText, 'String', '');
0171
0172 % Reenable inputs.
0173 set(handles.sysEdit, 'Enable', 'on');
0174 set(handles.diaEdit, 'Enable', 'on');
```