MATLAB 大作业

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一、 问题描述

人们经常面临用一个解析函数描述数据（通常是测量值）的任务，一般设法找出某条光滑曲线，用以最佳的拟合原始数据，但不必经过每个数据点。最佳拟合可以解释为在数据点的最小误差平方和，若所用的曲线限定为多项式，那么去曲线拟合是相当简捷的，称为多项式的最小二乘拟合。

使用 MATLAB GUI 模块设计一个 GUI 界面，可以实现拟合功能并展示拟合的数据、集合阶次、拟合图像和拟合表达式。

二、 方案设计

2.1 构思草图

1、建立一个坐标轴对象，用于显示函数和零点坐标；

2、建立 5 个静态文本框，标注相应控件的提示和用来显示坐标数值；

3、建立 2 个按钮，用于求函数零点和结束程序。

在 x，y 静态文本框中可是输入改变相应数值，得到新的拟合曲线。界面设计如图 2-1 所示。

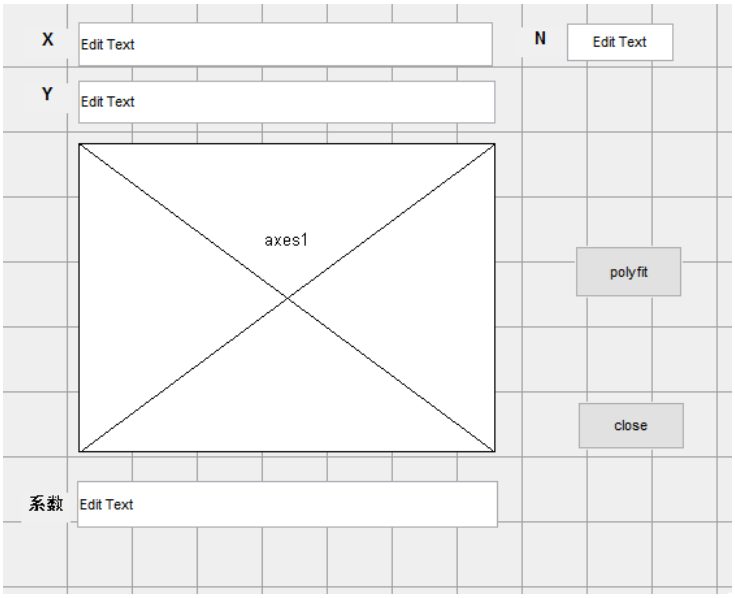


图 2-1 数值拟合 GUI 界面

2.2 设置控件的相关属性

1、设置第一个按钮的 Tag 标识为 polyfit_pushbutton，用于曲线拟合；

2、设置第一个按钮的 Tag 标识为 close_pushbutton，用于结束程序；

3、设置 4 个可编辑文本框，显示 x，y，n 和拟合后的系数数据，Tag 的标识依次是 x_edit、y_edit、n_edit、xishu_edit。

4、建立一级菜单 file，在其下设置两个字菜单项 polyfit 和 close。菜单项 polyfit 的 Tag 设置为 polyfit_menu，调用曲线拟合的函数；菜单项 close 的 Tag 设置为 close_menu，执行关闭图形功能。如图 2-2 所示。

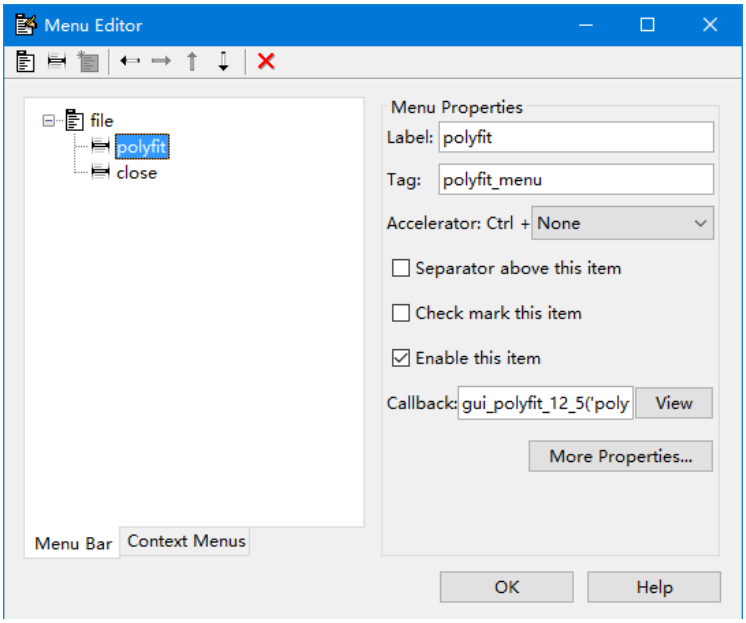


图 2-2 设置菜单

2.3 编写相关代码

1、系统自动生成 M 文件程序代码。

2、在程序初始化的时候，显示默认 X，Y，N 的数据。

3、按钮 polyfit_pushbutton 调用函数，将 x，y，n 的字符转化为数据，进行曲线拟合，把拟合后的系数输出在 Tag 为“xishu_edit”的编辑文本框中。

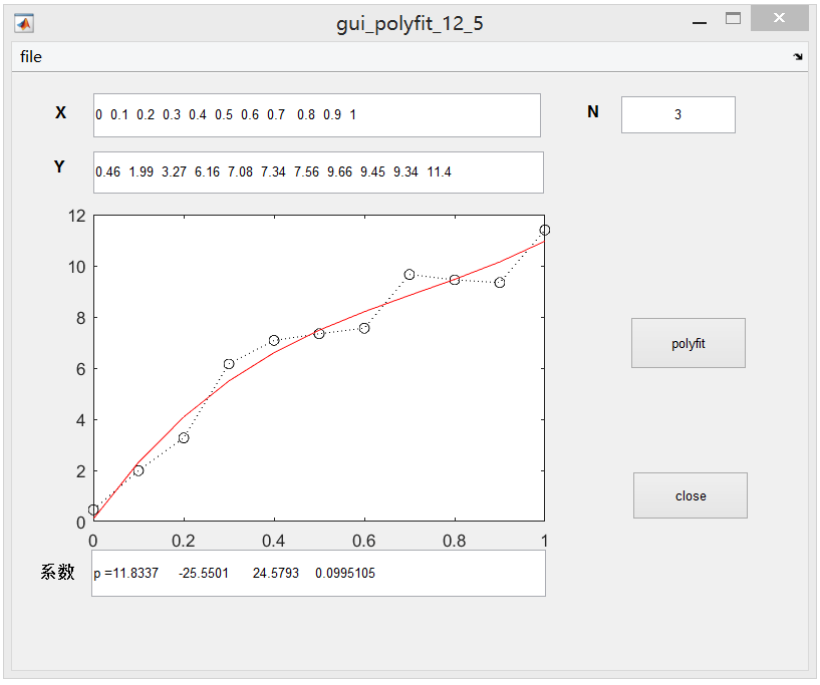
4、按钮 close_pushbutton 调用 close 函数关闭图形结束程序。

5、菜单项 polyfit_menu 调用 polyfit_pushbutton_Callback 函数进行曲线拟合。

6、菜单项 close_menu 调用 close 函数关闭图形结束程序。

三、运行结果

运行结果如图 3-1 所示。



四、源代码

```
function varargout = gui_polyfit_12_5(varargin)
% GUI_POLYFIT_12_5 M-file for gui_polyfit_12_5.fig
%      GUI_POLYFIT_12_5, by itself, creates a new GUI_POLYFIT_12_5 or raises the existing
%      singleton*.
%
%      H = GUI_POLYFIT_12_5 returns the handle to a new GUI_POLYFIT_12_5 or the handle to
%      the existing singleton*.
%
%      GUI_POLYFIT_12_5('CALLBACK',hObject,eventData,handles,...) calls the local
%      function named CALLBACK in GUI_POLYFIT_12_5.M with the given input arguments.
%
%      GUI_POLYFIT_12_5('Property','Value',...) creates a new GUI_POLYFIT_12_5 or raises the
%      existing singleton*.  Starting from the left, property value pairs are
%      applied to the GUI before gui_polyfit_12_5_OpeningFunction gets called.  An
%      unrecognized property name or invalid value makes property application
%      stop.  All inputs are passed to gui_polyfit_12_5_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 gui_polyfit_12_5

% Last Modified by GUIDE v2.5 05-Sep-2007 16:38:59

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',          mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @gui_polyfit_12_5_OpeningFcn, ...
                   'gui_OutputFcn',  @gui_polyfit_12_5_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 gui_polyfit_12_5 is made visible.
function gui_polyfit_12_5_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 gui_polyfit_12_5 (see VARARGIN)
set(handles.x_edit,'String','0    0.1    0.2    0.3    0.4    0.5    0.6    0.7      0.8    0.9    1');
set(handles.y_edit,'String','0.46     1.99     3.27     6.16     7.08     7.34     7.56     9.66     9.45     9.34
11.4');
set(handles.n_edit,'String','3');

% Choose default command line output for gui_polyfit_12_5
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes gui_polyfit_12_5 wait for user response (see UIRESUME)
% uiwait(handles.figure1);


% --- Outputs from this function are returned to the command line.
function varargout = gui_polyfit_12_5_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 polyfit_pushbutton.
function polyfit_pushbutton_Callback(hObject, eventdata, handles)
% hObject        handle to polyfit_pushbutton (see GCBO)
% eventdata     reserved - to be defined in a future version of MATLAB
```

```
% handles    structure with handles and user data (see GUIDATA)
x=str2num(get(handles.x_edit,'String'));
y=str2num(get(handles.y_edit,'String'));
n=str2num(get(handles.n_edit,'String'));
plot(x,y,'k:','Marker','o');
hold on;
p=polyfit(x, y, n);
yy=polyval(p, x);
plot(x,yy,'r-');
set(handles.xishu_edit,'String',strcat('p = ',num2str(p)));

% --- Executes on button press in close_pushbutton.
function close_pushbutton_Callback(hObject, eventdata, handles)
% hObject    handle to close_pushbutton (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
close



% --------------------------------------------------------------------
function polyfit_menu_Callback(hObject, eventdata, handles)
% hObject    handle to polyfit_menu (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
polyfit_pushbutton_Callback(hObject, eventdata, handles)

% --------------------------------------------------------------------
function close_menu_Callback(hObject, eventdata, handles)
% hObject    handle to close_menu (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
close

% --------------------------------------------------------------------
function file_menu_Callback(hObject, eventdata, handles)
% hObject    handle to file_menu (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
function x_edit_Callback(hObject, eventdata, handles)
% hObject    handle to x_edit (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of x_edit as text
%        str2double(get(hObject,'String')) returns contents of x_edit as a double


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

% Hint: edit 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



function y_edit_Callback(hObject, eventdata, handles)
% hObject    handle to y_edit (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of y_edit as text
%        str2double(get(hObject,'String')) returns contents of y_edit as a double


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

% Hint: edit 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
```

```
function xishu_edit_Callback(hObject, eventdata, handles)
% hObject        handle to xishu_edit (see GCBO)
% eventdata     reserved - to be defined in a future version of MATLAB
% handles       structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of xishu_edit as text
%               str2double(get(hObject,'String')) returns contents of xishu_edit as a double


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

% Hint: edit 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
```