1.GUI 主程序源程序

```
function varargout = gui(varargin)
gui_Singleton = 1;
gui_State = struct('gui_Name',          mfilename, ...
                   'gui_Singleton',   gui_Singleton, ...
                   'gui_OpeningFcn', @gui_OpeningFcn, ...
                   'gui_OutputFcn',   @gui_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
%结束初始化
function gui_OpeningFcn(hObject, eventdata, handles, varargin)
handles.output = hObject;
guidata(hObject, handles);
function varargout = gui_OutputFcn(hObject, eventdata, handles)
varargout{1} = handles.output;

% ====================输入图像============================
function pushbutton1_Callback(hObject, eventdata, handles)
[filename pathname]=uigetfile({'*.jpg';'*.bmp'}, 'File Selector');
I=imread([pathname '\' filename]);
handles.I=I;
guidata(hObject, handles);
axes(handles.axes1);
imshow(I);title('原图');

% ===================图像处理============================
function pushbutton2_Callback(hObject, eventdata, handles)
I=handles.I;
I1=rgb2gray(I);
I2=edge(I1,'roberts',0.18,'both');
axes(handles.axes2);
imshow(I1);title('灰度图');
axes(handles.axes3);
imshow(I2);title('边缘检测');
se=[1;1;1];
```

```matlab
I3=imerode(I2,se);%腐蚀操作
se=strel('rectangle',[25,25]);
I4=imclose(I3,se);%图像聚类，填充图像
I5=bwareaopen(I4,2000);%去除聚团灰度值小于 2000 的部分
[y,x,z]=size(I5);%返回 15 各维的尺寸，存储在 x,y,z 中
myI=double(I5);
tic        %tic 计时开始，toc 结束
Blue_y=zeros(y,1);%产生一个 y*1 的零针
for i=1:y
    for j=1:x
        if(myI(i,j,1)==1)%如果 myI 图像坐标为（i，j）点值为 1，背景颜色蓝色，blue 加一
            Blue_y(i,1)=Blue_y(i,1)+1;%蓝色像素点统计
        end
    end
end
[temp MaxY]=max(Blue_y);
%Y 方向车牌区域确定
%temp 为向量 yellow_y 的元素中的最大值，MaxY 为该值得索引
PY1=MaxY;
while((Blue_y(PY1,1)>=5)&&(PY1>1))
    PY1=PY1-1;
end
PY2=MaxY;
while((Blue_y(PY2,1)>=5)&&(PY2<y))
    PY2=PY2+1;
end
IY=I(PY1:PY2,:,:);
%X 方向车牌区域确定
Blue_x=zeros(1,x);%进一步确认 x 方向的车牌区域
for j=1:x
    for i=PY1:PY2
        if(myI(i,j,1)==1)
            Blue_x(1,j)=Blue_x(1,j)+1;
        end
    end
end
PX1=1;
while((Blue_x(1,PX1)<3)&&(PX1<x))
    PX1=PX1+1;
end
PX2=x;
while((Blue_x(1,PX2)<3)&&(PX2>PX1))
    PX2=PX2-1;
end
```

```matlab
PX1=PX1-1;%对车牌区域的矫正
PX2=PX2+1;
dw=I(PY1:PY2-8,PX1:PX2,:);
t=toc;
axes(handles.axes4);imshow(dw),title('定位车牌');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
imwrite(dw,'dw.jpg');%将彩色车牌写入 dw 文件中
a=imread('dw.jpg');%读取车牌
b=rgb2gray(a);%将车牌图像转换为灰度图
imwrite(b,'灰度车牌.jpg');%将灰度图写入文件
g_max=double(max(max(b)));
g_min=double(min(min(b)));
T=round(g_max-(g_max-g_min)/3);%T 为二值化的阈值
[m,n]=size(b);
d=(double(b)>=T);%d:二值图像
imwrite(d,'二值化.jpg');
%均值滤波前
%滤波
h=fspecial('average',3);
%建立预定义的滤波算子，average 为均值滤波，模板尺寸为 3*3
d=im2bw(round(filter2(h,d)));%使用指定的滤波器 h 对 h 进行 d 即均值滤波
imwrite(d,'均值滤波.jpg');
%某些图像进行操作
%膨胀或腐蚀
se=eye(2);%单位矩阵
[m,n]=size(d);%返回信息矩阵
if bwarea(d)/m/n>=0.365%计算二值图像中对象的总面积与整个面积的比是否大于 0.365
    d=imerode(d,se);%如果大于 0.365 则进行腐蚀
elseif bwarea(d)/m/n<=0.235%计算二值图像的总面积与整个面积的比值是否小于 0.235
    d=imdilate(d,se);%%如果小于则实现膨胀操作
end
imwrite(d,'膨胀.jpg');
%寻找连续有文字的块，若长度大于某阈值，则认为该块有两个字符组成，需要分割
d=qiege(d);
[m,n]=size(d);
k1=1;
k2=1;
s=sum(d);
j=1;
while j~=n
    while s(j)==0
        j=j+1;
    end
    k1=j;
```

```matlab
        while s(j)~=0 && j<=n-1
            j=j+1;
        end
        k2=j-1;
        if k2-k1>=round(n/6.5)
            [val,num]=min(sum(d(:,[k1+5:k2-5])));
            d(:,k1+num+5)=0;%分割
        end
    end
end
%再切割
d=qiege(d);
%切割出 7 个字符
y1=10;
y2=0.25;
flag=0;
word1=[];
while flag==0
    [m,n]=size(d);
    left=1;
    wide=0;
    while sum(d(:,wide+1))~=0
        wide=wide+1;
    end
    if wide<y1 %认为是左干扰
        d(:,[1:wide])=0;
        d=qiege(d);
    else
        temp=qiege(imcrop(d,[1 1 wide m]));
        [m,n]=size(temp);
        all=sum(sum(temp));
        two_thirds=sum(sum(temp([round(m/3):2*round(m/3)],:)));
        if two_thirds/all>y2
            flag=1;word1=temp;%word1
        end
        d(:,[1:wide])=0;d=qiege(d);
    end
end
%分割出第二至七个字符
[word2,d]=getword(d);
[word3,d]=getword(d);
[word4,d]=getword(d);
[word5,d]=getword(d);
[word6,d]=getword(d);
[word7,d]=getword(d);
```

```matlab
[m,n]=size(word1);
%商用系统程序中归一化大小为 40*20
word1=imresize(word1,[40 20]);
word2=imresize(word2,[40 20]);
word3=imresize(word3,[40 20]);
word4=imresize(word4,[40 20]);
word5=imresize(word5,[40 20]);
word6=imresize(word6,[40 20]);
word7=imresize(word7,[40 20]);
axes(handles.axes5);imshow(word1),title('1');
axes(handles.axes6);imshow(word2),title('2');
axes(handles.axes7);imshow(word3),title('3');
axes(handles.axes8);imshow(word4),title('4');
axes(handles.axes9);imshow(word5),title('5');
axes(handles.axes10);imshow(word6),title('6');
axes(handles.axes11);imshow(word7),title('7');
imwrite(word1,'1.jpg');
imwrite(word2,'2.jpg');
imwrite(word3,'3.jpg');
imwrite(word4,'4.jpg');
imwrite(word5,'5.jpg');
imwrite(word6,'6.jpg');
imwrite(word7,'7.jpg');
liccode=char(['0':'9' 'A':'Z' '辽粤豫鄂鲁陕京津']);%字符模板
SubBw2=zeros(40,20);
l=1;
for I=1:7;
    ii=int2str(I);
    t=imread([ii,'.jpg']);
    SegBw2=imresize(t,[40 20],'nearest');
    SegBw2=double(SegBw2)>20;
    if l==1 %第一位汉字识别
        kmin=37;
        kmax=43;
    elseif l==2 %第二位字母识别
        kmin=11;
        kmax=36;
    else l>=3    %第三位后字母或数字识别
        kmin=1;
        kmax=36;
    end
    for k2=kmin:kmax
        fname=strcat('字符模板\',liccode(k2),'.jpg');
        SamBw2=imread(fname);
```

```matlab
            SamBw2=double(SamBw2)>1;
            for i=1:40
                for j=1:20
                    SubBw2(i,j)=SegBw2(i,j)-SamBw2(i,j);
                end
            end
            %相当于两幅图相减得第三幅图
            Dmax=0;
            for k1=1:40;
                for l1=1:20
                    if(SubBw2(k1,l1)>0 | SubBw2(k1,l1)<0)
                        Dmax=Dmax+1;
                    end
                end
            end
            Error(k2)=Dmax;
        end
        Error1=Error(kmin:kmax);
        MinError=min(Error1);
        findc=find(Error1==MinError);
        Code(l*2-1)=liccode(findc(1)+kmin-1);
        Code(l*2)=' ';
        l=l+1;
    end
end
axes(handles.axes12);imshow(dw),title(['车牌号码：',Code],'Color','b');
axes(handles.axes13);imhist(I1);title('灰度化直方图');

% =======================退出系统=========================
function pushbutton3_Callback(hObject, eventdata, handles)
close(gcf);
```

2.qiege 子函数(字符切割)

```matlab
function e=qiege(d)
[m,n]=size(d);
top=1;
bottom=m;
left=1;
right=n;
while sum(d(top,:))==0 && top<=m
    top=top+1;
end
while sum(d(bottom,:))==0 && bottom>1
    bottom=bottom-1;
```

```matlab
end
while sum(d(:,left))==0 && left<n
    left=left+1;
end
while sum(d(:,right))==0 && right>=1
    right=right-1;
end
dd=right-left;
hh=bottom-top;
e=imcrop(d,[left top dd hh]);
```

3.getword 子函数(字符识别)

```matlab
function[word,result]=getword(d)
word=[];
flag=0;
y1=8;
y2=0.5;
while flag==0
    [m,n]=size(d);
    wide=0;
    while sum(d(:,wide+1))~=0 && wide<=n-2
        wide=wide+1;
    end
    temp=qiege(imcrop(d,[1 1 wide m]));%用于返回图像的一个裁剪区域
    [m1,n1]=size(temp);
    if wide<y1 && n1/m1>y2
        d(:,[1:wide])=0;
        if sum(sum(d))~=0
            d=qiege(d);%切割出最小范围
        else word=[];flag=1;
        end
    else
        word=qiege(imcrop(d,[1 1 wide m]));
        d(:,[1:wide])=0;
        if sum(sum(d))~=0;
            d=qiege(d);
            flag=1;
        else d=[];
        end
    end
end
result=d;
```