内螺旋算法

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function [path,record,path_long]=main()
    clear all
    a=load("test.txt");
    n=size(a,1);
    b=a;
    b(end+1,end+1)=1;
    figure(1)
    colormap([1 1 1;0 1 1]);
    pcolor(b);
    set(gca,'XTick',10:10:n,'YTick',10:10:n);
    axis image xy
    array=reshape(1:n*n,n,n);
    array=array';
%     array=array(end:-1:1,:);
    for i=1:n*n
        [col,row]=find(array==i);
        text(row+0.2,col+0.5,num2str(i));
    end
    [path,record]=SP(array,a);
    record1=record;
    record1(end+1,end+1)=1;
    figure(2);
    colormap([0 0 0;1 0 0;0 1 0;0 0 1;1 1 0;1 0 1]);
    pcolor(record1);
    hold on
    set(gca,'XTick',10:10:n,'YTick',10:10:n);
    axis image xy
    DrawPath(array,path);
    path_long=0;
    for i=1:length(path)-1
        path_long=path_long+distance(array,path(i),path(i+1));
    end
end

function [path,record]=SP(array,a)
  [m,n]=size(array);
  begin_x=1;
  begin_y=1;
  end_x=n;
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end_y=m;
path=[];
record=zeros(m,n);
while 1
for i=begin_x:end_x
    if a(i,begin_y)==1
        j=1;
        while(a(i,begin_y+j)==1)
            path=[path array(i-1,begin_y+j)];
            record(i-1,begin_y+j)=record(i-1,begin_y+j)+1;
            j=j+1;
        end
        path=[path array(i,begin_y+j)];
        record(i+1,begin_y+j)=record(i+1,begin_y+j)+1;
        if j>1
           for s=1:j-1
              path=[path array(i+1,begin_y+j-s)];
              record(i+1,begin_y+j-s)=record(i+1,begin_y+j-s)+1;
           end
        end
    else
        path=[path array(i,begin_y)];
        record(i,begin_y)=record(i,begin_y)+1;
    end
end
begin_y=begin_y+1;
if begin_y>end_y
    break
end
for i=begin_y:end_y
        if a(end_x,i)==1
        j=1;
        while(a(end_x-j,i)==1)
            path=[path array(end_x-j,i-1)];
            record(end_x-j,i-1)=record(end_x-j,i-1)+1;
            j=j+1;
        end
        path=[path array(end_x-j,i)];
        record(end_x-j,i)=record(end_x-j,i)+1;
        if j>1
           for s=1:j-1
        path=[path array(end_x-j+s,i+1)];
        record(end_x-j+s,i+1)=record(end_x-j+s,i+1)+1;
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            end
        end
        else
            path=[path array(end_x,i)];
            record(end_x,i)=record(end_x,i)+1;
        end
end
end_x=end_x-1;
if end_x<begin_x
    break
end
for i=end_x:-1:begin_x
    if a(i,end_y)==1
        j=1;
        while(a(i,end_y-j)==1)
            path=[path array(i+1,end_y-j)];
            record(i+1,end_y-j)=record(i+1,end_y-j)+1;
            j=j+1;
        end
        path=[path array(i,end_y-j)];
        record(i,end_y-j)=record(i,end_y-j)+1;
        if j>1
            for s=1:j-1
        path=[path array(i-1,end_y-j+s)];
        record(i-1,end_y-j+s)=record(i-1,end_y-j+s)+1;
            end
        end
    else
        path=[path array(i,end_y)];
        record(i,end_y)=record(i,end_y)+1;
    end
end
end_y=end_y-1;
if begin_y>end_y
    break
end
for i=end_y:-1:begin_y
      if a(begin_x,i)==1
        j=1;
        while(a(begin_x+j,i)==1)
            path=[path array(begin_x+j,i+1)];
            record(begin_x+j,i+1)=record(begin_x+j,i+1)+1;
            j=j+1;
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126             end
127             path=[path array(begin_x+j,i)];
128             record(begin_x+j,i)=record(begin_x+j,i)+1;
129             if j>1
130                for s=1:j-1
131             path=[path array(begin_x+j-s,i-1)];
132             record(begin_x+j-s,i-1)=record(begin_x+j-s,i-1)+1;
133                end
134             end
135          else
136                path=[path array(begin_x,i)];
137                record(begin_x,i)=record(begin_x,i)+1;
138          end
139    end
140    begin_x=begin_x+1;
141    if end_x<begin_x
142        break
143    end
144    end
145 end
146
147 function DrawPath(array,path)
148      n=length(path);
149      col=zeros(1,n);
150      row=zeros(1,n);
151      for i=1:n
152         [col(i),row(i)]=find(array==path(i));
153      end
154      plot(row+0.5,col+0.5,'y-o ');
155 end
156
157 function d=distance(array,i,j)
158     [x_i,y_i]=find(array==i);
159     [x_j,y_j]=find(array==j);
160     d=sqrt((x_i-x_j)^2+(y_i-y_j)^2);
161 end
```