

内螺旋算法

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1 function [path,record,path_long]=main()
2     clear all
3     a=load("test.txt");
4     n=size(a,1);
5     b=a;
6     b(end+1,end+1)=1;
7     figure(1)
8     colormap([1 1 1;0 1 1]);
9     pcolor(b);
10    set(gca,'XTick',10:10:n,'YTick',10:10:n);
11    axis image xy
12    array=reshape(1:n*n,n,n);
13    array=array';
14    %     array=array(end:-1:1,:);
15    for i=1:n*n
16        [col,row]=find(array==i);
17        text(row+0.2,col+0.5,num2str(i));
18    end
19    [path,record]=SP(array,a);
20    record1=record;
21    record1(end+1,end+1)=1;
22    figure(2);
23    colormap([0 0 0;1 0 0;0 1 0;0 0 1;1 1 0;1 0 1]);
24    pcolor(record1);
25    hold on
26    set(gca,'XTick',10:10:n,'YTick',10:10:n);
27    axis image xy
28    DrawPath(array,path);
29    path_long=0;
30    for i=1:length(path)-1
31        path_long=path_long+distance(array,path(i),path(i+1));
32    end
33 end
34
35 function [path,record]=SP(array,a)
36     [m,n]=size(array);
37     begin_x=1;
38     begin_y=1;
39     end_x=n;

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40     end_y=m;
41     path=[];
42     record=zeros(m,n);
43     while 1
44         for i=begin_x:end_x
45             if a(i,begin_y)==1
46                 j=1;
47                 while(a(i,begin_y+j)==1)
48                     path=[path array(i-1,begin_y+j)];
49                     record(i-1,begin_y+j)=record(i-1,begin_y+j)+1;
50                     j=j+1;
51                 end
52                 path=[path array(i,begin_y+j)];
53                 record(i+1,begin_y+j)=record(i+1,begin_y+j)+1;
54                 if j>1
55                     for s=1:j-1
56                         path=[path array(i+1,begin_y+j-s)];
57                         record(i+1,begin_y+j-s)=record(i+1,begin_y+j-s)+1;
58                     end
59                 end
60             else
61                 path=[path array(i,begin_y)];
62                 record(i,begin_y)=record(i,begin_y)+1;
63             end
64         end
65         begin_y=begin_y+1;
66         if begin_y>end_y
67             break
68         end
69         for i=begin_y:end_y
70             if a(end_x,i)==1
71                 j=1;
72                 while(a(end_x-j,i)==1)
73                     path=[path array(end_x-j,i-1)];
74                     record(end_x-j,i-1)=record(end_x-j,i-1)+1;
75                     j=j+1;
76                 end
77                 path=[path array(end_x-j,i)];
78                 record(end_x-j,i)=record(end_x-j,i)+1;
79                 if j>1
80                     for s=1:j-1
81                         path=[path array(end_x-j+s,i+1)];
82                         record(end_x-j+s,i+1)=record(end_x-j+s,i+1)+1;

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83         end
84     end
85     else
86         path=[path array(end_x,i)];
87         record(end_x,i)=record(end_x,i)+1;
88     end
89 end
90 end_x=end_x-1;
91 if end_x<begin_x
92     break
93 end
94 for i=end_x:-1:begin_x
95     if a(i,end_y)==1
96         j=1;
97         while(a(i,end_y-j)==1)
98             path=[path array(i+1,end_y-j)];
99             record(i+1,end_y-j)=record(i+1,end_y-j)+1;
100             j=j+1;
101         end
102         path=[path array(i,end_y-j)];
103         record(i,end_y-j)=record(i,end_y-j)+1;
104         if j>1
105             for s=1:j-1
106                 path=[path array(i-1,end_y-j+s)];
107                 record(i-1,end_y-j+s)=record(i-1,end_y-j+s)+1;
108             end
109         end
110     else
111         path=[path array(i,end_y)];
112         record(i,end_y)=record(i,end_y)+1;
113     end
114 end
115 end_y=end_y-1;
116 if begin_y>end_y
117     break
118 end
119 for i=end_y:-1:begin_y
120     if a(begin_x,i)==1
121         j=1;
122         while(a(begin_x+j,i)==1)
123             path=[path array(begin_x+j,i+1)];
124             record(begin_x+j,i+1)=record(begin_x+j,i+1)+1;
125             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

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