Subject: Re: Repost of Vertex question...
Posted by david[2] on Fri, 29 Jun 2001 00:06:04 GMT
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Brian Koss writes:

> I have images of polygons connected edge to edge in a
> quasiperiodic array, like this one.

Isn't science weird!? Why would anyone want to
be a business major?

Cheers,

David

--
David Fanning, Ph.D.
Fanning Software Consulting
Phone: 970-221-0438 E-Mail: davidf@dfanning.com
Coyote's Guide to IDL Programming: http://www.dfanning.com/
Toll-Free IDL Book Orders: 1-888-461-0155

Subject: Re: Repost of Vertex question...
Posted by Craig Markwardt on Fri, 29 Jun 2001 02:46:12 GMT
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Brian Koss <bakoss@rainbow.uchicago.edu> writes:
>
> I have images of polygons connected edge to edge in a
> quasiperiodic array, like the one I
> have attached to this message...
> The images are black and white and the edges of the polygons are
> distinguisable because
> they are straight lines.
> I would love to be able to use IDL to find the vertices in this
> image.

Cute. Somehow I don't think this is a program that someone on the
newsgroup can knock out in ten minutes. Converting a raster image
into a vector image is not the easiest thing that can be done. In
fact, from what I found on the web, raster-to-vector is *very* hard.
If your images are computer-generated, can you get the original vector
data?

Craig

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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
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Subject: Re: Repost of Vertex question...
Posted by Richard French on Fri, 29 Jun 2001 10:55:40 GMT
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> I would love to be able to use IDL to find the vertices in this
> image.
> Essentially this will give me all the corners in the image. Is
> there a
> function in IDL that does such a thing (find intersections or
> verticies)?

Here's an idea that might get you started.

1) Find a way to sort the pixels that contain the 'line' information so that
they are contiguous - i.e., so that they are ordered in such a way that if
you used 'plots,/dev,xvals,yvals' on this set of xvals and yvals, they would
follow the edges of a given polygon as if you were drawing it with a pen on
the screen - there are several ways of doing this, but the details depend on
the nature of your images, so I leave this part to you. If you can't do this
on your image immediately, then you can set up a test image that has this
information in it - that is, simplify your image so that it contains a single
polygon with known pixel coordinates in order.

2) Given this list of pixels, compute the slope of the line containing each
contiguous pair of pixels - something like
theta_vals = atan(yvals-shift(yvals,1), xvals-shift(xvals,1))
(syntax is close but may not be perfect here)

3) Now you can search for vertices by defining them as successive values in
the array theta_vals whose difference (in absolute value) exceeds some

threshold
level. You may have some wrap-around modulo two-pi problems when theta goes between
0 and 2*!pi, but this is the general idea.

If you have a very low resolution image, this approach might not work very well,
due to the granularity of the pixel locations, but it is a start. If you are only
after vertices with very sharp angles, though, this might be close to what you want.

Hope this sparks some ideas from others,

Dick French
Astronomy Dept, Wellesley College

Subject: Re: Repost of Vertex question...
Posted by Struan Gray on Fri, 29 Jun 2001 14:01:54 GMT
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Craig Markwardt, craigmnet@cow.physics.wisc.edu writes:
> Brian Koss <bakoss@rainbow.uchicago.edu> writes:
>>
>> I have images of polygons connected edge to edge in a
>> quasiperiodic array, like the one I have attached to this
>> message... The images are black and white and the edges of
>> the polygons are distinguisable because they are straight
>> lines. I would love to be able to use IDL to find the
>> vertices in this image.
>
> Cute. Somehow I don't think this is a program that
> someone on the newsgroup can knock out in ten minutes.

Oh. I don't know.

A quasicrystal will have a limited number of vertex orientations, which you can pick out by hand. Simply cut out one of each type of vertex into it's own sub-image, do a cross correlation between that and the whole image to find where that type of vertex occurs, and add up the resulting lists for each vertex type.

Alternately, if you know something about the scale invariance of the quasicrystal, find the postions of the edges or centres of the polygons in the same way, and then

use the quasicrystal's scaling properties to find the
vertices.

Struan

Subject: Re: Repost of Vertex question...
Posted by Craig Markwardt on Fri, 29 Jun 2001 14:24:49 GMT
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Struan Gray <struan.gray@sljus.lu.se> writes:

> Craig Markwardt, craigmnet@cow.physics.wisc.edu writes:
>> Brian Koss <bakoss@rainbow.uchicago.edu> writes:
>>>
>>> I have images of polygons connected edge to edge in a
>>> quasiperiodic array, like the one I have attached to this
>>> message... The images are black and white and the edges of
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>
>
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>
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> orientations, which you can pick out by hand. Simply cut
> out one of each type of vertex into it's own sub-image, do a
> cross correlation between that and the whole image to find
> where that type of vertex occurs, and add up the resulting
> lists for each vertex type.
...

Cool ideas!

Craig

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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
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Subject: Re: Repost of Vertex question...
Posted by Struan Gray on Mon, 02 Jul 2001 11:05:27 GMT
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Craig Markwardt, craigmnet@cow.physics.wisc.edu writes:

> Cool ideas!

Quasicrystals are cool things. Back when I were a nipper looking at options for a thesis project they were one of the things that persuaded me that Solid state physics could compete with Astronomy when it came to beauty, mathmatical elegance and real-world physics wrapped up in one image.

I was musing over the weekend on ways to automatically detect the vertex types, but without seeing Brian's image (some net-nanny seems to have auto-removed it before it got to our newsservers) I don't know what sort of quasicrystal he's dealing with. Something like a Penrose tiling, with only a pair of polygonal units, would be pretty simple, but more complex quasicrystals would make it a bit too involved, and it's easier to just point at the screen.

Of course, the hardcore quasicrystallographer will use MPFIT to find the higher-dimensional regular lattice of which the quasicrystal is the two-dimensional projection. I'll leave this as an exercise for the reader :-P.

Struan

Subject: Re: Repost of Vertex question...
Posted by Craig Markwardt on Mon, 02 Jul 2001 13:33:22 GMT
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Struan Gray <struan.gray@sljus.lu.se> writes:
> Of course, the hardcore quasicrystallographer will use
> MPFIT to find the higher-dimensional regular lattice of
> which the quasicrystal is the two-dimensional projection.
> I'll leave this as an exercise for the reader :-P.

Then thank goodness I'm not a hardocre quasicrystallographer! :-)

Craig

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Craig B. Markwardt, Ph.D. EMAIL: craigmnet@cow.physics.wisc.edu
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Subject: Re: Repost of Vertex question...
Posted by Martin Downing on Thu, 12 Jul 2001 15:41:11 GMT
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> (This is the same as my last post, but with a smaller image size
> and up-todate email contact
> Sorry for the confusion.)
>
> I have images of polygons connected edge to edge in a
> quasiperiodic array, like the one I
> have attached to this message...
> The images are black and white and the edges of the polygons are
> distinguisable because
> they are straight lines.

Brian

I clearly need much more coffee, as all I can see is a wavey black line over a grey mosaic pattern. So what are the vertices you want to pick out? Had the image looked different I was going to suggest (straight) line finding using the Hough Transform, but now I think I will just up the ratio of beans:water.

Martin