Subject: Re: Image segmentation programs in IDL?
Posted by David Fanning on Wed, 13 Dec 2006 15:07:54 GMT
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Tim writes:

> I am looking for image segmentation routines that are available in or
> written in IDL. I think my images are not very challenging. They have
> been thresholded, so that the regions I want to segment all have values
> of -1, and the background is +1. The boundaries are smooth. Examples of
> the images can be found about a third of the way down the page at
> http://physics.kenyon.edu/people/sullivan/Research/CahnHilli ard/ .
>
> [...]
>
> If I knew anything about image segmentation, I suspect this would be
> easy. But I don't. Any help would be appreciated.

Oddly enough, Karsten Rodenacker was just here for the IEPA Conference of Mathematical Morphologists and we spent a pleasant weekend walking in the mountains and talking about this very thing for a chapter of a book I am writing. As a result, I'm gung ho to start writing some programs to do just this thing. If you would like to send me some images, I would be happy to play around with this a little bit.

I can't guarantee exactly when you will see results (the holidays seem to slow things down, although I have spent free Christmas afternoons in the past working on IDL programs, much to the disgust of my family). But you catch me at a reasonably good time to work on something like this, if you are interested.

Cheers,

David

P.S. I think this particular problem would be fairly easy, looking at the images. But perhaps the article that results would at least give you some notion of how to approach a problem like this in the future.

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/
Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Image segmentation programs in IDL?
Posted by peter.eddy@shaw.ca on Wed, 13 Dec 2006 19:52:29 GMT
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Tim,
To start you off you may want to look at the Label_Region function
which (from IDL help):

" consecutively labels all of the regions, or blobs, of a bi-level
image with a unique region index. This process is sometimes called
'blob coloring'."

Pete

Subject: Re: Image segmentation programs in IDL?
Posted by peter.eddy@shaw.ca on Thu, 14 Dec 2006 02:46:00 GMT
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David,
I would be interested in your article. I have been working with
different segmentation methods through my grad studies and am always
looking for good reference materials.

Pete

Subject: Re: Image segmentation programs in IDL?
Posted by Karsten Rodenacker on Thu, 14 Dec 2006 07:46:24 GMT
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Hi, you are showing interesting images. Still I don't understand what you
would like to do.
Do you mean with "Segmentation" that connected objects are labeled and
characterized? Or would you like to quantify the simulation results in
general? Or ... there are infinite possibilities.

I would recommend:
1. Global analysis:
 Area
 A(time,minority fraction) = total(Simulationresult(time, minority
fraction) ge 0.)
 Surface estimate
 S(time,minority fraction) = A(time,minority fraction) - $
 total(erode(Simulationresult(time,
minority fraction) ge 0.,[[0,1,0],[1,1,1],[0,1,0]]))

2. Object analysis: for each labeled object i

```
 L = label_region(Simulationresult(time, minority fraction) ge 0.)
 E = erode(Simulationresult(time, minority fraction) ge
0.,[[0,1,0],[1,1,1],[0,1,0]])
 Area
 A(i,time,minority fraction) = total(L eq i)
 Surface estimate
 S(i,time,minority fraction) = A(i,time,minority fraction) - $
                               total(E * (L eq i))
```

and so on

3. Object count with wrap around is a bit cumbersome with the label_region behavior in mind. For that I think a merging routine for border touching objects have to be written.

Regards
Karsten

Am Wed, 13 Dec 2006 15:39:09 +0100 schrieb Tim <anonymouse@anonymouse.net>:

> I am looking for image segmentation routines that are available in or
> written in IDL. I think my images are not very challenging. They have
> been thresholded, so that the regions I want to segment all have values
> of -1, and the background is +1. The boundaries are smooth. Examples of
> the images can be found about a third of the way down the page at
> http://physics.kenyon.edu/people/sullivan/Research/CahnHilli ard/ .
>
> I am aware of the particle tracking algoriths of Crocker, Weeks, and
> Spalding, et al., but their problem is identifying same size circular
> images and my objects vary in widely size and shape.
>
> There is one complication that I can live without at first, but would
> eventually need to rectify. My fields are have periodic boundary
> conditions, so eventually I would like an algorithm that identified as
> one object, an object that wraps around the top and bottom and left and
> right sides of the image.
>
> If I knew anything about image segmentation, I suspect this would be
> easy. But I don't. Any help would be appreciated.
>
> Tim Sullivan
> sullivan@kenyon.edu

--

Subject: Re: Image segmentation programs in IDL?
Posted by helaha on Thu, 14 Dec 2006 08:09:38 GMT
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I think your images are already segmented. There is one value for the objects and there is a distinct value for the background. Do you want a morphological characterization of the objects, such as how irregular or rough the objects are? The seed images are very irregular evolving to target images, that are more regular.
Regards,
Helmut

Tim wrote:
> I am looking for image segmentation routines that are available in or
> written in IDL. I think my images are not very challenging. They have
> been thresholded, so that the regions I want to segment all have values
> of -1, and the background is +1. The boundaries are smooth. Examples of
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> right sides of the image.
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> If I knew anything about image segmentation, I suspect this would be
> easy. But I don't. Any help would be appreciated.
>
> Tim Sullivan
> sullivan@kenyon.edu

Subject: Re: Image segmentation programs in IDL?
Posted by Tim[2] on Thu, 14 Dec 2006 14:13:17 GMT
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Thanks to everyone for their interest.

1) As mentioned, I do not have any experience in identifying objects in images, so I may be using the terminology incorrectly. By "image segmentation" what I meant was that I wanted to know, for each black region in the image, a list of the grid points in that region. (I didn't mention in my original posting that since I have hundreds of

these images to analyze I wanted a completely automatic algorithm, unlike some algorithms I have seen described that require user interaction.)

2) My goal is to come up with a single number that characterizes the image. For example, a number that is zero for the images composed all circles, but which gets bigger as the objects depart from circularity. I have tried some quantities such as the total perimeter to total area ratio which are global in the sense that they don't require me to know which grid points are in which object. These numbers show some systematic variation, but the variations are small and vary with the average size of the objects, that is, they are not clean measures of object "circularity". To improve them, I would at least have to know how many separate objects were in the image.

3) So my purpose now is to get a list of grid points in each black region. Then I will calculate, for example, the moment of inertia of each object about its center of mass (to use the physics terms) then subtract the moment of inertia of a circle of the same area, then divide by the moment of inertia of the circle of the same area. Finally, I will average this quantity over all the objects in the image. That should give me a number which quantifies the "non-circularity" of the objects in the image.

I think my IDL skills are up to the challenge of calculating the moments, once I learn to identify which black grid points are in which object.

Again, thank you all for your time and help.

Tim

On Dec 14, 3:09 am, hel...@gmx.net wrote:
> I think your images are already segmented. There is one value for the
> objects and there is a distinct value for the background. Do you want a
> morphological characterization of the objects, such as how irregular or
> rough the objects are? The seed images are very irregular evolving to
> target images, that are more regular.
> Regards,
> Helmut
>
> Tim wrote:
>> I am looking for image segmentation routines that are available in or
>> written in IDL. I think my images are not very challenging. They have
>> been thresholded, so that the regions I want to segment all have values
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>> If I knew anything about image segmentation, I suspect this would be
>> easy. But I don't. Any help would be appreciated.
>
>> Tim Sullivan
>> sulli...@kenyon.edu

Subject: Re: Image segmentation programs in IDL?
Posted by David Fanning on Thu, 14 Dec 2006 14:41:24 GMT
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Tim writes:

> I think my IDL skills are up to the challenge of calculating the
> moments, once I learn to identify which black grid points are in which
> object.

LABEL_REGION is definitely the place to start. Be aware,
though, that it has problems on the boundary. Normally,
the image is embedded in a blank image so that there
is a blank boundary of one pixel along all edges.

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/
Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Image segmentation programs in IDL?
Posted by Paolo Grigis on Thu, 14 Dec 2006 14:54:51 GMT
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Tim wrote:
> Thanks to everyone for their interest.
>
> 3) So my purpose now is to get a list of grid points in each black
> region. Then I will calculate, for example, the moment of inertia of
> each object about its center of mass (to use the physics terms) then
> subtract the moment of inertia of a circle of the same area, then
> divide by the moment of inertia of the circle of the same area.
> Finally, I will average this quantity over all the objects in the
> image. That should give me a number which quantifies the
> "non-circularity" of the objects in the image.

Be careful that you want your quantity of "non-circularity",
however you are defining it, not to depend on rotations of
the system (that is, on the axis with respect to which you
compute the momenta). There is a way of expressing the inertial
momenta in a frame-independent form, but this will give you
two numbers...

Ciao,
Paolo

Subject: Re: Image segmentation programs in IDL?
Posted by David Fanning on Thu, 14 Dec 2006 15:06:11 GMT
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Tim writes:

> I think my IDL skills are up to the challenge of calculating the
> moments, once I learn to identify which black grid points are in which
> object.

I've used FIT_ELLIPSE and FIND_BOUNDARY (found on my
web page) to do a similar analysis of "blobs" in the
past. They might give you some ideas.

Cheers,

David

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
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Subject: Re: Image segmentation programs in IDL?
Posted by Tim[2] on Thu, 14 Dec 2006 16:08:39 GMT
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David,

I sent you a message yesterday using "reply to author". Did you get
that?

Tim

On Dec 14, 10:06 am, David Fanning <n...@dfanning.com> wrote:
> Tim writes:
>> I think my IDL skills are up to the challenge of calculating the
>> moments, once I learn to identify which black grid points are in which
>> object.I've used FIT_ELLIPSE and FIND_BOUNDARY (found on my
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> past. They might give you some ideas.
>
> Cheers,
>
> David
>
> --
> David Fanning, Ph.D.
> Fanning Software Consulting, Inc.
> Coyote's Guide to IDL Programming:http://www.dfanning.com/
> Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Image segmentation programs in IDL?
Posted by David Fanning on Thu, 14 Dec 2006 16:37:55 GMT
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Tim writes:

> I sent you a message yesterday using "reply to author". Did you get
> that?

Humm. No. Try DAVID at DFANNING dot COM.

Thanks,

David

P.S. Spam has gotten a little out of hand around here, even with
very good filters, but I was looking for something.
--

David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/
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Subject: Mapping Etopo2 in IDL?
Posted by skyflow2008 on Tue, 19 Dec 2006 07:54:45 GMT
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Dear Fanning:
Now there is a problem puzzled me. I want to map etopo2 data in IDL. I know to use color table we can get a false color picture. But I want to realize hillshade texture and color simutaneously to display in my map like global mapper. I don't know hwo to realize. Please help me!
