

# Re: segmentation of images with poor noise statistics

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*Source:* <http://sci.tech-archive.net/Archive/sci.image.processing/2007-06/msg00011.html>

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- *From:* goanicks <[spamsux@xxxxxxxx](mailto:spamsux@xxxxxxxx)>
  - *Date:* Fri, 01 Jun 2007 23:39:25 -0000
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On 1 Jun., 19:12, "Pixel.to.life" <[pixel.to.l...@xxxxxxxx](mailto:pixel.to.l...@xxxxxxxx)> wrote:

On May 31, 3:53 pm, goanicks <[spam...@xxxxxxxx](mailto:spam...@xxxxxxxx)> wrote:

Hi there,

I am looking for a clever approach to perform an image segmentation in SPECT images with typically poor noise properties. According to the present (Poisson) noise, simple first-order-methods, such as edge detection filtering, or simply applying a threshold usually fail. Browsing the WEB I found, that there are so called statistical region based methods based on a 'snake', which also take the noise properties of the image into account and which are (from the authors) reported to be very stable and reliable ...

Now my questions:

- Is this the method of choice for the type of images I want to process?
- Are there any free code sources or even programs which can be used to try out this approach?

Thanks a lot in advance!

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Regards  
Andy

Hi, Andy,

By nature, SPECT images will have low SNR, low spatial resolution, and sometimes low dynamic range too. That would make traditional intensity based methods not very useful as you would notice: you cant effectively estimate gradients and separate regions easily (see example images here:<http://www.alasbimnjournal.cl/revistas/15/images/carreira2.jpg> ).

In my experience, when information content is low, or corrupted, additional information needs to be used in conjunction with the intensity to achieve a practical analysis result. I have seen geometric methods being successfully employed in the pursuit (active contours, level-sets e.g.)

If you wish to work in 2D images, you may start with active contours. But ultimately I would recommend a level-sets based approach (fast marching) owing to its robustness to topology changes when evolving an interface.

Here is an example work:

<http://ipg.zesoi.fer.hr/papers/mi01spect.pdf>

You may find on page 4 how the authors deal with noise and fuzziness. If you imagine a geometric contour evolving towards the boundary of the desired object, you can employ additional constraints other than just intensity value, gradient etc. You can adjust the speed function based on curvature to avoid leaking into areas with fuzzy boundary.

Here is another post with similar discussion, although image modality being different:

[http://groups.google.com/group/medicalimagingsscience/browse\\_thread/th...](http://groups.google.com/group/medicalimagingsscience/browse_thread/th...)

Do keep us posted with the results...

Pixel.To.Life

[\[http://groups.google.com/group/medicalimagingsscience?hl=en\]](http://groups.google.com/group/medicalimagingsscience?hl=en)– Zitierten Text ausblenden –

– Zitierten Text anzeigen –

Hi,

thanks that you took your time to send me such a comprehensive reply. Although I am not (yet ;-)) an expert in this field, I fully agree with

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your statement about the applicability of standard (intensity based) methods.

I already started with an active contour approach, but I am not yet happy with the achieved result. According to what I saw so far, it works only with konvex objects which is not appropriate in my case. However, I don't think this is a normal behaviour, but rather a result of the chose contour movement rules and segmentation quality criteria I have chosen. So, there is clearly room for further improvement.

Maybe I get some more ideas from reading the paper and having a look at the earlier postings you mentioned.

Thanks again

Andy

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