Subject: Re: Automatic Brain Detection from MRI scans
Posted by David Fenyes on Tue, 04 Jul 2000 07:00:00 GMT
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>>>> > "Michael" == Michael Cugley <mjcugley@tigger.medschool.dundee.ac.uk> writes:

Michael> I've just been given an assignment involving MRI scans of
Michael> the brain; one of the "wish list" features is being able
Michael> to automatically detect the brain within each scan.

One of my ex-colleagues as a grad student developed a heuristic algorithm that seemed to be quite effective, which he used as part of his thesis research:

Bedell, B.J., Narayana, P.A.: Automatic removal of extrameningeal tissues from MR images of human brain. J. Magn. Reson. Imag. 6:939-943, 1996.

Bedell, B.J., Narayana, P.A., and Johnston, D.A.: Three-Dimensional image registration for human brain. Magn. Reson. Med., 35:384-390, 1996.

David.

--
David Fenyes -- _dave_@_fenyes_._net_ -- remove the '_'s for address

Subject: Re: Automatic Brain Detection from MRI scans
Posted by anne on Fri, 07 Jul 2000 07:00:00 GMT
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There is a lot of literature on how to segment brains in MRI scans ranging from fairly simple techniques which could easily be written in idl to very complex methods that would take months of work to implement. The best method to use will depend on the type of MRI scan you are working on and how accurate you want the segmentation to be. For large 3d volumes with > 50 slices then a method to set upper and lower threshold levels combined with 3d morphology operators to break the connections between the brain and the surrounding structures is the simplest approach.
For scans with just a few slices a manual approach which allows thresholds to be set interactively and also allows the user to restrict the region from growing out into unwanted regions would work.

This bit of code works for a single 128x128 T1 weighted slice (summed image)- values of r and thresh have been optimised for our images and can be adjusted. We use it to segment the brain from single slice dynamic sequences.

```
mask = bytarr(s[1],s[2])
 r=7
disc = SHIFT(DIST(2*r+1), r, r) LE r
thresh=0.25*max(summed_image)
mask=summed_image gt thresh
mask=morph_open(mask,disc)
; now fill holes
roi = search2d(mask,0,0,0,0)  ;fill holes
mask(*)=1
mask(roi)=0
```

Anne Martel,
Dept Medical Physics,
QMC, Nottingham
anne.martel@nottingham.ac.ukqqq

Michael Cugley wrote:

> I've just been given an assignment involving MRI scans of the brain;
> one of the "wish list" features is being able to automatically detect
> the brain within each scan. Failing that, some way of making the
> process easier, such as a single click on "brain", and the program
> then selecting the rest of the "brain" from there (similar to "magic
> wand" selection tools in paint programs).
>
> Has anyone any experience in this area? References to look up? I'd
> rather not have to re-invent the wheel on this one...
>
> --
> Michael Cugley (mjcugley@medphys.dundee.ac.uk)

Subject: Re: Automatic Brain Detection from MRI scans
Posted by Ivan Zimine on Sat, 08 Jul 2000 07:00:00 GMT

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anne martel wrote:
>
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> Anne Martel,
> Dept Medical Physics,
> QMC, Nottingham
> anne.martel@nottingham.ac.ukqqq
>
> Michael Cugley wrote:
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>>
>> --
>> Michael Cugley (mjcugley@medphys.dundee.ac.uk)

also regs=label_region(mask) & histogram(regs) can help to get rid of
non-brain structures
and roberts function to get the contour of the cortex.

--
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