Subject: tracking clusters through multiple timesteps
Posted by Ian[1] on Mon, 20 Feb 2012 17:34:01 GMT
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Hi all,
I have a binary dataset (flags of cloud presence or absence) and i would like to find a way of tracking clusters of 1's through time, with an aim of finding the start point (in space and time) of the object, the end point, its maximum size and its trajectory. I have experience of using 'label_region' to identify individual objects within an image by pixel connectivity, but i am completely at a loss for correct way to move forward from here.
I am dealing with an array of dimensions 1133,751,8832, with 8832 being the number of timesteps i ultimately aim to work through.
Any help, tips or advice would be hugely appreciated!
Cheers,
Ian

Subject: Re: tracking clusters through multiple timesteps
Posted by David Fanning on Mon, 20 Feb 2012 18:39:03 GMT
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Ian_Ashpole writes:

> For now i would like to work on an idealised case with no splitting or
> merging - but where the cloud will move quite a way from its start to
> finish location. I should specify that i am very much an IDL novice
> but it seems logical to pass the index given to a cluster of pixels
> (above a threshold of, say, 250, to filter out noise resulting from
> the initial flagging stage) at t to an overlapping cluster at t+1.

Yes, I can't tell you how to proceed because too many variables come into play here, but to start with, I'd take a single cloud in the first image and create a "movie" of that cloud moving through space. If the cloud overlaps with *any* pixels in the second image, then I would say those overlapping pixels belong to the "cloud" in the second image. (Maybe if it overlaps more than one cloud, you take the one that has more pixels? Both? Don't know, you will have to decide.) Keep overlapping the last cloud discovered with the next time image. Does the cloud "move" and "change shape" in a reasonable way?

If it does, maybe you are on to something. If it doesn't, well, the fish aren't going anywhere. ;-)

Now, you could do the second cloud, and add this to your movie sequence, etc. Start with a handful

of the biggest clouds to see if this works. If they
were different colors, you could see the clouds
evolving in time as you played your movie.

I'm looking at clouds blowing around outside my window
right now. I seriously doubt whether this is going to
work very well. :-(

Cheers,

David

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

Subject: Re: tracking clusters through multiple timesteps
Posted by cgguido on Mon, 20 Feb 2012 19:35:11 GMT
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You could try track.pro
(http://www.physics.emory.edu/~weeks/idl/tracking.html)

This works best for diffusing clouds... Also, if you can set up your experiment so that the displacement of a cloud over dt=1 is smaller than the intercloud distance in a frame, you should be "on the pig's back". (which is a good thing)

Gianguido

Subject: Re: tracking clusters through multiple timesteps
Posted by Ian[1] on Mon, 20 Feb 2012 23:08:20 GMT
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Thanks for the replies both of you, i've a feeling this is going to
take quite some time and head-banging-against-the-wall, but hopefully
i'll find a suitable way. I better had anyway, it's the last chapter
of my phd thesis and money is running low...!

Best wishes to both of you
Ian

Subject: Re: tracking clusters through multiple timesteps
Posted by manodeep@gmail.com on Tue, 21 Feb 2012 03:39:25 GMT
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On Feb 20, 5:08 pm, Ian_Ashpole <ian.ashp...@ouce.ox.ac.uk> wrote:
> Thanks for the replies both of you, i've a feeling this is going to
> take quite some time and head-banging-against-the-wall, but hopefully
> i'll find a suitable way. I better had anyway, it's the last chapter
> of my phd thesis and money is running low...!
>
> Best wishes to both of you
> Ian

Hi Ian,

This problem is similar to creating tracking halos (creating mergertrees) in astrophysical simulations. However, with particle data there is an unique particle ID that allows you to track halos through time. These are the steps you would need:

1. First generate the list of blobs at all timesteps

2. Match some unique identifier across timesteps. If you are going to use a pixel index, then you have a some sort of physical model as to how much the pixels can move in between timesteps - which translates into a fractional pixel search radius.

3. Come up with a weighting function that assigns one blob at timestep t0 to another blob at timestep t1. If you want to do it right, check out bipartite graph matching.

4. Check for erroneous assignments.

5. Cross your fingers that everything worked out :)

Its difficult but do-able..

Cheers,
Manodeep