Subject: Already written function to find if a point is within a rectangle?
Posted by Jacare Omoplata on Mon, 20 Feb 2012 21:29:32 GMT
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Hi,

I'm working with some data that has been extracted from astronomical images. All the stars in the images have been identified and their x and y positions are recorded among other information. (these x and y position can be converted the Right Ascension (RA) and Declination (DEC), so the position of the star in the sky can be found)

These images overlap. I want to plot the positions of all the stars from all the images, but because of image overlaps, some points are going to be counted twice. Since the RA and DEC are floating point numbers, for the same star in two images they might be slightly different. So using the RA and DEC to identify double counts is not going to work.

I've come up with the following plan.

Start reading in stars by file. After reading each file, get the boundaries of each image (they are rectangular) and store them. For each star, check whether it is within the region of images already read. If it is, don't read it in. If it does not lie within the regions already read, read it in.

So I need a way to find out if a point (position of a star) is within a rectangle (image boundary). The rectangle edges are not strictly horizontal or vertical.

I've found several methods of doing this, and can write a function. But I can save some time if someone knows if there's already one available out there.

Thanks.

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by Craig Markwardt on Thu, 23 Feb 2012 09:34:31 GMT
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On Feb 22, 10:25 pm, Jacare Omoplata <walkeystal...@gmail.com> wrote:
>>>> So I need a way to find out if a point (position of a star) is
>>>> within a rectangle (image boundary). The rectangle edges are not
>>>> strictly horizontal or vertical.
>
>>> You talk about coordinates in RA and dec. So are the images really

>>> rectangular? It seems to me that the real problem is that you need to
>>> deal with spherical geometry.
>
>> Not only that, but an "image boundary" will be projection-dependent
>> [*]. For small images it probably won't matter much, but there will
>> always be an edge case that gets you later.
>
> I'm thinking of making polygons with a large number of edges, instead
> of rectangles, with every data point at the edge of a FITS file as a
> vertex. That would minimize the projection error, right?

That helps. Special care is probably need around the poles though.

Craig

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by Greg Hennessy on Thu, 23 Feb 2012 18:05:44 GMT
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It often helps to convert from ra/dec to unit vectors
([cos(ra)*cos(dec),sin(ra)*cos(dec),sin(dec)]) for both
the star position and the edges of the polygon.

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by penteado on Thu, 23 Feb 2012 19:13:18 GMT
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On Feb 23, 7:34 am, Craig Markwardt <craig.markwa...@gmail.com> wrote:
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> That helps. Special care is probably need around the poles though.

Not only the poles. Also at the longitude boundary. Working with
polygons in spherical geometry is, in my experience, a pain. Just
because there is not enough library support for it.

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by Jacare Omoplata on Fri, 24 Feb 2012 18:48:14 GMT
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On Feb 23, 1:05 pm, Greg Hennessy <greg.henne...@cox.net> wrote:
>>> I'm thinking of making polygons with a large number of edges, instead
>>> of rectangles, with every data point at the edge of a FITS file as a
>>> vertex. That would minimize the projection error, right?
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>> That helps. Special care is probably need around the poles though.
>
> It often helps to convert from ra/dec to unit vectors
> ([cos(ra)*cos(dec),sin(ra)*cos(dec),sin(dec)]) for both
> the star position and the edges of the polygon.

That's brilliant idea!

I'm not going to bother with it for this problem, since I've already
half written the program, and the images are not near the poles or the
longitude boundary. I will definitely use it in the future though.

Thanks.

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by JDS on Fri, 24 Feb 2012 22:00:14 GMT
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On Thursday, February 23, 2012 2:13:18 PM UTC-5, Paulo Penteado wrote:
> On Feb 23, 7:34 am, Craig Markwardt <craig.markwa...@gmail.com> wrote:
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I have a few routines for spherical polygons available:

http://tir.astro.utoledo.edu/jdsmith/code/idl.php

JD

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by Jacare Omoplata on Sat, 25 Feb 2012 06:33:47 GMT
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> I have a few routines for spherical polygons available:
>
> http://tir.astro.utoledo.edu/jdsmith/code/idl.php
>
> JD

Thanks! I will bookmark this page. These programs will definitely be
useful to me!

Subject: Re: Already written function to find if a point is within a rectangle?
Posted by suruchi on Sun, 19 May 2013 04:19:53 GMT
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On Saturday, February 25, 2012 12:03:47 PM UTC+5:30, Jacare Omoplata wrote:
>> I have a few routines for spherical polygons available:
>>
>> http://tir.astro.utoledo.edu/jdsmith/code/idl.php
>>
>> JD
>
> Thanks! I will bookmark this page. These programs will definitely be
> useful to me!

Hi Jacare
I have been looking for finding overlap of two polygons covering some regions on solar disc

images defined in terms of latitude and longitudes. Hence here also spherical geometry comes into picture.. how to match the latitudes and longitudes? Could you suggest how can I achieve this?