Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Peter Clinch on Tue, 22 Nov 2005 08:31:41 GMT
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PYJ wrote:
  to use a loop because I have a lot of positions of centers of
> spheres that I should examine.
> I want to find the # of points inside each sphere.
> Now, I use a where function in order to find points inside the cube,
> then I compute distances of all. Next, I use where function again to
> examine # of distances less than radius of sphere.
> I think it is fairly slow when large data is considered.
>
> Is there any faster way?
> The fastest way to find the number of points in sphere(radius r)

If you have the radius R in terms of voxels then the number of voxels in
the sphere will be 4/3 Pi R^3, surely? Seems so simple I suspect that
my not having had a coffee yet has caused me to miss something obvious...

Pete.
--
Peter Clinch Medical Physics IT Officer
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net p.j.clinch@dundee.ac.uk http://www.dundee.ac.uk/~pjclinch/

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by snfinder@naver.com on Tue, 22 Nov 2005 09:06:31 GMT
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Sorry, I can't understand you.
It's not voxels.
X,Y,Z are 3D position of galaxies.(It's not just meaningless points.)

Actually, I want to know the # of points inside spheres by increasing
the radius.

:-)

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Peter Clinch on Tue, 22 Nov 2005 09:13:03 GMT
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PYJ wrote:

> Sorry, I can't understand you.
> It's not voxels.

Like I suspected, I haven't had a coffee yet...

sorry!

Pete.
--
Peter Clinch Medical Physics IT Officer
Tel 44 1382 660111 ext. 33637 Univ. of Dundee, Ninewells Hospital
Fax 44 1382 640177 Dundee DD1 9SY Scotland UK
net p.j.clinch@dundee.ac.uk http://www.dundee.ac.uk/~pjclinch/

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by snfinder@naver.com on Tue, 22 Nov 2005 11:33:03 GMT
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Data---------- ----------
lots of points: X, Y, Z
lots of spheres: XC, YC, ZC (positions of center), R(radius)
---------- ----------

I want to know the number of galaxies inside each sphere without a
loop.(If it is possible)
The faster, the better!

Help me, experts~~!!!

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Xavier Llobet on Tue, 22 Nov 2005 12:02:53 GMT
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In article <1132647395.741577.324420@z14g2000cwz.googlegroups.com>,
"PYJ" <snfinder@naver.com> wrote:

> Dear all,
>
> First of all, my data is three-dimensional set.
> I have to use a loop because I have a lot of positions of centers of
> spheres that I should examine.
> I want to find the # of points inside each sphere.
> Now, I use a where function in order to find points inside the cube,
> then I compute distances of all. Next, I use where function again to
> examine # of distances less than radius of sphere.

> I think it is fairly slow when large data is considered.
>
> Is there any faster way?
> The fastest way to find the number of points in sphere(radius r)
>
> ----------
> data:
> positions of points: X, Y, Z
> centers of spheres: XC, YC, ZC
> radius of spheres: r
> ----------
>
> Help me~

A way:

```
ix=indgen(n_elements(X))       ; index array to be used in BLAS_AXPY
t=transpose([[X], [Y], [Z]])   ; array(3,n) of cartesian coordinates

;Loop over spheres' centers:
  t1=t                         ; temporary array

;  Shift points' coordinates to the j-th sphere's center
  blas_axpy, t1, -1, [XC(j), YC(j), ZC(j)], [0,0], 2, ix

;  Convert to spherical coordinates (long, lat, radius)
  sph = cv_coord(from_rect=t1, /TO_SPHERE)

;  So sph(2,*) is the array of distances.
;  Histogram it, or treat as you please.

;end_loop
```

It could be faster...

--
_xavier
--
Only one "o" in my e-mail address
--
A: Because it messes up the order in which people normally read text.
Q: Why is top-posting such a bad thing?
A: Top-posting.
Q: What is the most annoying thing on usenet and in e-mail?

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Xavier Llobet on Tue, 22 Nov 2005 12:16:43 GMT
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In article <1132659183.873193.230050@g44g2000cwa.googlegroups.com>,
 "PYJ" <snfinder@naver.com> wrote:

> Data---------- ----------
> lots of points: X, Y, Z
> lots of spheres: XC, YC, ZC (positions of center), R(radius)
> ---------- ----------
>
> I want to know the number of galaxies inside each sphere without a
> loop.(If it is possible)
> The faster, the better!
>
> Help me, experts~~!!!

I have the nagging feeling of doing someone's homework...

A way to do what you want:

```
ix=indgen(n_elements(X))       ; index array to be used in BLAS_AXPY
t=transpose([[X], [Y], [Z]])   ; array(3,n) of cartesian coordinates

;Loop over spheres' centers:
  t1=t                         ; temporary array

;  Shift points' coordinates to the j-th sphere's center
  blas_axpy, t1, -1, [XC(j), YC(j), ZC(j)], 1, [0,0], 2, ix

;  Convert to spherical coordinates (long, lat, radius)
  sph = cv_coord(from_rect=t1, /TO_SPHERE)

;  So sph(2,*) is the array of distances.
;  Histogram it, or treat as you please.

;end_loop
```

It could be faster than your method...

--
_xavier
--
Only one "o" in my e-mail address
--
A: Because it messes up the order in which people normally read text.
Q: Why is top-posting such a bad thing?

A: Top-posting.
Q: What is the most annoying thing on usenet and in e-mail?

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by snfinder@naver.com on Tue, 22 Nov 2005 13:14:27 GMT
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Thank you, Xavier Llobet~^^

Actually, I expect a vectorizing method. (finding number of points
about all centers at a time.)

By the way,
The points that I have are about 5*10^5.
The number of centers is about 3*10^6.
These are quite large.

Anyway, I can't understand your way exactly.
Can you explain it more ?

So sph(2,*) is the array of distances.
-> distances? Whose distances?
***I need a number of points. ***
Do I use a where function about every centers again?
I want to avoid loops if possible.

Help, again. ^^

^_^

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by btt on Tue, 22 Nov 2005 14:00:40 GMT
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PYJ wrote:
> Data---------- ----------
> lots of points: X, Y, Z
> lots of spheres: XC, YC, ZC (positions of center), R(radius)
> ---------- ----------
>
> I want to know the number of galaxies inside each sphere without a
> loop.(If it is possible)
> The faster, the better!
>
> Help me, experts~~!!!

>

Hi,

I'm not sure if this is a similar problem, but it might be worth looking
at this thread...

http://tinyurl.com/92g73

Cheers,
Ben

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Xavier Llobet on Tue, 22 Nov 2005 15:29:13 GMT
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In article <1132665267.676156.221240@g49g2000cwa.googlegroups.com>,
 "PYJ" <snfinder@naver.com> wrote:

> Thank you, Xavier Llobet~^^
>
> Actually, I expect a vectorizing method. (finding number of points
> about all centers at a time.)
>
> By the way,
> The points that I have are about 5*10^5.
> The number of centers is about 3*10^6.
> These are quite large.

In that case, use ix = lindgen(n_elements(X))

> Anyway, I can't understand your way exactly.
> Can you explain it more ?
>
> So sph(2,*) is the array of distances.
> -> distances? Whose distances?

The only obscure point is

>> ; Shift points' coordinates to the j-th sphere's center
>> blas_axpy, t1, -1, [XC(j), YC(j), ZC(j)], 1, [0,0], 2, ix

It is a fast way of doing X1 = X-XC(j), Y1 = Y-YC(j), Z1 = Z-ZC(j)

> ***I need a number of points. ***
> Do I use a where function about every centers again?

Quoting myself:
>> ; Histogram it, or treat as you please.

> I want to avoid loops if possible.

Well, given that you have 5E5 points and 3E6 centers, you have 1.5E12
distances to consider. It might be difficult to do it without loops...

--
_xavier
--
Only one "o" in my e-mail address
--
A: Because it messes up the order in which people normally read text.
Q: Why is top-posting such a bad thing?
A: Top-posting.
Q: What is the most annoying thing on usenet and in e-mail?

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Xavier Llobet on Tue, 22 Nov 2005 16:01:26 GMT
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By the way, I have just timed my procedure (standard PC, Linux, 756MB)
IDL5.5, and it takes 0.74 s per center with 5E5 points, so for 3E6
centers it would take about a month (without histogramming).

--
_xavier
--
Only one "o" in my e-mail address
--
A: Because it messes up the order in which people normally read text.
Q: Why is top-posting such a bad thing?
A: Top-posting.
Q: What is the most annoying thing on usenet and in e-mail?

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Haje Korth on Tue, 22 Nov 2005 16:53:46 GMT
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Here the short answer: There is no way to avoid looping over your centers.
Xavier's method is the best you can do.

Haje

PS: To the experts: Please don't tell me that HISTOGRAM is the solution.
This functions usually does everything I cannot comprehend. :-)

"PYJ" <snfinder@naver.com> wrote in message
news:1132665267.676156.221240@g49g2000cwa.googlegroups.com.. .
> Thank you, Xavier Llobet~^^
>
> Actually, I expect a vectorizing method. (finding number of points
> about all centers at a time.)
>
> By the way,
> The points that I have are about 5*10^5.
> The number of centers is about 3*10^6.
> These are quite large.
>
> Anyway, I can't understand your way exactly.
> Can you explain it more ?
>
> So sph(2,*) is the array of distances.
> -> distances? Whose distances?
> ***I need a number of points. ***
> Do I use a where function about every centers again?
> I want to avoid loops if possible.
>
> Help, again. ^^
>
> ^_^
>

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by MarioIncandenza on Tue, 22 Nov 2005 18:18:22 GMT
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Those are some pretty big numbers for this problem. I'm not sure even
HISTOGRAM can get around that. If this is homework, forget about it,
but if it's your dissertation, I think you'll likely end up calling
these C routines: http://www.cs.umd.edu/~mount/ANN/

Good luck,

Edward Hyer.

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by Xavier Llobet on Tue, 22 Nov 2005 19:16:31 GMT

In article <1132683502.085584.295570@g14g2000cwa.googlegroups.com>,
"Ed Hyer" <ejhyer@gmail.com> wrote:

> Those are some pretty big numbers for this problem. I'm not sure even
> HISTOGRAM can get around that.

HISTOGRAM should be able to handle 3E5 elements: called once per sphere
center.

> If this is homework, forget about it,
> but if it's your dissertation, I think you'll likely end up calling
> these C routines: http://www.cs.umd.edu/~mount/ANN/

If it's dissertation-grade work, a month of CPU is not much. The work
can be divided in as many pieces as desired (results for each center are
completely independent), and if you can use 6 PC's, from 17:00 to 09:00
plus week-end you are done in less than a week. And this is a
calculation that you need to do only once, as there are no parameters to
vary.

_x.

--
Only one "o" in my address.

Subject: Re: the fastest way to find number of points in sphere(radius r)
Posted by snfinder@naver.com on Wed, 23 Nov 2005 06:23:18 GMT

Thanks a million. Everyone~

Thank you for your time and consideration.

Park
