
Subject: Re: Distance between two sets of datapoints
Posted by [Maxwell Peck](#) on Thu, 25 Mar 2010 10:46:31 GMT
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That should say I am generating the full set of indices and then
subsetting.

Thanks

On Mar 25, 9:33 pm, Maxwell Peck <maxjp...@gmail.com> wrote:

```
> Hi All,  
>  
> I have two sets of data points, inputa and inputb, inputa has many  
> more data points than the other. I need to find the distance between  
> each point in inputa and all the points in inputb (hopefully without  
> loops). At the moment I am using parts of distance_measure.pro to  
> generate the full set of distances and subsetting indexes as required.  
> The code follows. I can't see an easy way of generating the indexes  
> though so that only the pairs i want are calculated (i.e. not  
> calculating between inputb/inputb or inputa/inputa indexes).  
>  
> inputa and inputb can be very very large so I don't think i can use a  
> matrix approach to do it vectorially and looping seems awfully slow.  
>  
> An alternative approach or other suggestions would be appreciated.  
>  
> Regards  
>  
> Max  
>  
> inputa = findgen(2,10)  
> inputb = findgen(2,2)  
>  
> t = [[inputa],[inputb]]  
> m=n_elements(t)/2  
> n = m*(m-1)/2  
>  
> ii = 0L  
> index0 = LINDGEN(m - 1) + 1 ; work array  
> index1 = LONARR(n, /NOZERO)  
> index2 = LONARR(n, /NOZERO)  
>  
> for i=0,m-2 do begin  
>   n1 = m - (i+1)  
>   index1[ii:ii+n1-1] = i  
>   index2[ii] = index0[0:n1-1] + i  
>   ii += n1  
> endfor  
>  
> diff = abs(t[* ,index1] - t[* ,index2])
```

> res = sqrt(TOTAL(diff^2, 1))

Subject: Re: Distance between two sets of datapoints
Posted by [Kenneth P. Bowman](#) on Thu, 25 Mar 2010 14:55:47 GMT
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In article
<4707b3ed-9e43-4863-977f-7fd091e62868@a4g2000prb.googlegroups.com>,
Maxwell Peck <maxjpeck@gmail.com> wrote:

> Hi All,
>
> I have two sets of data points, inputa and inputb, inputa has many
> more data points than the other. I need to find the distance between
> each point in inputa and all the points in inputb (hopefully without
> loops). At the moment I am using parts of distance_measure.pro to
> generate the full set of distances and subsetting indexes as required.
> The code follows. I can't see an easy way of generating the indexes
> though so that only the pairs i want are calculated (i.e. not
> calculating between inputb/inputb or inputa/inputa indexes).
>
> inputa and inputb can be very very large so I don't think i can use a
> matrix approach to do it vectorially and looping seems awfully slow.
>
> An alternative approach or other suggestions would be appreciated.
>
> Regards
>
> Max
>
>
> inputa = findgen(2,10)
> inputb = findgen(2,2)
>
> t = [[inputa],[inputb]]
> m=n_elements(t)/2
> n = m*(m-1)/2
>
> ii = 0L
> index0 = LINDGEN(m - 1) + 1 ; work array
> index1 = LONARR(n, /NOZERO)
> index2 = LONARR(n, /NOZERO)
>
> for i=0,m-2 do begin
> n1 = m - (i+1)
> index1[ii:ii+n1-1] = i
> index2[ii] = index0[0:n1-1] + i

```
> ii += n1
> endfor
>
> diff = abs(t[* ,index1] - t[* ,index2])
> res = sqrt(TOTAL(diff^2, 1))
```

If I understand you right, don't you want to do this?

```
na = 10
nb = 2
xa = FINDGEN(na)
ya = FINDGEN(na)
xb = FINDGEN(nb)
yb = FINDGEN(nb)

dist = FLTARR(na, nb)
```

```
FOR i = 0, nb-1 DO BEGIN
  d = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
  dist[0,i] = d
ENDFOR
```

I changed the notation to make the indexing simpler.

This computes the Cartesian distance between all pairs of points in a and b.

You should loop over the smaller of na or nb.

Ken Bowman

Subject: Re: Distance between two sets of datapoints
Posted by [Kenneth P. Bowman](#) on Thu, 25 Mar 2010 19:04:20 GMT
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In article <k-bowman-EEB2FB.09554725032010@news.tamu.edu>,
"Kenneth P. Bowman" <k-bowman@null.edu> wrote:

```
>
> FOR i = 0, nb-1 DO BEGIN
>   d = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
>   dist[0,i] = d
> ENDFOR
```

I just realized this could be simplified to

```
FOR i = 0, nb-1 DO dist[0,i] = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
```

which removes some unneeded memory access.

Ken

Subject: Re: Distance between two sets of datapoints
Posted by [Maxwell Peck](#) on Thu, 25 Mar 2010 19:38:49 GMT
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Thanks Ken, I'll give it a shot. I had tried a similar loop (I thought) but it seemed to be very slow that is why i was looking at vectorising it similar to distance_measure.

Thanks
Max

On Mar 26, 6:04 am, "Kenneth P. Bowman" <k-bow...@null.edu> wrote:

```
> In article <k-bowman-EEB2FB.09554725032...@news.tamu.edu>,
> "Kenneth P. Bowman" <k-bow...@null.edu> wrote:
>
>
>
>> FOR i = 0, nb-1 DO BEGIN
>>   d = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
>>   dist[0,i] = d
>> ENDFOR
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>
> which removes some unneeded memory access.
>
> Ken
```

Subject: Re: Distance between two sets of datapoints
Posted by [Kenneth P. Bowman](#) on Fri, 26 Mar 2010 13:11:05 GMT
[View Forum Message](#) <> [Reply to Message](#)

In article
<eb0d2a64-900b-4c9e-9599-699dcd3da17b@k4g2000prh.googlegroups.com>,
Maxwell Peck <maxjpeck@gmail.com> wrote:

```
> Thanks Ken, I'll give it a shot. I had tried a similar loop (I
> thought) but it seemed to be very slow that is why i was looking at
```

```
> vectorising it similar to distance_measure.  
>>  
>> FOR i = 0, nb-1 DO dist[0,i] = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
```

This should vectorize reasonably well if na is large and nb is not too large.

Ken

Subject: Re: Distance between two sets of datapoints

Posted by [Gray](#) on Fri, 26 Mar 2010 13:16:53 GMT

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On Mar 25, 3:38 pm, Maxwell Peck <maxjp...@gmail.com> wrote:

```
> Thanks Ken, I'll give it a shot. I had tried a similar loop (I  
> thought) but it seemed to be very slow that is why i was looking at  
> vectorising it similar to distance_measure.
```

```
>
```

```
> Thanks
```

```
> Max
```

```
>
```

```
> On Mar 26, 6:04 am, "Kenneth P. Bowman" <k-bow...@null.edu> wrote:
```

```
>
```

```
>
```

```
>
```

```
>> In article <k-bowman-EEB2FB.09554725032...@news.tamu.edu>,
```

```
>> "Kenneth P. Bowman" <k-bow...@null.edu> wrote:
```

```
>
```

```
>>> FOR i = 0, nb-1 DO BEGIN
```

```
>>>   d = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
```

```
>>>   dist[0,i] = d
```

```
>>> ENDFOR
```

```
>
```

```
>> I just realized this could be simplified to
```

```
>
```

```
>> FOR i = 0, nb-1 DO dist[0,i] = SQRT((xb[i] - xa)^2 + (yb[i] - ya)^2)
```

```
>
```

```
>> which removes some unneeded memory access.
```

```
>
```

```
>> Ken
```

Take a look at JD Smith's match_2d (http://tir.astro.utoledo.edu/idl/match_2d.pro), which uses histogram to quickly find distances between lists of coordinates (and then matches them, which you don't need).

Subject: Re: Distance between two sets of datapoints
Posted by [Maxwell Peck](#) on Fri, 26 Mar 2010 22:11:38 GMT
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Thanks Ken,

It is definitely much much faster (from 30 minutes for looping only to 1 minute). It is difficult to characterise the speedup entirely because I was able to add a lot more of the calculations inside the loop, na is about 700 times larger than nb. I think I must have done something stupid the first time I tried this and looped over the other dimension hence my confusion.

Cheers,
Max

On Mar 27, 12:11 am, "Kenneth P. Bowman" <k-bow...@null.edu> wrote:
> In article
> <eb0d2a64-900b-4c9e-9599-699dcd3da...@k4g2000prh.googlegroups.com>,
> Maxwell Peck <maxjp...@gmail.com> wrote:
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>> Thanks Ken, I'll give it a shot. I had tried a similar loop (I
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>
> Ken
