
Subject: Re: How to calculate the abscissa values for the given vertical values
Posted by duxiyu@gmail.com on Mon, 05 Oct 2009 13:43:01 GMT
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Maybe my statement is not clear.

There is a function $Y=F(X)$, and I want to calculate the correspondent abscissa values X for $Y=0$.

It means that there are several intersection points between the line $Y=F(X)$ and the horizontal line $Y=0$,
and I want to get the correspondent abscissa values of these points.

On Oct 5, 3:10 pm, Wox <s...@nomail.com> wrote:

> On Mon, 5 Oct 2009 01:56:20 -0700 (PDT), "dux...@gmail.com"

>

> <dux...@gmail.com> wrote:

>> Hi, all.

>> I want to calculate the abscissa values for the given vertical values.

>

>> For example,

>> $x = \text{findgen}(1000)/1000*4*\pi$

>> $y = \cos(x)$

>> I want to get the abscissa values for $y=0$.

>> For this example, the results should be $[\pi/2, 3*\pi/2, 5*\pi/2, 7*\pi/2]$.

>> But how can I get it by IDL codes?

>

>> Best wishes,

>> jdu

>

> Just for this function:

> $\text{print}(\text{indgen}(\text{ceil}(\text{max}(x)/\pi))+1)*\pi/2$

>

> What do you need exactly? You can always find the answer analytically

> no?

Subject: Re: How to calculate the abscissa values for the given vertical values
Posted by pgrigis on Mon, 05 Oct 2009 14:55:01 GMT
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On Oct 5, 9:43 am, "dux...@gmail.com" <dux...@gmail.com> wrote:

> Maybe my statement is not clear.

>

> There is a function $Y=F(X)$, and I want to calculate the correspondent

> abscissa values X for $Y=0$.

> It means that there are several intersection points between the line $Y=F$

> (X) and the horizontal line $Y=0$,
> and I want to get the correspondent abscissa values of these points.

You should realize that what you *want* and what you can *achieve* are two different things. This is a hard problem for general F...
I believe you should read chapter 9 (on root finding) of the numerical recipes book.

But - this problem becomes more easy if you do know something about the properties of your function - for instance if you can bracket your solutions - so maybe the question is, what do you know about F?

Ciao,
Paolo

>
> On Oct 5, 3:10 pm, Wox <s...@nomail.com> wrote:
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>
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>> print,(indgen(ceil(max(x)/pi))+1)*pi/2
>
>> What do you need exactly? You can always find the answer analytically
>> no?
>
>

Subject: Re: How to calculate the abscissa values for the given vertical values
Posted by duxiyu@gmail.com on Mon, 05 Oct 2009 15:34:39 GMT
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Y is a time series and X is the sampling time.
Both X and Y are discrete.
I don't know the analytical form of the relation between X and Y.

To get the vertical value NY for a given time NX, I can use 'NY = interpol(Y, X NX)'.

Similarly, I want to get the correspondent time CX for a fixed vertical value CY.

But the values of correspondent time are not unique. CX should be not a scalar but an array.

So I cannot use 'CX = interpol(X, Y, CY)' to get these values.

On Oct 5, 4:55 pm, Paolo <pgri...@gmail.com> wrote:

> On Oct 5, 9:43 am, "dux...@gmail.com" <dux...@gmail.com> wrote:

>

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>

>> There is a function $Y=F(X)$, and I want to calculate the correspondent abscissa values X for $Y=0$.

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> Ciao,

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>>>> For example,

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>>>> I want to get the abscissa values for y=0.
>>>> For this example, the results should be [ $\pi/2$ ,  $3\pi/2$ ,  $5\pi/2$ ,  $7\pi/2$ , ...]
>>>> But how can I get it by IDL codes?
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>>>> Best wishes,
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>>> Just for this function:
>>> print,(indgen(ceil(max(x)/pi))+1)*pi/2
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>>> What do you need exactly? You can always find the answer analytically
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>

```

Subject: Re: How to calculate the abscissa values for the given vertical values
 Posted by [Jean H.](#) on Mon, 05 Oct 2009 16:26:50 GMT

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duxiyu@gmail.com wrote:

```

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> I don't know the analytical form of the relation between X and Y.
>
> To get the vertical value NY for a given time NX, I can use 'NY =
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> vertical value CY.
> But the values of correspondent time are not unique. CX should be not
> a scalar but an array.
> So I cannot use 'CX = interpol(X, Y, CY)' to get these values.

```

You may do it by hand...

```

x = findgen(1000)/1000*4*pi
y = cos(x)

```

Ytarget = 0

```

;Find the 2 consecutive points that are > and < of the Y threshold value
;(don't forget to deal where a point = the value)

```

```

Xidx = where((y gt Ytarget and shift(y,1) lt Ytarget) or (y lt Ytarget

```

and shift(y,1) gt Ytarget), count)

then you can do a linear interpolation to find Xsolution

```
y = ax+b  
a = (y[xIdx] - y[xIdx+1]) / (x[xIdx] - x[xIdx+1])  
b = y[xIdx]-a*x[xIdx]  
Xsolution = (yTarget - b)/a
```

Jean

Subject: Re: How to calculate the abscissa values for the given vertical values
Posted by [pgrigis](#) on Mon, 05 Oct 2009 17:55:21 GMT

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On Oct 5, 11:34 am, "dux...@gmail.com" <dux...@gmail.com> wrote:

- > Y is a time series and X is the sampling time.
- > Both X and Y are discrete.
- > I don't know the analytical form of the relation bewteen X and Y.

Ok - then this is much easier and Jean indicated a good approach
- with minor modifications to take into account the case where
a datapoint is exactly zero.

Ciao,
Paolo

- >
- > To get the vertical value NY for a given time NX, I can use 'NY =
- > interpoly(X, NX)'.
- > Similarly, I want to get the correspondent time CX for a fixed
- > vertical value CY.
- > But the values of correspondent time are not unique. CX should be not
- > a scalar but an array.
- > So I cannot use 'CX = interpoly(X, Y, CY)' to get these values.
- >
- > On Oct 5, 4:55 pm, Paolo <pgri...@gmail.com> wrote:
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- >> On Oct 5, 9:43 am, "dux...@gmail.com" <dux...@gmail.com> wrote:
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- >>> It means that there are several intersection points between the line Y=F
- >>> (X) and the horizontal line Y=0,

```

>>> and I want to get the correspondent abscissa values of these points.
>
>> You should realize that what you *want* and what you can *achieve*
>> are two different things. This is a hard problem for general F...
>> I believe you should read chapter 9 (on root finding) of the
>> numerical recipes book.
>
>> But - this problem becomes more easy if you do know something about
>> the properties of your function - for instance if you can bracket
>> your solutions - so maybe the question is, what do you know about F?
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>>> On Oct 5, 3:10 pm, Wox <s...@nomail.com> wrote:
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>>>> >I want to get the abscissa values for y=0.
>>>> >For this example, the results shoule be [!pi/2, 3*!pi/2, 5*!pi/2, 7*!
>>>> >pi/2].
>>>> >But how can I get it by IDL codes?
>
>>>> >Best wishes,
>>>> >jdu
>
>>>> Just for this function:
>>>> print,(indgen(ceil(max(x)/!pi))+1)*!pi/2
>
>>>> What do you need exactly? You can always find the answer analytically
>>>> no?
>
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```

Subject: Re: How to calculate the abscissa values for the given vertical values
 Posted by duxiyu@gmail.com on Tue, 06 Oct 2009 07:55:04 GMT
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On Oct 5, 6:26 pm, "Jean H." <jghas...@DELTHIS.ucalgary.ANDTHIS.ca>
 wrote:

```

> dux...@gmail.com wrote:
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>> Both X and Y are discrete.
>> I don't know the analytical form of the relation between X and Y.
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>> To get the vertical value NY for a given time NX, I can use 'NY =
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>> Similarly, I want to get the correspondent time CX for a fixed
>> vertical value CY.
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>> a scalar but an array.
>> So I cannot use 'CX = interpol(X, Y, CY)' to get these values.
>
> You may do it by hand...
>
> x = findgen(1000)/1000*4*pi
> y = cos(x)
>
> Ytarget = 0
>
> ;Find the 2 consecutive points that are > and < of the Y threshold value
> ;(don't forget to deal where a point = the value)
>
> Xidx = where((y gt Ytarget and shift(y,1) lt Ytarget) or (y lt Ytarget
> and shift(y,1) gt Ytarget), count)
>
> then you can do a linear interpolation to find Xsolution
>
> ;y = ax+b
> a = (y[xidx] - y[xidx+1]) / (x[xidx] - x[xidx+1])
> b = y[xidx]-a*x[xidx]
> Xsolution = (yTarget - b)/a
>
> Jean

```

Thank you very much! ^_^

Subject: Re: How to calculate the abscissa values for the given vertical values
 Posted by [Maarten\[1\]](#) on Tue, 06 Oct 2009 11:04:59 GMT

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On Oct 5, 6:26 pm, "Jean H." <jghas...@DELTHIS.ucalgary.ANDTHIS.ca>
 wrote:

```

> x = findgen(1000)/1000*4*pi
> y = cos(x)
>

```

```
> Ytarget = 0
>
> ;Find the 2 consecutive points that are > and < of the Y threshold value
> ;(don't forget to deal where a point = the value)
>
> Xidx = where((y gt Ytarget and shift(y,1) lt Ytarget) or (y lt Ytarget
> and shift(y,1) gt Ytarget), count)
```

I think this is easier, and possibly faster:

```
Xidx = where((y-ytarget)*shift(y-ytarget,1) le 0, count)
```

The multiplication will only be negative if two points straddle the crossing. The value 0 will be repeated twice if one of the points matches exactly. These are easy to take out beforehand. The rest is as before.

```
> ;y = ax+b
> a = (y[xidx] - y[xidx+1]) / (x[xidx] - x[xidx+1])
> b = y[xidx]-a*x[xidx]
> Xsolution = (yTarget - b)/a
```

Maarten
