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 serval intersection points between the line Y=F (X) and the horizonal 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 = findgen(1000)/1000*4*pi
      v = cos(x)
>> 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/21.
>> 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?
```

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 serval intersection points between the line Y=F

- > (X) and the horizonal 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?

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

>> no?

>>> jdu

Ciao, Paolo

>

>

>>> Best wishes,

>> Just for this function:

>> print,(indgen(ceil(max(x)/!pi))+1)\*!pi/2

Subject: Re: How to calculate the abscissa values for the given vertical values Posted by <a href="mailto:duxiyu@gmail.com">duxiyu@gmail.com</a> on Mon, 05 Oct 2009 15:34:39 GMT View Forum Message <> Reply to Message

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.

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:
>
>> 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 serval intersection points between the line Y=F
>> (X) and the horizonal line Y=0,
>> and I want to get the correspondent abscissa values of these points.
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>
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> 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
>
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>>> 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 = findgen(1000)/1000*4*pi
>>> y = cos(x)
>>>> 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?
>
```

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:

- > 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.

>

- > 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.

You may do it by hand...

```
x = findgen(1000)/1000*4*piy = 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) It Ytarget) or (y It Ytarget

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

then you can do a linear interpolation to find Xsolution

```
;y = ax+b
a = (y[xldx] - y[xldx+1]) / (x[xldx] - x[xldx+1])
b = y[xldx]-a*x[xldx]
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 =
> 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.
>
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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 serval intersection points between the line Y=F

>>> (X) and the horizonal 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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          x = findgen(1000)/1000*4*pi
>>>> >
>>>> >
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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?
>
```

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 View Forum Message <> Reply to Message

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

```
> 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.
>> 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.
>
> You may do it by hand...
> x = findgen(1000)/1000*4*pi
> v = 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) It Ytarget) or (y It Ytarget
> and shift(y,1) gt Ytarget), count)
>
> then you can do a linear interpolation to find Xsolution
> ;y = ax+b
> a = (y[x|dx] - y[x|dx+1]) / (x[x|dx] - x[x|dx+1])
> b = y[x]dx]-a*x[x]dx
> 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 View Forum Message <> Reply to Message

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) It Ytarget) or (y It 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[x|dx] - y[x|dx+1]) / (x[x|dx] - x[x|dx+1])
    b = y[x|dx]-a*x[x|dx]
    Xsolution = (yTarget - b)/a
```

## Maarten