Subject: Fredholm integral equation
Posted by Gompie on Tue, 01 Jul 2014 17:52:35 GMT

Dear All,
I wish to solve a Fredholm integral equation of the first kind. Is there an idl routine that can do this.
My Equation is of the kind

 knownfunction = integral(knownfunction X unknownfunction)

-GlanPlon

Subject: Re: Fredholm integral equation
Posted by Bill Nel on Tue, 01 Jul 2014 19:46:59 GMT

On Tuesday, July 1, 2014 1:52:35 PM UTC-4, Gompie wrote:
> Dear All,
>
> I wish to solve a Fredholm integral equation of the first kind. Is there an idl routine that can do this.
>
> My Equation is of the kind
>
>
>
>   knownfunction = integral(knownfunction X unknownfunction)
>
>
>
> -GlanPlon

If you're willing to discretize your integral equation, there are built-in routines for solving matrix equations, e.g.,

knownVector = knownMatrix ## unknownVector

Subject: Re: Fredholm integral equation
Posted by Gompie on Wed, 02 Jul 2014 02:52:50 GMT

Hi
Thanks for the suggestion. I am using Trapezoidal rule to descretize the integral. My x intervals are uneven. I can use any other one too. How to resolve it into two arrays.
GlanPlon

Subject: Re: Fredholm integral equation
Posted by Gompie on Wed, 02 Jul 2014 18:54:07 GMT

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Thanks once again for the suggestion. I guess the following thing should work.

Trapezoidal rule can be written as

0.5*[(x2-x1)f(x1) + (x3-x1)*f(x2) + (x4-x2)*f(x3) +...].

Here f(x)=knownfunction*unknownfunction.

The above expression is a ## multiplication of two vectors hence is respresentable as a expression you mentioned in your message (i.e knownVector = knownMatrix ## unknownVector)
-GlanPlon

Subject: Re: Fredholm integral equation
Posted by Bill Nel on Thu, 03 Jul 2014 16:18:03 GMT

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On Wednesday, July 2, 2014 2:54:07 PM UTC-4, Gompie wrote:
> Thanks once again for the suggestion. I guess the following thing should work.
>
>
>
> Trapezoidal rule can be written as
>
>
>
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>
>
>
> Here f(x)=knownfunction*unknownfunction.
>
>
>
> The above expression is a ## multiplication of two vectors hence is respresentable as a
expression you mentioned in your message (i.e knownVector = knownMatrix ## unknownVector)
>
> -GlanPlon

I may be misunderstanding your problem, but what I meant was that if you have

  h(x) = Integral_dy{ f(x,y) g(y) }

this can be approximated as

h(i dx) = (1/dy) Sum_over_j{ f(i dx, j dy) g(j dy) }

where i = 0, 1, ...
    j = 0, 1, ...
and dx, dy are your (equal) grid spacing. This is just a matrix equation

  h[i] = (1/dy) f[i, j] g[j]

with h and f known, g unknown.

Subject: Re: Fredholm integral equation
Posted by Gompie on Mon, 07 Jul 2014 03:52:15 GMT
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Hi
Your idea is correct just that my grid spacing is not equal. So I am using the Trapezoidal rule to integrate.
Gompie.