Subject: Re: Hankel (Fourier-Bessel) Transform
Posted by on Wed, 26 Mar 2014 16:25:06 GMT
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Den tisdagen den 24:e juli 2001 kl. 21:03:48 UTC+2 skrev William Thompson:
> Georg.Pabst@nrc.ca (Georg Pabst) writes:
>
>> Hi,
>
>> I'm looking for the Hankel (Fourier-Bessel) Transform, i.e.,
>> int(0,infinity) f(t)*BesselJ(t*r)t dt being implemented in IDL.
>
>> There is a paper "Siegman A. 1980. Quasi fast Hankel transform. Opt.
>> Lett. 1, 13-15" and one can also find the code in Fortran or C...
>
>> Thanks,
>> Georg
>
> Here's an old program that I think might be what you need.
>
> Bill Thompson
>
>
>
> FUNCTION HANKEL,F
> ;
> ; This function returns the Hankel transform of the argument.
> ;
> S = SIZE(F)
> IF S(0) NE 1 THEN BEGIN
>   PRINT,'*** Variable must be a one-dimensional array, name= F, routine HANKEL.'
>   RETURN,F
> ENDIF
> ;
> X = INDGEN(F)
> K = (2. * !PI / FLOAT(N_ELEMENTS(X))) * X
> SC = 0.*X + 1.
> IF N_ELEMENTS(SC) GT 3 THEN BEGIN
>   SC(0) = 3.D0 / 8.D0
>   SC(1) = 7.D0 / 6.D0
>   SC(2) = 23.D0 / 24.D0
> ENDIF
> ;
> H = BES0(K # X) # (K * F * SC)
> ;
> RETURN,H
> END

So this thread is from 2001 but it is all I found by googling for "Hankel transform IDL"...

I tried to use the HANKEL function given above but I couldn't make it work. The X=INDGEN(F) makes no sense to me. Should it be X=INDGEN(n_elements(F))? I tried that and as I can't find the BES0 function, I substituted beselj(K # X, 0). This gave me some output, but it completely failed my test of using the same function to compute the inverse Hankel transform and thus getting the original function back. So maybe my changes were all wrong.

So, does anyone know of a useful implementation for IDL? Or C? I just want to convolve some circularly symmetrical functions, but I want to do it as part of a model fitting problem so it would be great if I could save some time by not doing 2D FFTs.

In a response to the post above, Craig commented that it can be done with the discrete Fourier transform. That sounds easy. Is it?
