
Subject: Spherical Harmonics.

Posted by [sjt](#) on Mon, 10 Apr 1995 07:00:00 GMT

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Does anyone have either of the following:

1) A routine to fit (low order) spherical harmonics to data. That is take data tabulated at selected latitude & longitude values and return spherical harmonic coefficients of the best fit.

or failing that:

2) A routine to return the value of a spherical harmonic function of given order at a given location?

I can't find anything in the major libraries (APL, ASTRO etc.)

If not I'll have a shot at (2) and post the result.

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+-----+-----+-----+
| James Tappin,      | School of Physics & Space Research | O__  |
| sjt@star.sr.bham.ac.uk | University of Birmingham    | -- V^ |
| Ph: 0121-414-6462. Fax: 0121-414-3722    | |
+-----+-----+-----+
```

Subject: Re: Spherical Harmonics.

Posted by [bowman](#) on Mon, 10 Apr 1995 07:00:00 GMT

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In article <3mb3uk\$5bn@sun4.bham.ac.uk>, sjt@xuna.sr.bham.ac.uk (James Tappin) wrote:

> Does anyone have either of the following:

>

> 1) A routine to fit (low order) spherical harmonics to data. That is take
> data tabulated at selected latitude & longitude values and return
> spherical harmonic coefficients of the best fit.

There is a Fortran package available from NCAR (ftp.ncar.ucar.edu) to compute spherical harmonic transforms (either direction) on regular or Gaussian lat-lon grids.

Try: <http://http.ucar.edu/SOFTLIB/SPHERE.html>

You can call Fortran from IDL, although I haven't tried to call this particular library.

Regards, Ken Bowman

--

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Subject: Re: Spherical Harmonics.
Posted by [ahlquist](#) on Fri, 14 Apr 1995 07:00:00 GMT
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James Tappin (slt@xuna.sr.bham.ac.uk) wrote:
: Does anyone have either of the following:

: 1) A routine to fit (low order) spherical harmonics to data. That is take
: data tabulated at selected latitude & longitude values and return
: spherical harmonic coefficients of the best fit.

I have some old software that may do some of what you want.
It is in Fortran. Check our anonymous ftp site: [ftp.met.fsu.edu](ftp://ftp.met.fsu.edu)
(note that ftp is part of the site address).
Check in directory /pub/spherical_harmonics.
(I'm currently working with a grad student on updated software,
but it isn't ready to release yet and probably won't be until fall.)

: or failing that:

: 2) A routine to return the value of a spherical harmonic function of
: given order at a given location?

Version 2 of Numerical Recipes has function `plgndr()` which computes
the value of an associated Legendre function.
A more complete source would be "spherepack" which is a spherical
harmonics package. It has been a long time since I retrieved
this package, but I believe that it is available by anonymous
ftp at [ftp.ucar.edu](ftp://ftp.ucar.edu) (ucar = university corporation for
atmospheric research). Check in directory /dsl/catalog
for a list of software packages (dsl = distributed software libraries).
Check the appropriate subdirectory in directory /dsl/lib
for the Fortran source code.

Jon Ahlquist
Dept. of Meteorology
Florida State University

Subject: Re: spherical harmonics

Posted by [John C. Wright](#) on Fri, 13 Oct 2000 07:00:00 GMT

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On Fri, 13 Oct 2000, Klaus Gottschaldt wrote:

> Subject: spherical harmonics
>
> Hallo!
>
> I want to analyze data on a sphere, representing them by spherical
> harmonic coefficients.
> This is somehow like a Fourier transform, but based on Legendre
> polynoms, which are
> defined on the surface of a sphere.
> Unlike wavelets, this transform is global.
> My data are given in the form [longitude, latitude, data_value], where
> longitude, latitude
> and data_value are vectors of the same length.
> Data points are randomly scattered over the sphere with a resolution of
> approx. 100km
> on the Earth's surface.
>
> Does somebody know, how to do this transform with idl?
>
> Klaus

Hi Klaus,

I may be in need of such a transform in the near future, also. But for now, the MIDL library has a function, `legendre_pol.pro`, that returns associated legendre polynomials, then it would be possible to build the transform, though I recognize this would be a bit of work, though the longitudinal transform could be done with IDL's FFT.

A word of warning, there are many different Spherical Harmonic decompositions, so make sure your basis functions and normalizations are the same between applications. Let the list know if you find any publicly available solutions, I for one, would be interested.

-john

Subject: Re: spherical harmonics

Posted by [Peter Thorne](#) on Fri, 13 Oct 2000 07:00:00 GMT

Klaus,

I have some code to do this, but its been released to me under licence and therefore I am not at liberty to release it directly. If you contact me by email I'll point you towards the people who wrote the source code and you can approach them.

HTH

Peter
