Subject: Re: Least squares fit of a model to a skeleton consisting out of 3D points.
Posted by pgrigis on Mon, 24 Nov 2008 15:13:10 GMT
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Johan wrote:
> I have the following problem to solve and was wondering whether the
> mpfit routines of Craig Markwardt will do the job?
>
> Do have the following model:
> Let g(X,Y,Z)=1 be a quadratic function in the coordinate system
> (O,Z,Y,Z) defined by the long, horizontal and vertical axes
> (ellipsoid). Write the equation of this quadratic function in matrix
> notation as follows:
>
> g(X,Y,Z) = [X, Y, Z]*[[A1,A4,A5],[A4,A2,A6],[A5,A6,A3]]*[[X],[Y],[Z]]
> + [X, Y, Z]*[[A7],[A8],[A9]]
>
> Need to fit this model to a 3D skeleton of N points by using least
> squares by calculating the coefficients Ai .
>
> This is achieved by minimizing the total squared error between the
> exact position of the points (Xi, Yi, Zi) on the quadratic surface and
> their real position in the coordinate system (O, X, Y, Z).

I am confused by this statement. In which system are Xi,Yi,Zi
measured?
What are "exact" and "real" position? This is very confusing...

Paolo

> The
> minimizing is performed from the derivative of the equation below with
> respect to A1 ... A9:
>
>
> This equation yields a linear system of nine equations in which the
> values of coefficients A1 ... A9 are unknown.
>
> Anyone that can help?
> Johan Marais

Subject: Re: Least squares fit of a model to a skeleton consisting out of 3D points.
Posted by Johan on Mon, 24 Nov 2008 15:56:12 GMT
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On Nov 24, 3:13 pm, Paolo <pgri...@gmail.com> wrote:
> Johan wrote:

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>
>
>
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>> minimizing is performed from the derivative of the equation below with
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>> J(A1 ... A9) = for i=0,N sigma(1 (Xi, Yi, Zi))^2
>
>> This equation yields a linear system of nine equations in which the
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>
>> Anyone that can help?
>> Johan Marais- Hide quoted text -
>
> - Show quoted text -- Hide quoted text -
>
> - Show quoted text -

The description I gave is an extract from a publication from which I
want to implement a specific algorithm and it doesn’t seem to be that
clear in general.

The problem I want to solve is as follows:

I have a set of points in 3D from my data that are represented by in a specific cartesian coordinate system. I want to fit a 3D ellipsoid (in the same coordinate system) to these points to get the long, horizontal and vertical axes (their dimensions and orientations) of the fitted ellipsoid. My understanding is that the “real” position is the position of the specific data points of the data and the “exact” position is the position of each point should they fall on the fitted ellipsoid’s surface.

Subject: Re: Least squares fit of a model to a skeleton consisting out of 3D points.
Posted by Jeremy Bailin on Mon, 24 Nov 2008 16:04:00 GMT
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On Nov 24, 10:56 am, Johan <jo...@jmarais.com> wrote:
> On Nov 24, 3:13 pm, Paolo <pgri...@gmail.com> wrote:
>
>
>
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> the position of the specific data points of the data and the “exact”
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> ellipsoid’s surface.

You know, I'm pretty sure I used to have IDL code that solved exactly
this problem, but which died during The Great Hard Drive Crash Of
2000. :-(But there's a chance it was from after that... let me see
if I can find it.

-Jeremy.