Subject: Least squares fit of a model to a skeleton consisting out of 3D points.
Posted by Johan on Mon, 24 Nov 2008 13:33:18 GMT
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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). The minimizing is performed from the derivative of the equation below with respect to A1 ... A9:

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 values of coefficients A1 ... A9 are unknown.

Anyone that can help?
Johan Marais