Subject: Reconstruct surface from gradient field?
Posted by dg86 on Thu, 13 Feb 2014 22:24:22 GMT
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Dear Folks,

I have measurements of the gradient field (tangent vectors) associated with
a two-dimensional surface, and would like to compute the height of the surface
itself. I understand that there are standard algorithms to do this, and wonder if
any of them have been implemented in IDL. If so, I'd be grateful for a pointer.

More specifically, I have values grad_x(x,y) and grad_y(x,y) that represent the
gradient of an unknown function z(x,y) measured at irregularly gridded locations
x and y in the plane. I can use griddata() to interpolate the gradient
functions smoothly across the plane. I want to calculate z(x,y) from grad_x and grad_y.
Moreover, I want to do this as accurately as possible.

Simple line integration is OK, but yields errors in the estimate for z(x,y) that vary
widely across the field of view. I've also taken a first shot at using FFTs to solve
Poisson's equation for z(x,y). Tests with simulated data were not encouraging.
These disappointing first efforts make me very hopeful indeed that somebody else
has a good solution already coded up, and is willing to share!

All the best,

David