SIMPLE TEST CASE FOR MIGRATION OF IRREGULAR DATA

Migration is a convolution. So why not following experiment:

model space m: regularly sampled with 2 or 3 impulses in 2d image. (alternatively, random) two operators: B binning from regular to irregular 2d C convolution of regular with L shape impulse responses

data: d = B C m Two solution approaches: estimate $(BC)^(-1)$ what are good preconditioner etc invert binning $m' = B^(-1)d$, then invert convolution $m = C^(-1)$ Is one better than the other. More stable, robust? How can you build in velocity analysis.

PROBLEM

Exercise for studying simple inverse problems. Problems where I understand the in and outs. Another reason: help with a true application: Irregular data and its effect on imaging. Regularisation and Imaging operator. Kirchhoff my not be the only solution. What did Gardner do? What would be a good test problem? Bill Symes referenced a work from Delft (not Berkhout) which looked at imaging as an acceleration device.

BILINEAR SOLVER

The *Bilinear Operator* is composite operator that is often used in missing data estimations at SEP. Furthermore, the Hessian of a vector valued function is a Bilinear Operator (see jam paper). All second order tensors are bilinear operators. A Bilinear Operator $\mathbf{A}(\mathbf{x_1}, \mathbf{x_2})$ is an operator that is linear with respect to $\mathbf{x_1}$ when $\mathbf{x_2}$ is constant, and vice versa. A convolution is a bilinear operator with respect to its filter coefficients and its input data. Bilinear operators are better behaved then fully non-linear operators, e.g., their gradient is easily computed.

MASKING MISSING DATA

The problem is to fill in a hole of missing data. The data is synthetic in which an elliptical hole is punched out (from Claerbout – tdf). The data is filled in with a given laplacian filter.

FINDING THE OPTIMAL FILTER

The problem is to find the best PEF for a rectangle of data with a missing region. In this particular problem, the data is synthetic with an elliptical hole of "missing data" punched out (from Claerbout – tdf). See the sister directory misfilt for an example of using a given filter to fill in the data.

Some ideas on the masking operator

(These comments were made about the original SepMask operator which is currently in book/Otherops. As of this writing, I am using SepMask2 in book/misfilt.)

Perhaps we could have a MaskFactory which would have functions like:

getMaskFromKnownData(Vector knownData): this could return an Rsf or Isf mask depending on the class of knownData

getMaskFromUnknownData(Vector knownData): analogous to the above, but this returns the "complement"

Maybe a Mask should have a method *Mask getComplement()*, which would return the complement as a mask (Complement = Identity - Mask). This getComplement() function conflicts with the fact that SepMask is derived from DiagRsfOp, since the complement requires a new Rsf to be made. That's inefficient. Basically, if we don't want getComplement, SepMask should continue to be derived from DiagRsfOp, otherwise it probably should not.

SEABEAM

The input data we use is not the raw data, but is already binned by Jon in `tdf/gem/seab`.