Subject: Re: Error propagation expressions
Posted by Randall Skelton on Wed, 10 Oct 2001 12:42:16 GMT
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On 9 Oct 2001, John Copley wrote:

> Does anyone know of, or has anyone written, an IDL procedure that takes an
> input string expression such as
> "w4=w1+4*w2/(w3+con)"
> and creates an output string expression that expresses the variance of
> the quantity on the left hand side?
> In this case the output string expression would be something like
> "v4=v1+16*((w3+con)^2*v2+w2^2*v3)/(w3+con)^4.
> In these expressions wi, where i is an integer, e.g. w4, represents a
> quantity whose variance is vi, e.g. v4.
> Other quantities, e.g. con in the above expressions, are treated as
> constants.
> The assumption is that variances add, i.e. standard deviations add
> root mean square.
> I am looking for a routine that can handle arbitrarily complicated
> combinations of (at least) addition, subtraction, multiplication and
> division.
> I look forward to your thoughts!
> John Copley
>

I believe you can do this with Matlab using Maple for the analytic derivation part. What you are asking for is a symbolic algebra package and IDL is not such a tool. If you knew of a C/Fortran program that did this, i.e. takes a string algebric expression and generates its multivariant differential, you could write a simple DLM to communicate with the C/Fortran code and achive your desired result. Try searching google and the Scientific Applications for Linux page for a free interpreter of symbolic manipulation. I know Kalamaris (GPL) does symbolic derrivatives so perhaps you could borrow the symbolic algebra package from them... Then talk to Ronn Kling (or buy his book) about writing DLMs.

Good luck,
Randall