Subject: RSI response to CONTOUR problems/questions.
Posted by info on Mon, 27 Sep 1993 16:31:20 GMT
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A number of news group postings have been about the new CONTOUR, and in particular about the /SPLINE and /FILL options. Although we do not normally respond to postings on the news group, we believe that a response is in order.

In response to Sylvain Korzennik's (Smithsonian Astrophysical Observatory) points in regard to changes in the CONTOUR procedure:

> 1) the userlib function MIN_CURVE_SURF is NOT equivalent to the
> keyword /spline: indeed, MIN_CURVE_SURF() takes forever to process
> any medium size array (ie a 40x20), while /splines will work fine,
> and. Adding a new userlib function is improvement, but dropping a
> useful keyword definitively isn't

Indeed the MIN_CURVE_SURF is not equivalent to the old keyword /SPLINE. The spline smoothing was applied to each contour line individually, rather than to the entire surface globally. One unfortunate effect of local smoothing was that contour lines occasionally crossed. This was clearly wrong, and we believed that a global smoothing technique, such as MIN_CURVE_SURF, would remove an error and be an improvement.

We hope to write a user library procedure that will take contour paths as written to a file, and apply spline smoothing to them, duplicating most of the functionality of the old CONTOUR, /SPLINE routines.

A number of users have complained about the speed of MIN_CURVE_SURF. Sample timings are included in the function documentation header. The time required is very roughly proportional to K1 * M^3 + K2 * N * M, where M is the number of input points and N is the number of output points, and K1 and K2 are constants. Simply put, for a large number of input points, the routine is a dog. But, smoothing is normally only desired when the input sampling is sparse.

> 2) the /fill option is broken when trying to fill only 1 level, why
> so?:

This is clearly a bug. All known bugs with CONTOUR, /FILL have been fixed and will be available with version 3.5, due in November.
We apologize for these errors, and have learned the hard way that general contouring and filling is extremely difficult to implement and test.

There is a simple work-around for the 1 level filling bug: provide a second level, higher than all valid data values.

Other CONTOUR, /FILL bugs that have found and fixed are:
- Filled contours are now clipped against the plot window.
- Outer contours, which didn't have edge crossings were not drawn.
- The CONTOUR procedure would crash if the difference between a contour value and a data value was extremely small.

3) We considered orienting the labeling to indicate the downhill direction but rejected it because: 1) labels could appear upside down, backwards, etc. making them hard to read; 2) there seems to be no consensus as to which way the labels should read (uphill or downhill); and 3) downhill ticks seem more intuitive, are widely accepted in the geologic sciences.

In response to Patrick Ryan's (NASA/GSFC) requests:

> 1) to "Get rid of /MAX_VALUE. put in code to do real handling of
> missing data."

Ralph Finch (Calif. Dept of Water), and Bill Thompson (NASA/GSFC) also expressed this opinion. Part of the IDL philosophy is that since IDL is a full feature language, it is better to solve such problems using IDL, rather than jam in special purpose features. Providing a "special missing data value" is trivial within IDL's framework.
Here, is a CONTOUR procedure (in 8 lines of code) that accepts a special value for missing data:

```
PRO CONTOUR_MISSING, z, MISSING=missing, _EXTRA=extra
gone = WHERE(z eq missing, count)
if count gt 0 then begin
   zz = z
   zz(gone) = 1.0E30 ;Assumed to be larger than any valid data
   CONTOUR, zz, MAX_VALUE=9.99E29, _EXTRA=extra
endif else CONTOUR, z, _EXTRA=extra  ;No missing data
end
```

This technique may also be used for any other IDL procedure that accepts the MAX_VALUE keyword for missing data.

> 2) "Put in a really slick irregular data interpolator. NCARG's BIVAR
> code is pretty good."

NCARG's BIVAR uses Akima's method which consists of triangulation followed by a 5th order polynomial fit. TRIANGULATE, followed by TRIGRID(/QUINTIC) does exactly the same thing, but with a more efficient triangulation algorithm.

> 3) "Make MAP_SET more sophisticated. Allow the user to color in the
> continents (another thing NCARG does well)."

We are exploring the acquisition of continental and political boundary outline data bases that are better organized and that allow polygon filling. IDL uses the old NCAR SUPMAP.DAT. The database now used in NCARG is not public domain, and as such, not freely redistributable.

Patrick Ryan also says:
> My solution is: Call RSI! Since we all need support contracts now, we
> can all call them. They won't know what's wrong unless we tell them.
> Don't assume that posting gripes here will make IDL's developers work
> any faster.

YES!!! As the FAQ states, the newsgroup is for communicating with other users, not the vendors. If you want to say something to RSI, we are happy to listen. Our phone number (303-786-9900) and E-mail address (info@rsinc.com, or support@rsinc.com if you have a current support contract) are well known.

Finally, in her posting, Amara Graps presents a number of examples dealing with CONTOUR, /FILL and map projections. Contours which are not closed and which intersect a map edge are not filled. This will be explained in the next version of the documentation.