
Subject: Re: Variogram

Posted by [eoraptor](#) on Wed, 19 May 2004 18:25:24 GMT

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Stephane,

Here's some code that I found in one of my IDL libraries from a long time ago. I haven't used it in years, but the last time I did it worked ok. You have to reshape your image into two arrays: one array (vector) called DATA of length N which contains only the values for each pixel, and the other array called LOCS which is of shape (d,N) where d is the dimension of your space. For satellite images, you'll construct LOCS(2,N) and populate it with the map coordinates of each pixel. I'm sure there are better ways of computing the variogram without all of the loops in the code below. It computes much faster if you select a random sample (or select a specific subset of pixels) of the image and pass that along for variogram calculation rather than the entire image.

If someone wants to re-work this procedure (remove some loops) to make it more efficient, by all means go ahead.

```
;VGRAM2.PRO
```

```
;computes the empirical (isotropic, homogeneous) (semi)variogram from  
a set of
```

```
;given data
```

```
;adapted from varigram.pro - this version is compatible with very  
large data sets
```

```
;TMO 4-99
```

```
PRO vgram2, data, locs, bintype, binparms, vargram, vardist, count
```

```
;INPUT
```

```
;data - values of data, array of length N
```

```
;locs - locations data, array of length d by N where d = dimension  
of space
```

```
;bintype - flag that specifies type of binning of values along  
"distance" axis
```

```
;binparms - parameters needed to fully specify the binning for each  
type
```

```
;types: 1. nbins = binparms(0), equal-sized with binsize =  
binparms(1) beginning at
```

```
; minbin = binparms(2) (maxdist = minbin +  
(nbins+1)*binsize)
```

```
; 2. user specifies (in binparms) nbins+1 bin boundaries  
ordered from small
```

```
;      to large
;      In either case, interpoint distances falling outside the bins
are ignored.
```

```
;OUTPUT
```

```
;vargram - values of the variogram
```

```
;vardist - distance for each value of variogram
```

```
;vargram(i) and dist(i) are the average over "point" values falling
into the ith bin.
```

```
;count - number of pairs falling into each bin, giving in idea of the
precision of the estimate.
```

```
sz = size(locs)
```

```
if sz(0) eq 1 then d = 1 else d = sz(2)
```

```
N = n_elements(data)
```

```
;construct bin boundaries
```

```
if bintype eq 1 then begin
```

```
  nbins = binparms(0) & binsize = binparms(1) & minbin = binparms(2)
```

```
  bounds = binsize*findgen(nbins+1) + minbin
```

```
endif else if bintype eq 2 then begin
```

```
  nbins = n_elements(binparms)-1 & bounds = binparms
```

```
endif
```

```
vargram = fltarr(nbins)
```

```
vardist = fltarr(nbins)
```

```
count = fltarr(nbins)
```

```
maxdist = 0.
```

```
for i=1,N-1 do begin
```

```
  for j=0,i-1 do begin
```

```
    if d eq 1 then pdist = abs(locs(i) - locs(j)) else pdist =
norm(locs(*,i) - locs(*,j))
```

```
    if pdist gt maxdist then maxdist = pdist
```

```
    subs = where(bounds le pdist, cnt)
```

```
    if cnt gt 0 and cnt le nbins then begin
```

```
      sub = max(subs)
```

```
      vardist(sub) = vardist(sub) + pdist
```

```
      vargram(sub) = vargram(sub) + .5*(data(i)-data(j))^2
```

```
      count(sub) = count(sub) + 1.
```

```
    endif
```

```
  endfor
```

```
endfor
```

```
for i=0,nbins-1 do begin
```

```
  if count(i) gt 0 then begin
```

```
    vardist(i) = vardist(i)/count(i)
```

```
    vargram(i) = vargram(i)/count(i)
```

```
  endif else vardist(i) = .5*(bounds(i) + bounds(i+1))
```

endfor

END
