Subject: cool way to determine durations in time series
Posted by Thomas Pfaff on Fri, 20 Jan 2006 18:32:37 GMT
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Hello everyone,

I'm doing some IDL-abuse in hydrology, so my question might seem a bit odd, maybe.

A task that is occurring quite regularly is to determine the duration of certain events. For example "What is the longest contiguous duration of stream flow below/above a certain discharge"

Assuming I have an equidistant time series (e.g. one value each day) this basically reduces to the question of how can I transform an array like this

series = [1,1,0,0,0,0,1,0,1,1,1,0,0,1,1]

into something like this

durations = [2,1,3,2]

which is I want to count all contiguous fields of '1's in an array.

Somehow my brain wants to use HISTOGRAM for this, but I just can't see how to do it.
At the moment I'm helping myself by using CONVOL(to highlight the edges) and WHERE(to get the differences between two adjacent edge indices) but as the data gets more, this becomes extremely tedious as well as memory consuming (see the example below). Besides, CONVOL wouldn't work if a series started or ended with '1's as it can't correctly apply the kernel to those elements.

Any ideas? Anyone who has seen this problem in one of his/her maths textbooks? Hints to literature are also highly appreciated.

Thanks in advance,

Thomas

Here's an example how I did it 'the hard way'

```
;sim_mask is an array consisting of 0 and 1
sim_mask = round(randomu(10, 2000))
```

```
;create space for the 'histogram'
sim_hist = replicate( 0, $
   n_elements(where(convol(sim_mask, [1,3,1]) eq 3)) $
 + n_elements(where(convol(sim_mask, [1,3,1]) eq 4))/2)
;determine the durations by subtracting the respective pairs of
;occurences of the 'edge-marker' 4
for i=1, n_elements(where(convol(sim_mask,[1,3,1]) eq 4))-1, 2 do $
 sim_hist[i/2] = (where(convol(sim_mask,[1,3,1]) eq 4))[i] $
 - (where(convol(sim_mask,[1,3,1]) eq 4))[i-1]
;all values are now one less than the actual duration
sim_hist +=1
```

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