Subject: Re: Phase Unwrapping Algorithms?
Posted by Sergei Senin on Wed, 20 Nov 1996 08:00:00 GMT
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William Ryu wrote:
> Let's say we have a 2D matrix of complex data a+bi and would like to
> extract the phase value. A simple way would be to take arctan (b/a) but a
> problem exists because arctan is modulo 2PI. The data often gets
> "wrapped."

Time domain phase unwrapping:
K.W.Wan, J. Austin, E. Vilar, "A Novel Approach to the Simultaneous Measurement
of Phase and Amplitude Noise of Oscillators', 44th Ann. Symp. on Freq. Control,
Baltimore, USA, May 1990, 5p."

For fractional phase calculations (Sorry, the programs are not exactly very well written)

```
 ;------------------------------------------------------------ ----
;fract_phas.pro
 ;------------------------------------------------------------ ----
;+
; NAME: fract_phas
; PURPOSE: Calculates fractional phase (phase difference between i and i+1
;         samples) for the input IQ array
; CATEGORY: Signal Processing
; CALLING SEQUENCE: y=fract_phas(x)
; INPUTS: x- two dimensional array, x(0,*) - I signal , x(1,*) - Q signal
; MODIFICATION HISTORY:
; ss@.ee.port.ac.uk on Wed Mar  6 09:58:10 GMT 1996 , UoP, MT&SPRG
;-
 ;------------------------------------------------------------ ----
; fract_phas.pro start line
 ;------------------------------------------------------------ ----
function fract_phas, x
y=imaginary(alog((complex(x(0,*), x(1,*)))* $
(shift(complex(x(0,*), -x(1,*)), 0, 1))))
nn=n_elements(y)
y=reform(y,nn)
y=double(y)
;y(0)=0.0d
return, y
end
 ;------------------------------------------------------------ ----
; fract_phas.pro stop line
```

```
 ;------------------------------------------------------------ ----
```

For phase curve:

```
 ;------------------------------------------------------------ -----------
;phas_sum.pro
 ;------------------------------------------------------------ -----------
;+
; NAME: phas_sum
; CATEGORY: Signal Processing
; CALLING SEQUENCE:c6 = phas_sum(c5)
; INPUTS: c5 - output from fract_phas
; OUTPUTS: c6 - phase curve with trend
; MODIFICATION HISTORY:
; ss@.ee.port.ac.uk on Mon Apr 15 12:34:26 BST 1996
;-
 ;------------------------------------------------------------ -----------
;phas_sum.pro start line
 ;------------------------------------------------------------ -----------
function phas_sum, c5, c6
c6=fltarr(n_elements(c5))
c6(0) = c5(0)
  for i = 1L, n_elements(c5)-1L do begin
   c6(i) = c6(i-1) + c5(i)
  endfor
return, c6
end
 ;------------------------------------------------------------ -----------
;phas_sum.pro stop line
 ;------------------------------------------------------------ -----------
```

Cheers

Sergei
http://www.ee.port.ac.uk:80/~ss-www/WAVE/index.html
