
Subject: Re: The Behavior of CONVOL

Posted by [agrap](#)s on Fri, 01 Nov 1996 08:00:00 GMT

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"Kevin R. Turpie" <turpie@seaeagle.gsfc.nasa.gov> writes:

> I've found the behavior of CONVOL to be a bit confusing. Please
> let me know if I'm missing something, but here are my observations:

I've noticed confusing behavior too.

[...]

> Second, when CENTER is set to 0, CONVOL does a convolution in a
> strict sense *if* the input kernel function, say $k(x)$, is defined
> so that $k(x) = 0$ for all $x < 0$. The result is usually shifted to
> the right.

So that's what's going on... I've noticed the right shift. I've had to
"fix" (fudge?) the first values to get the result that I knew I should
have gotten.

> To do a true convolution with CONVOL for any kernel, it seems that
> CENTER must be set to 1 and REVERSE must be applied to each dimension
> of the kernel prior to input.

This is really useful, thanks.

I wrote a function a couple of years ago that performed the equivalent
of Matlab's "conv" (convolution) function. (It's crude, but it works.)
That's when I first noticed the different behavior. I'll attach it
below.

> PS - If your interested, I did create a routine to perform
> two dimensional convolutions using a FFT. It is *very* fast
> and behaves like CONVOL with the EDGE_WRAP keyword on and
> the kernel oriented properly.

I'm interested.

Amara

```
*****  
;  
FUNCTION conv, a, b  
;+  
; NAME:  
; CONV  
;  
;
```

```

; PURPOSE:
; This function performs a convolution operation like Matlab's conv.
;
; CATEGORY:
; Signal Processing
;
; CALLING SEQUENCE:
;   y = CONV(a, b)
;
; INPUTS:
;   a: 1st vector.
;   b: 2nd vector, the "kernel"
;
; OUTPUTS:
;   y: a convolved with b. See description in Matlab Reference Manual
;       for conv.
;
;
; MODIFICATION HISTORY:
;   Written by Amara Graps  November, 1994.
;-

; Pad a with zeros of size of the kernel
p = N_ELEMENTS(b)
new_a = [a, FLTARR(p-1)]

; Apply IDL's convolution function
out = CONVOL(new_a, b, center = 0)

; Calculate results for 1st p-1 values (another Fudge to equal
; Matlab's conv). i.e. if p=5 then the first p values are:
; out(0) = new_a(0)*b(0)
; out(1) = new_a(0)*b(1) + new_a(1)*b(0)
; out(2) = new_a(0)*b(2) + new_a(1)*b(1) + new_a(2)*b(0)
; out(3) = new_a(0)*b(3) + new_a(1)*b(2) + new_a(2)*b(1) + new_a(3)*b(0)
; out(4) = new_a(0)*b(4) + new_a(1)*b(3) + new_a(2)*b(2) + new_a(3)*b(1) +
;         new_a(4)*b(0)

FOR i = 0, p-1 DO BEGIN
  out(i) = new_a(0) * b(i)
  FOR l = 1, i DO BEGIN
    out(i) = out(i) + new_a(l)*b(i-l)
  END ;l
END ;i

RETURN, OUT
END ;function conv
;*****

```

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Amara Graps email: agraps@netcom.com
Computational Physics vita: finger agraps@best.com
Multiplex Answers URL: http://www.amara.com/
