
Subject: normalized cross correlation: Improving performance (?)

Posted by [pogen2](#) on Thu, 05 Jun 2003 14:37:31 GMT

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How can I perform the following normalized cross correlation between an image and a template (not of the same size) without the use of two FOR loops?

```
> ;f is the transformed image and w is the template (reference image)
>
>  t = systime(1)
>
>  rsz = size(w)      ;dimension KxJ
>  tsz = size(f)      ;dimension MxN
>  a = (rsz[1]-1)/2    ;a=(K-1)/2
>  b = (rsz[2]-1)/2    ;b=(J-1)/2
>
>  IF rsz[0] NE tsz[0] THEN message, 'ERROR:template and image must have the same
dimension'
>  IF rsz[4] GT tsz[4] THEN message, 'ERROR:template bigger than image'
>
>  crosscorr = FLTARR(tsz[1]-rsz[1]+1,tsz[2]-rsz[2]+1) ;dimension M-K+1 x N-J+1
>
>  FOR x=a, tsz[1]-(a+1) DO BEGIN
>    FOR y=b, tsz[2]-(b+1) DO BEGIN
>
>      f2 = f[x-a:x+a,y-b:y+b]
>
>      wavg = total(w)/rsz[4]      ;reference image average
>      favg = total(f2) /tsz[4]    ;transformed image average
>
>      ; The cross correlation
>      ;crosscorr = ((w-wavg))*((f-favg))
>      ;crosscorr = total(crosscorr)/rsz[4]
>
>      ; The normalized cross correlation (in range [-1,+1])
>      ww = (w-wavg)
>      ff = (f2-favg)
>      crosscorr[x-a,y-b] = total(ww*ff)/sqrt(total(ww^2)*total(ff^2))
>
>    ENDFOR
>  ENDFOR
```

I tried something with arrays such as :

```
>  subs_arr = ["something working"]      ;array of subscripts
```

```

> farr = FLTARR(rsz[4],tsz[1]-rsz[1]+1,tsz[2]-rsz[2]+1) ;dimension K*J x M-K+1 x N-J+1
>
> ;the next line is the tricky part that isn't working. If something
> can be done so that
> ;farr becomes an array of M-K+1 x N-J+1 (which is the size of the
> crosscorr coefficients
> ;array) vectors each one containing the pixels of the masked area of
> f, it would be
> ;wonderful!
>
> farr[* ,subs_arr[?],subs_arr[?]] = reform(f[?:?+2*a,?:?+2*b],1)
>
> ;the following should be working after that...
>
> wavg = total(w)/rsz[4] ;reference image average
> favg = total(farr,1) /rsz[4] ;transformed image average
>
> ; The cross correlation
> ;crosscorr = ((w-wavg))*((f-favg))
> ;crosscorr = total(crosscorr)/rsz[4]
>
> ; The normalized cross correlation (in range [-1,+1])
> ww = (w-wavg)
> ff = (farr-favg)
> crosscorr = total(reform(ww,1)*ff,1)/sqrt(total(ww^2)*total(ff^2,1))

```

Thank you for any help,

Pier Genest
