
Subject: Transpose(A)*P*A

Posted by mapper4u6@gmail.com on Fri, 10 Oct 2008 14:25:07 GMT

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hello,

I have a question about how to improve the computation speed when deal with non-linear equation

$$\begin{matrix} A & x & = & I, \\ \text{row, } P \text{ is } M \times M & & & P \text{ is the weight for each} \\ M \times N & N \times 1 & & M \times 1 \end{matrix}$$

then I have to build normal matrix which is

$$\begin{matrix} \text{Transpose}(A) \times P \times A & x & = & \text{Transpose}(A) \times P \times I \\ N \times N & N \times 1 & & N \times 1 \end{matrix}$$

then x can be solved.

When M is bigger as 20000, N as 3000, the time to build AtPA is almost one hour, that is too long. the code is:

```
PRO NormalMatrix, A, I, ATPA, ATPL, Weight = P
szA = SIZE(A, /DIMENSIONS)
if N_ELEMENTS(szA) ne 2 then begin
    mess = dialog_message('Input matrix must be M*N format!', /
information)
    return
endif
szL = SIZE(L, /DIMENSIONS)
if (N_ELEMENTS(szL) ne 2 and szL[0] ne 1) then begin
    mess = dialog_message('Input I must be 1*M format!', /information)
    return
endif
if (szA[1] ne szL[1]) then begin
    mess = dialog_message('Input A and I must be same rows!', /
information)
    return
endif
if not keyword_set(P) then P = fltarr(szA[1])*0.0+1.0
ATPA = fltarr([szA[0], szA[0]])
ATPL = fltarr(1, szA[0])

for i=0L, szA[0]-1 do begin
    t1 = systime(1)
    ATPA[i, i:szA[0]-1] = (p*A[i, *])###A[i:szA[0]-1, *]
    ATPA[i:szA[0]-1, i] = ATPA[i, i:szA[0]-1]
    ATPL[0, i] = (p*A[i, *])###
```

```
t2 = systime(1)
print, sza[0], i, t2-t1
endfor
```

END

I like to know how I can improve it to few seconds.
