
Subject: Question about MOMENT

Posted by [ECSPRS](#) on Wed, 26 Jul 1995 07:00:00 GMT

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Hi again.

There's something in the MOMENT function I don't think fits with the online documentation. When calculating the variance the online help defines it as;

$$\text{Variance} = \frac{1}{N-1} \left[\sum_{i=0}^{N-1} (X_i - \bar{X})^2 \right] - \frac{1}{N} \left[\sum_{i=0}^{N-1} (X_i - \bar{X}) \right]^2$$

where X_i is data points, \bar{X} is the mean, N number of points.

Now in the function code of MOMENT.PRO (in \IDL40\LIB) variance is calculated the following way;

```
var1 = total((x - mean)^2) / (nx-1.0)
var2 = (total((x-mean)^2) - ((total((x-mean)))^2)/nx)/(nx-1.0)
var = (var1 + var2)/2.0
sdev = sqrt(var) ; standard deviation
```

Now var1 is obviously the first term in the above equation. What I couldn't figure was why that term also appears in var2, along with the second term, until I saw the third line which adds and then divides by 2 to get var. So to rewrite the IDL code as equations that means;

$$\text{var} = \frac{\text{Sigma}(X_i - \bar{X})^2}{2(N-1)} + \frac{\text{Sigma}(X_i - \bar{X})^2}{2(N-1)} - \frac{(\text{Sigma}(X_i - \bar{X}))^2}{2N(N-1)}$$

(dropping all the sigma extra bits)

So, point (1), the second term has now been divided by a factor of 2, unlike what appears in the documentation, and point (2) why go to all the computational effort of calculating term 1 twice just so you can halve it and add them together? The rest of the MOMENT code doesn't show any other use for individual var1 and var2 parts. As far as I can see lines 1 and 3 of the above code should be dropped and var2 is the result we're after.

Comments, flames, anyone?

Paul
