# Re: Multinomial approximation to Poisson ??

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- *From*: "Reef Fish" <Large_Nassau_Gr0uper@xxxxxxxxx>
- *Date*: 1 Sep 2006 13:31:03 −0700

se16@xxxxxxxxxxxxxx wrote:

> Nag wrote:
>
> > Think of convergence of Binomial to Poisson. Binomial is 2−variate by
> > your argument and yet converges to a univariate Poisson. Given
> > Poisson(L) and n, Binomial(p,L/n) converges to Poisson (L) as n −> oo.
>
> I assume you meant to say "Binomial(n,L/n) converges to Poisson (L)"
>
> Note that the mean of Binomial(n,L/n) is L, and that the variance is
> L(1−L/n) which tends towards a fixed L as n increases. By happy
> coincidence the mean and variance of Poisson(L) are both equal to L.

Good technical point about the convergence of Binomial to a Poisson.

> Also note the problem that if, instead of fixing L, you fix p and let L
> increase with n by having L=np, so the variance of the Binomial becomes
> np(1−p) and never gets closer in any sense to the mean np. So you
> cannot say "Binomial(n,p) converges to Poisson (np)".

Thanks for filling in the details (which I didn't bother, in view of
the
fairly obvious lack of understanding on Nag's part) to what I said:

RF> The convergence of the Binomial (not Bernoulli) distribution to a
RF> Poisson distribution require additional assumptions besides
RF> n −−> infinity.

Both your comment on L and the preceding paragraph explained what
I said to Nag very well, in detail.

−− Reef Fish Bob.

> Interpret my problem in the same way. Instead of 0 or 1 in each trial,
> we get 0 or 1 or 2 or 3 or 4 in each trial. My interest is in the sum
> of outcomes of n such trials and the behavior of this sum as n −> oo.

If the variance of your multinomial is not equal to its mean then a
Poisson approximation cannot help you.

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