Re: Deriving an unknown probability distribution

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In article <0471312f−50f4−4d01−847c−b7ea79cd0f5b@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>, <Tariq.Biziou@xxxxxxxxx> wrote:

> Hi
>
> I'm trying to find a probability distribution to fit the following scenario:
>
> I have a finite set of events that must occur in a finite interval (continuous on the real line). For all sub−intervals of a constant length x, I would like to know the probability that the maximum number of events does not exceed a certain number.
>
> I've looked at approximating this with a poisson distribution using order statistics to get the maximum, but haven't had any success (or the approximation going this route is just bad in general).
>
> Does anyone have any suggestions on a solution to this?

Maxima can be very difficult to work with. The solution depends on the probability distribution. In a sense, the worst case is the uniform.

I see no reason to expect that the distribution should approximate the Poisson.

If the distribution is unimodal and the length x is small but not too small, depending on the number n of events, the problem was treated by Chernoff as a problem in estimating the location of the mode.

His approach does not attack the maximum magnitude,
however, but shows which methods can be used.

It might help to know what values of n and x you
are interested in, assuming the length of the
interval is 1, and also what distribution of the
points is of interest, if not uniform.

If n*x is somewhat smaller than n, a good approximation
for n large for the probability that no interval has
more than 1 can be obtained from looking at the smallest
order statistic for n+1 exponentials with mean 1/(n+1);
the probability that the maximum is one is close to
the probability that the minimum is at least x.
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This address is for information only. I do not claim that these views
are those of the Statistics Department or of Purdue University.
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