

Re: Simulating Poisson process/Random numbers

Source: <http://sci.tech-archive.net/Archive/sci.math.research/2005-08/msg00107.html>

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 - *Date:* Fri, 26 Aug 2005 19:00:06 +0000 (UTC)
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In article <denea8\$1f5\$1@xxxxxxxxxxxxxxxx>, Michael H Lees <mhl@xxxxxxxxxxxxxxxx++> wrote:
>Hi,

>I have a model which uses the exponential distribution to estimate
>inter-arrival times of events from various sources. This estimation or
>prediction assumes that the inter-arrival times from the various event
>sources combine to form an exponential distribution, or that the
>combination of sources can be modelled as a poisson process.

>To test the model I'm trying to determine how to generate random
>inter-arrival times from multiple sources such that the combined
>distribution of their inter-arrival times forms an exponential
>distribution. The central limit theorem only applies to normal
>distributions, therefore if I generate random inter-arrival times at
>each source using an exponential distribution with different mean the
>combined distribution will not be exponential.

How are the inter-arrival times combined? Or are you just combining the distributions? If the combination of sources is to be modeled as a Poisson process, the problem is more complex, as one process can be going on while another is finishing. What happens in this case? If each goes on, the result may or may not be a Poisson process.

>If I generate the inter-arrival times at each source using the same
>exponential distribution, with the same mean, then the resulting
>distribution should be the same original exponential distribution.
>However, I want some way of varying the mean inter-arrival time of each
>source but still have a resulting combined distribution which is
>exponential.

If there are a number of processes with exponential interarrival times with rates r_k operating independently, and all of the arrivals of all of the processes are recorded, the overall process is a Poisson process with the rate of arrivals being $\sum r_k$. So in the above case, the mean

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time between arrivals would be $1/n$ of the mean times of the processes.

>Is this possible??

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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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• **References:**

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 - ◇ *From:* Michael H Lees
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