Contribution ID: **8** Type: **not specified**

Numeric Inverse Laplace Transform for Likelihood Evaluation

Thursday, 29 June 2023 14:00 (20 minutes)

The PDF of a positive continuous random variable X can be too complex for direct evaluation e.g. when X is a sum of the positive continuous random variables. But when the characteristic function $\psi(t)$ of X is known, we can employ $N = 2^k$ point FFT to obtain a table of PDF with equidistant spacing for the interpolation of $\mathrm{f}(x_k)$ and for $k = 1, \ldots, m$. Adequate time complexity of single likelihood evaluation is $\mathrm{T}(N) = N \log_2 N$ for $N > 10^7$.
Fortunately, we can evaluate $\mathrm{F}(s) = \psi(\mathrm{j}s)$ and then apply the inverse Laplace transform.
There are many various approaches to the numeric inversion. They begin with Bromwich integral formula and various finite sampling over integration contour. The time complexity of m point likelihood evaluation is only $\mathrm{T}(m, M) = m\,M$ with $M < 25$.

Primary author: KUKAL, Jaromír (FNSPE CTU in Prague)

Presenter: KUKAL, Jaromír (FNSPE CTU in Prague)

Session Classification: Stochastic monitoring control