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Parameter Inference in the Ornstein-Uhlenbeck Process PAUL MULLOWNEY, Tech-X Corporation, SATISH IYENGAR, Department of Statistics at the University of Pittsburgh — The Ornstein-Uhlenbeck process has been proposed as a model for the spontaneous activity of a neuron. In this model, the firing of the neuron corresponds to the first passage of the process to a constant boundary, or threshold. While the Laplace transform of the first passage time distribution is available, the real density has not been obtained in any tractable form. We address the problem of estimating the parameters of the process when the only available data from a neuron are the interspike intervals, or the times between firings. In particular, we give an algorithm for computing maximum likelihood estimates (MLEs) and their corresponding confidence regions for three of the five model parameters by numerically inverting the Laplace transform. We also provide an analysis on the reliability of the estimates and their confidence regions when simulated data is used to generate the first passage sample.

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