

POSTER PRESENTATION

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# Nonparametric estimation of characteristics of the interspike interval distribution

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We address the problem of non-parametric estimation of the probability density function as a description of the probability distribution of noncorrelated interspike intervals (ISI) in records of neuronal activity. We also continue our previous effort [1,2] to propose alternative estimators of the variability measures. Kernel density estimators are probably the most frequently used non-parametric estimators of the probability distribution. However, there are also other non-parametric approaches. We focus on non-parametric methods based on a principle of extrema of the Fisher information. Specifically, we focus on the maximum penalized likelihood estimation of the probability density function proposed by Good and Gaskins [3], which can be understood as a kernel estimator with a particular kernel function [4]. Other non-parametric approach we would like to address is the spline interpolation proposed by Huber [5] which can uniquely estimate the ISI distribution.

4. Eggermont PPB, LaRiccia VN: *Maximum Penalized Likelihood Estimation: Volume I: Density Estimation*. Springer 2001.
5. Huber PJ: **Fisher information and spline interpolation**. *Ann. Stat* 1974, **2**:1029-1033.

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## References

1. Kostal L, Lansky P, Pokora O: **Variability measures of positive random variables**. *PLoS ONE* 2011, **6**:e21998.
2. Kostal L, Pokora O: **Nonparametric Estimation of Information-Based Measures of Statistical Dispersion**. *Entropy* 2012, **14**:1221-1233.
3. Good IJ, Gaskins RA: **Nonparametric roughness penalties for probability densities**. *Biometrika* 1971, **58**:255-277.

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