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Entropy and Fisher information based measures of statistical dispersion

We propose and discuss two information-based measures of statistical dispersion of timing precision of neuronal firing: the entropy-based dispersion and Fisher information-based dispersion, and compare them with the standard deviation. Although the standard deviation is used routinely, we show, that it is not well suited to quantify some aspects of dispersion that are often expected intuitively, such as the degree of randomness. The proposed dispersion measures are not entirely independent, although each describes the firing regularity from a different point of view. We discuss relationships between the measures and describe their extremal values. We also apply the method to real experimental data from spontaneously active olfactory neurons of rats. Our results and conclusions are applicable to a wide range of situations where the distribution of a continuous positive random variable is of interest.

REFERENCES

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