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Tuning and mutual info

[draft]

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Notes and memos on rate, tuning, mutual information.

Note: Dear Reader, please remember that you're the ultimate peer-reviewer of anything you read.

1 Synopsis

We have three time-dependent quantities: activity $a(t)$, position $\boldsymbol{r}(t) \coloneqq \big(x(t), y(t)\big)$, direction $\theta(t)$. The first is a generalized function[1], the second a 2D vector, the third an angle (periodic). We are interested in the statistical associations between the first and the second, the first and the third, and the first and the second & third jointly.

By statistical association we mean the features of the limit joint frequencies of these quantities, in a hypothetical experiment which lasts a very long time and the experimental conditions remain the same. We are therefore not speaking about 'causal' relations among the quantities.

Bibliography

('de *X*' is listed under D, 'van *X*' under V, and so on, regardless of national conventions.)

Egorov, Y. V. (1990a): *A contribution to the theory of generalized functions*. Russ. Math. Surveys (Uspekhi Mat. Nauk) **45**[5], 1–49.

— (1990b): *Generalized functions and their applications*. In: Exner, Neidhardt (1990), 347–354.

Exner, P., Neidhardt, H., eds. (1990): *Order, Disorder and Chaos in Quantum Systems*. (Birkhäuser, Basel).

Lighthill, M. J. (1964): *Introduction to Fourier Analysis and Generalised Functions*. (Cambridge University Press, London). First publ. 1958.

[1] Egorov 1990a,b; Lighthill 1964.