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Aspects of the permutation entropy

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Recent results show that there is a close relation of the Kolmogorov- Sinai entropy and the relatively new concept of Permutation entropy based on measuring the diversity of ordinal patterns in a dynamical system. In order to get more insights into this relation, we discuss how the Kolmogorov-Sinai entropy of a discrete-time measure-preserving dynamical can be obtained from the ordinal patterns obtained via measurements by a collection of real-valued random variables. We show that under certain separation conditions the distribution of these patterns is sufficient for determining the Kolmogorov-Sinai entropy (see [1]). On the base of this statement, we discuss Permutation entropy and, in the case of ergodicity, the estimation of Kolmogorov-Sinai entropy. Finally, we give two new variants of Permutation entropy, a conditional and a robust one (see [3, 1]), and illustrate their performance in data analysis.

References

[1] K. Keller, S. Maksymenko, I. Stolz, Entropy determination based on the ordinal structure of a dynamical system, to appear in *Discrete Contin. Dyn. Syst. B.*

[2] K. Keller, A.M. Unakafov, V.A. Unakafova, Ordinal Patterns, Entropy, and EEG, *Entropy* 16 (2014), 6212-6239.

[3] A.M. Unakafov, K. Keller, Conditional entropy of ordinal patterns, *Physica D* 269 (2014), 94-102.