Correlations, scale-invariance and entropy

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We focus on a generic system having N elements or subsystems that might be probabilistically correlated, particularly in a scale-invariant manner.
The entropy that can be adequately associated is analyzed. The connections with nonlinear dynamical systems are illustrated as well. Finally, numerical evidence is provided which suggests the existence of a new central limit theorem, different from the usual Gaussian and Levy-Gnedenko ones. The whole scheme seems to be well adapted to financial and other complex phenomena.

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