CHARACTERIZING EXTREME EVENTS IN SPACE PHYSICS WITH MACHINE LEARNING

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Abstract:

How to effectively characterize extreme events in space physics is still an open issue especially in the context of space weather monitoring. This article attempts to advance this direction incorporating extreme fluctuations (endogenous and exogenous) as a characteristic of non-Gaussian fluctuations related to self-affine and multifractal inhomogeneous scaling. Starting from the generalized Wiener-Khinchin theorem for nonstationary processes [1], we derive a spectral parameter-space that characterizes distinct classes of complex stochastic fluctuations from the Ornstein-Uhlenbeck process [2] and MIMC1 (p-model)[3]. Examples of data from different experiments in space physics are used to discuss the effectiveness of the proposed method mainly within the scope of supervised data analytics using machine learning.

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References:

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