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STATIONARITY AS A PATH PROPERTY

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Abstract: Traditionally, stationarity refers to shift invariance of the distribution of a stochastic process. In this paper, we rediscover stationarity as a path property instead of a distributional property. More precisely, we characterize a set of paths, denoted by A, which corresponds to the notion of stationarity. On one hand, the set A is shown to be large enough, so that for any stationary process, almost all of its paths are in A. On the other hand, we prove that any path in A will behave in the optimal way under any stationarity test satisfying some mild conditions.

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