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Title:	Scalable ultra-sensitive detection of heterogeneity via coupled bistable dynamics
Authors:	Singh, K.P. (/jspui/browse?type=author&value=Singh%2C+K.P.) Kapri, R. (/jspui/browse?type=author&value=Kapri%2C+R.) Sinha, Sudeshna (/jspui/browse?type=author&value=Sinha%2C+Sudeshna)
Issue Date:	2012
Publisher:	EPLA
Citation:	Europhysics Letters, 98 (6), art. no. 60004,
Abstract:	We demonstrate how the collective response of N globally coupled bistable elements can strongly reflect the presence of very few non-identical elements in a large network of otherwise identical elements. Counter-intuitively, when there are a small number of elements with natural stable state different from the bulk of the elements, all the elements of the system evolve to the stable state of the minority due to strong coupling. The critical fraction of distinct elements needed to produce this swing shows a sharp transition with increasing N, scaling as . Furthermore, one can find a global bias that allows robust one-bit sensitivity to heterogeneity. Importantly, the time needed to reach the attracting state does not increase with the system size. We indicate the relevance of this ultra-sensitive generic phenomenon for massively parallelized applications, such as the determination of the existence of a needle in a haystack by one measurement
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