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| Title:                  | Identifying nodal properties that are crucial for the dynamical robustness of multistable networks  |
| Authors:                | Rungta, Pranay Deep (/jspui/browse?type=author&value=Rungta%2C+Pranay+Deep)<br>Meena, C. (/jspui/browse?type=author&value=Meena%2C+C.)<br>Sinha, Sudeshna (/jspui/browse?type=author&value=Sinha%2C+Sudeshna)   |
| Keywords:               | Betweenness centralities<br>Bistable elements<br>Localized perturbation<br>Network topology   |
| Issue Date:             | 2018  |
| Publisher:              | American Physical Society   |
| Citation:               | Physical Review E, 98(2).   |
| Abstract:               | We investigate the collective dynamics of bistable elements connected in different network topologies and estimate the network response to localized perturbations on different classes of nodes by introducing a variant of the concept of multinode basin stability. We show that perturbations on nodes with high closeness and betweenness centrality drastically reduces the capacity of the system to return to the original state. This effect is most pronounced for a star network, where perturbation of the single hub node can destroy the collective state, while the system manages to recover even when a majority of the peripheral nodes are strongly perturbed. This demonstrates the extreme effect of the centrality of the perturbed node on the stability of the network. Further, we exploit the difference in centrality distributions in random scale-free networks with $m=1$ and $m=2$ to probe which property most influences the collective dynamics in heterogeneous networks. Significantly, we find clear evidence that the betweenness centrality of the perturbed node is more crucial for dynamical robustness than closeness centrality or degree of the node. This allows us to decide which nodes to safeguard in order to maintain the collective state of a network against targeted localized attacks. |
| URI:                    | <a href="https://journals.aps.org/pre/abstract/10.1103/PhysRevE.98.022314">https://journals.aps.org/pre/abstract/10.1103/PhysRevE.98.022314</a><br>( <a href="https://journals.aps.org/pre/abstract/10.1103/PhysRevE.98.022314">https://journals.aps.org/pre/abstract/10.1103/PhysRevE.98.022314</a> )<br><a href="http://hdl.handle.net/123456789/1900">http://hdl.handle.net/123456789/1900</a> ( <a href="http://hdl.handle.net/123456789/1900">http://hdl.handle.net/123456789/1900</a> )   |
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