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Title:	Vulnerability analysis of power grid with the network science approach based on actual grid characteristics: A case study in Iran.

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Abstract: Abstract The vulnerability analysis of power grids has long been of paramount interest to researchers and authorities. Network vulnerability analysis refers to beforehand evaluation of the impact of local failures on the network as a whole so that proper measures could be adopted before occurrence of any major crisis. Previous studies on power grid vulnerabilities that are based on network science concept have been mostly concentrated on topological measures and unweighted networks. In this paper, grid vulnerability identification is carried out by combined use of grid network topology and centrality measures along with real and physical characteristics of power grid. Namely line load and failure rate, with the help of Weighted PageRank algorithm. The main advantage of this approach is that it eliminates complex and time-consuming differential calculations, which results in reduced computation time, and allows real-time updating of the result based on changes in the actual grid characteristics. The proposed model was validated by implementation over a section of Iranian 400 kV and 230 kV power grids. The striking accuracy of the achieved result was confirmed by comparison against results that obtained through calculations by Iran's national dispatching body. Highlights •

We do not just use the centrality measure. We combined use of grid network topology and centrality measures with real and physical characteristics of power grid. • The advantage of this approach is that it eliminates complex and time-consuming differential calculations. • We used real dataset and the results were compared with dispatching center and verified. [ABSTRACT FROM AUTHOR]

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