Cascading behaviors in random directed dependency networks[1]

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— Cascading behaviors have been studied only for some specific dependency network systems. In this paper, we present a more general and realistic network system with both random connectivity and directed dependency links. Using percolation approach, we obtained the universal boundaries among first order transition, second order transition and unstable regimes, which depend only on less than fourth moment of degree distribution and the fractions of zero and one directed dependency link nodes. Moreover, besides the connectivity degree distribution, we also find the final state of dynamical cascading process is determined by out degree distribution of directed dependency links, and the in degree distribution only influence cascading speed.

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