Exhaustive percolation in binary avalanches[1] BJÖRN SAMUELS-
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plex Systems, Duke University — We introduce the concept of binary avalanches as
a generalization of commonly investigated site or bond percolation processes. Binary
avalanches are capable of displaying a behavior that we call exhaustive percolation,
where the fraction of nodes that are not affected by an avalanche approaches zero in
the large system limit. We present a numerical example of exhaustive percolation on
a directed lattice and analytical results for directed random networks. For random
networks, the transition to exhaustive percolation is second order with scaling prop-
erties different from ordinary percolation. Our numerical calculations indicate that
the exhaustive percolation transition on the directed lattice is also second order.
Our analytic results for random networks improve the understanding of dynamical
properties in random Boolean networks.

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