## Finding Anomalies in Border Gateway Protocol for Routing Data Through the Internet

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Abstract—We carry out an effective clustering of distributed time series graphs. The work uses singular value decomposition (SVD) of spectral gaps of graphs derived from BGP data found at the RouteViews Project at the University of Oregon. We detect extremal events and examine anomalous events that cause disruptions in Internet routing. We use spectral gaps to examine how redundant and sparse the graph is. We base the anomaly detection method in BGP networks on the fact that a drop in the value would signify a lack of this redundancy, which in the distributed redundant Internet would be an anomalous event.

Index Terms—BGP, graph, spectral-gap, expanders, time series, time series clustering, spectral clustering, SVD, power-law 6th Ernest Battifarano

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