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Real-Time Change Detection in Large-Scale Dynamic Networks

In this talk we present a real-time change detection method for monitoring large, dynamic networks with community structure. We model the propensity for communication within and between communities to incorporate the structure of the underlying network. Our focus on communities makes our method scalable to large-scale networks and we use a window-based approach to accommodate network dynamics and a changing node set over time. We monitor deviations from the underlying model, where unexpectedly large deviations indicate potential changes. We benchmark our method using a simulation study with networks of 10,000 nodes and demonstrate its flexibility and detection accuracy. We apply the proposed method to a Reddit network defined by discussions on the r/WallStreetBets subreddit about the stock GME, which experienced one of the most notorious short squeezes in market history as retail investors took on hedge funds to drive GameStop's stock price sky-high. Our method is able to identify changes in the network well before the short squeeze.

Special/ Invited session

ISBIS session

Classification

Mainly methodology

Keywords

anomaly detection, multivariate control chart, network monitoring

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