Graph Mining: Patterns, Generators and Tools

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Abstract. How do graphs look like? How do they evolve over time? How can we generate realistic-looking graphs? We review some static and temporal 'laws', and we describe the "Kronecker" graph generator, which naturally matches all of the known properties of real graphs. Moreover, we present tools for discovering anomalies and patterns in two types of graphs, static and time-evolving. For the former, we present the 'CenterPiece' subgraphs (CePS), which expects q query nodes (eg., suspicious people) and finds the node that is best connected to all q of them (eg., the master mind of a criminal group). We also show how to compute CenterPiece subgraphs efficiently. For the time evolving graphs, we present tensor-based methods, and apply them on real data, like the DBLP author-paper dataset, where they are able to find natural research communities, and track their evolution.

Finally, we also briefly mention some results on influence and virus propagation on real graphs, as well as on the emerging map/reduce approach and its impact on large graph mining.