

Exploiting graphlet decomposition to explain the structure of complex networks: the GHuST framework

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Abstract-

The characterization of topology is crucial in understanding network evolution and behavior. This paper presents an innovative approach, the GHuST framework to describe complex-network topology from graphlet decomposition. This new framework exploits the local information provided by graphlets to give a global explanation of network topology. The GHuST framework is comprised of 12 metrics that analyze how 2- and 3-node graphlets shape the structure of networks. The main strengths of the GHuST framework are enhanced topological description, size independence, and computational simplicity. It allows for straight comparison among different networks disregarding their size. It also reduces the complexity of graphlet counting, since it does not use 4- and 5-node graphlets. The application of the novel framework to a large set of networks shows that it can classify networks of distinct nature based on their topological properties. To ease network classification and enhance the graphical representation of them, we reduce the 12 dimensions to their main principal components. Furthermore, the 12 dimensions are easily interpretable. This enables the connection between complex-network analyses and diverse real applications.

Index Terms- Redes complejas, planificación de la red, graphlets, topología de redes eléctricas

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