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Generalization of effective conductance centrality for egonetworks

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We generalize the concept of effective conductance centrality in this submission using the notion of modulus of families of walks. Modulus is a flexible tool for network analysis, and we show its utility for general networks with undi- rected or directed structures and ego-networksneighborhood networks formed around egos. Ego-networks are increasingly popular due to their ease of data collection and keeping the privacy of network entities. Therefore, we prove that with the language of modulus, the use of effective conductance and its counterpart effective resistance measures can be extended to directed and ego networks. In this manuscript, we discuss analytical solutions and approximation methods for computing the modulus based effective conductance centrality and its egocentric version and offer an effortless way to improve the degree centrality to incorporate the higher order neighborhoods of nodes.

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