

Designing Directed Network with Optimal Controllability

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Abstract : The directedness of links is crucial to determine the controllability in complex networks. Even the edge directions can determine the controllability of complex networks. Obviously, for a given network, we wish to design its edge directions that make this network approach the optimal controllability. In this work, we firstly introduce two methods to enhance network by assigning edge directions. However, these two methods could not completely mitigate the negative effects of inaccessibility and dilations. Thus, to approach the optimal network controllability, the edge directions must mitigate the negative effects of inaccessibility and dilations as much as possible. Finally, we propose the edge direction for optimal controllability. The optimal method has been found to be successfully useful on real-world and synthetic networks.

Keywords : complex network, dynamics, network control, optimization

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