Graph Similarity: Algebraic Model and Its Application to Nonuniform Signal Processing

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Abstract : A recent approach of representing graph signals and graph filters as polynomials is useful for graph signal processing. In this approach, the adjacency matrix plays pivotal role; instead of the more common approach involving graph-Laplacian. In this work, we follow the adjacency matrix based approach and corresponding algebraic signal model. We further expand the theory and introduce the concept of similarity of two graphs. The similarity of graphs is useful in that key properties (such as filter-response, algebra related to graph) get transferred from one graph to another. We demonstrate potential applications of the relation between two similar graphs, such as nonuniform filter design, DTMF detection and signal reconstruction.