

This paper presents methods to compare high-order networks, defined as weighted complete hypergraphs collecting relationship functions between elements of tuples. They can be considered as generalizations of conventional networks where only relationship functions between pairs are defined. Important properties between relationships of tuples of different lengths are established, particularly when relationships encode dissimilarities or proximities between nodes. Two families of distances are then introduced in the space of high-order networks. The distances measure differences between networks. We prove that they are valid metrics in the spaces of high-order dissimilarity and proximity networks modulo permutation isomorphisms. Practical implications are explored by comparing the coauthorship networks of two popular signal processing researchers. The metrics succeed in identifying their respective collaboration patterns.