A CHARACTERIZATION OF TESTABLE HYPERGRAPH PROPERTIES

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Abstract. We provide a combinatorial characterization of all testable properties of k-graphs (i.e. k-uniform hypergraphs). Here, a k-graph property $\mathbf{P}$ is testable if there is a randomized algorithm which makes a bounded number of edge queries and distinguishes with probability $2/3$ between k-graphs that satisfy $\mathbf{P}$ and those that are far from satisfying $\mathbf{P}$. For the 2-graph case, such a combinatorial characterization was obtained by Alon, Fischer, Newman and Shapira. Our results for the k-graph setting are in contrast to those of Austin and Tao, who showed that for the somewhat stronger concept of local repairability, the testability results for graphs do not extend to the 3-graph setting.

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