A Generalization of Menger's Theorem

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Abstract

We propose a generalization of the classical Menger's theorem: For an acyclic directed graph with multiple sources and multiple sinks, we prove that one can choose the Menger's paths between the sources and the sinks such that the number of mergings between these paths is upper bounded by a constant depending only on the min-cuts between the sources and the sinks, regardless of the size and topology of the graph. We also give exact values of and bounds on the minimum number of mergings between these paths, and discuss how the minimum number depends on the min-cuts.