On the Upper Bounds of the g-extra Connectivity of Augmented Hypercubes

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As an enhanced measurement of the fault-tolerance capability of network structures, the g-extra connectivity, $g \geq 0$, is the minimum size of a fault set, referred to as a g-extra cut, whose removal leads to a disconnected graph where every component contains at least $g + 1$ vertices. Many definitive results have been derived for various network structures. Such a result is still evasive for the augmented cube structure, AQ_n, a variant of the classic hypercube.

In this paper, we make an attempt to derive the upper bound of the g-extra connectivity of AQ_n by constructing a general g-extra cut, and a sequence of seemingly optimal anecdotal g-extra cuts; then compare their results, which is a bit surprising, and inconsistent with our intuition. For the future work, we will further explore such constructions to seek one which leads to a minimum g-extra cut, which might point to the right direction of suggesting, and proving, a lower bound result. The combination of such bound results will then give us the expected g-extra connectivity.

Keywords: Interconnection networks; fault tolerance properties; g-extra cut; augmented hypercube