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The Distribution of Values in The Quadratic Assignment Problem

We obtain a number of results regarding the distribution of values of a quadratic function f on the set of $n \times n$ permutation matrices (identified with the symmetric group S_n) around its optimum (minimum or maximum). We estimate the fraction of permutations σ such that $f(\sigma)$ lies within a given neighborhood of the optimal value of f and relate the optimal value with the average value of f over a neighborhood of the optimal permutation.

We describe a natural class of functions f with the property that permutations close to the optimal permutation in the Hamming metric of S_n tend to produce near optimal values of f (such is, for example, the objective function in the symmetric Traveling Salesman Problem). Also, we show that for general f, just the opposite behavior may take place: an average permutation in the vicinity of the optimal permutation may be much worse than an average permutation in the whole group S_n.

This is joint work with Alexander Barvinok.

A preprint is available at

ftp://ftp.math.lsa.umich.edu/pub/barvinok/quas1.ps