

USACO JAN09 Problem 'baric' Analysis

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The problem can be solved by dynamic programming. We turn this problem into the following: partition the array into $k+1$ segments such that the total error is minimized. The division points between consecutive segments correspond to the measurement and once we computed this information for all k , the answer can be extracted.

Given a single interval, the error can be computed by looping through the elements. Of course, special cases are needed for the intervals starting at the beginning or ending with the last entry.

Then to compute $best[i,k]$ when $k > 2$, consider the interval the last element is involved in. If it's at j , then the best value of the segment is $best[j,k-1]$ along with the error of the interval $[i,j]$ using 1 measurement (which we compute earlier).

There are $O(N^2)$ states of the DP, with $O(n)$ possible transitions. Along with the precomputation, the algorithm takes $O(n^3)$.