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MADALGO seminar by Allan Grønlund Jørgensen, Aarhus University

### Selecting Sums in Array

In an array of  $n$  numbers each of the  $\binom{n}{2} + n$  contiguous subarrays define a sum. In this paper we focus on algorithms for selecting and reporting maximal sums from an array of numbers. First, we consider the problem of reporting  $k$  subarrays inducing the  $k$  largest sums among all subarrays of length at least  $l$  and at most  $u$ . For this problem we design an optimal  $O(n + k)$  time algorithm. Secondly, we consider the problem of selecting a subarray storing the  $k$ 'th largest sum. For this problem we prove a time bound of  $\Theta(n \cdot \max\{1, \log(k/n)\})$  by describing an algorithm with this running time and by proving a matching lower bound. Finally, we combine the ideas and obtain an  $O(n \cdot \max\{1, \log(k/n)\})$  time algorithm that selects a subarray storing the  $k$ 'th largest sum among all subarrays of length at least  $l$  and at most  $u$ .

Joint work with Gerth S. Brodal