

1. DP. Let  $f[i][j]$  denote the optimal solution when we partition prefix  $i$  into  $j$  subarrays. Each transition takes  $O(n)$  time.  $O(n^2k)$ .
2. For a fixed  $j$ , transitions to  $f[i][j]$  can be written as the following form:  $\max_{\ell} b_{\ell} + \frac{y - y_{\ell}}{j - x_{\ell}}$ , where  $y = \sum_{1 \leq t \leq i} a_t$  is the prefix sum, and  $(b_{\ell}, x_{\ell}, y_{\ell})$  can be viewed as a 3D point only depends on  $\ell$ . Use dynamic 3D halfspace range emptiness [1] to find the optimal solution.  $\tilde{O}(nk)$ .

remark. improvable?

## References

- [1] Peyman Afshani and Timothy M Chan. Optimal halfspace range reporting in three dimensions. In *Proceedings of the twentieth annual ACM-SIAM symposium on Discrete algorithms*, pages 180–186. SIAM, 2009.