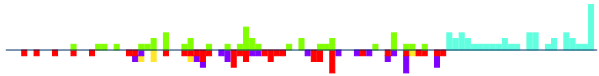
D: Decelerating Jump

Problem Author: Onno Berrevoets



- **Problem:** Given a sequence of n integers $p_1, \ldots, p_n$, find a subsequence $1 = p_{i_1} < p_{i_2} < \cdots < p_{i_k} = n$ such that the distance between consecutive elements does not increase.

Statistics: 146 submissions, 38 accepted, 43 unknown

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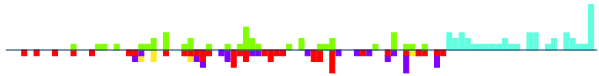

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- **Cubic solution:** Keep a DP table `dp[position][speed]`, which is computed as

$$\mathrm{dp}[i][s] = p_i + \max_{k \geq s} \mathrm{dp}[i-k][k]$$

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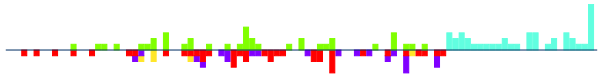

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- **Quadratic solution:** Loop over speed s from $n-1$ to 1, keeping track of the maximum score if you end in each cell with speed at least s. Then update all positions i from 1 to n:

$$\mathrm{dp}[i] = \max(\mathrm{dp}[i], p_i + \mathrm{dp}[i-s])$$

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