Implementing Rank Data Structure

- **Objective**: Design a space-efficient data structure to support queries of the following type
 - $rank_1(B)[i] = \left| \{i' | 1 \le i' \le i, B[i'] = 1 \} \right|$
 - $rank_0(B)[i] = \left| \{i' | 1 \le i' \le i, B[i'] = 0 \} \right|$
 - NOTE: $rank_0(B)$ is directly known from $rank_1(B)$
- An important building block of space-efficient data structures for general data as well as genomic data indexing

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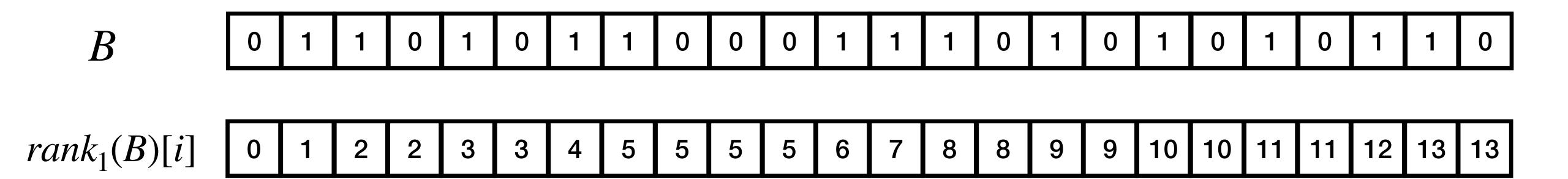
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Naive Algorithm



Succinct Algorithm (4-Russian technique)

