Bütwork

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1)

a) The minimum distance $a_1 a_2 \dots a_k$ and $b_1 b_2 \dots b_k$ represented by

$$D(k, \ell)$$

where k and ℓ are the last indices of strings a and b.

b) For $D(i,j)$, i is the ith index of first string, j is the jth index of second string, and $D(i,j)$ represents the minimum number of mismatches in the alignment.

c) For the first scenario,

$$D(i,j) = 1 + D(i, j-1).$$

d) For the second scenario,

$$D(i,j) = 1 + D(i-1, j).$$

e) For the third scenario,

$$D(i,j) = diff(i,j) + D(i-1, j-1).$$

$diff(i,j)$ is 0 if $a[i] = b[j]$ and 1 otherwise.

f) Whole formulation is,

$$D(i,j) = \min\{1 + D(i, j-1), 1 + D(i-1, j), diff(i,j) + D(i-1, j-1)\}.$$

2) a) The optimization objective function is

$C(i,j)$ = minimum cost of multiplying $A_i \times A_{i+1} \times \dots A_j$

b) i is the starting matrix, and
j is the final matrix, and
$C(i,j)$ represents the minimum cost of multiplying A_i to A_j.

c) for $k = 1$

$$C(i,j) = C(i,1) + C(2,j) + m_{i-1}\, m_1\, m_j$$

where $i \leq 1 < j$.

d) for $k=2$,

$$C(i,j) = C(i,2) + C(3,j) + m_{i-1} m_2 m_j$$

where $i \leq 2 < j$

e) Whole formulation is,

$$C(i,j) = \min_{i \leq k \leq j} \{ C(i,k) + C(k+1,j) + m_{i-1} m_k m_j \}$$