

Local Alignment

Wednesday, February 3, 2021 10:30 AM

Input: Sequences $s_1[1..m]$ and $s_2[1..n]$
 Parameters $\theta: \left\{ \begin{array}{l} \text{match}(m_a) > 0 \\ \text{mismatch}(m_i) < 0 \\ \text{gap}(g) < 0 \end{array} \right\}$

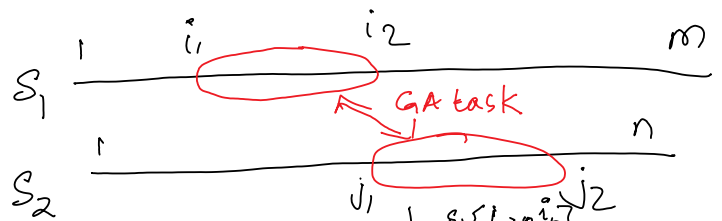
Output: Find a "best" pair of aligning substrings of s_1 & s_2

In other words,

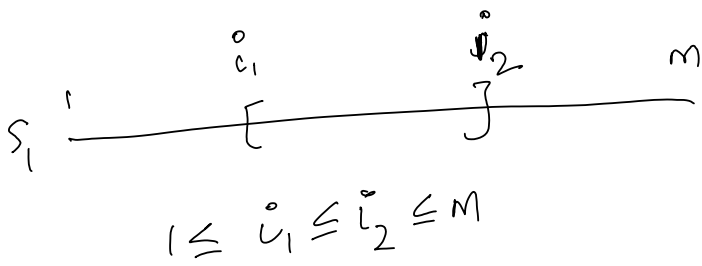
An optimal local alignment

\equiv is an alignment between substrings $\left(\begin{array}{l} s_1[i_0..i_{max}] \\ s_2[j_0..j_{max}] \end{array} \right)$ that produces the maximum possible score over all combinations of substring pairings.

Note: $0 \leq i_0 \leq i_{max} \leq m$
 $0 \leq j_0 \leq j_{max} \leq n$



1) How many # substrings in s_1 ?



$$\binom{m}{2} + m = \frac{m(m-1)}{2} + m = \frac{m(m+1)}{2} = O(m^2)$$

for all pairs of substrings

