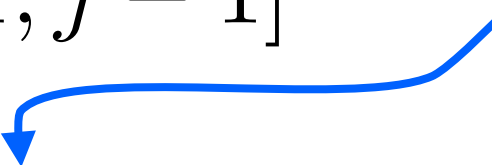


Affine Gap Penalties

$$M[i, j] = \text{match}(i, j) + \max \begin{cases} M[i-1, j-1] \\ X[i-1, j-1] \\ Y[i-1, j-1] \end{cases}$$

$M[i, j]$ match between x and y

If previous alignment ends in match, this is a new gap



$$X[i, j] = \max \begin{cases} \text{gap_start} + \text{gap_extend} + M[i, j-1] \\ \text{gap_extend} + X[i, j-1] \\ \text{gap_start} + \text{gap_extend} + Y[i, j-1] \end{cases}$$

$X[i, j]$ gap in x

$$Y[i, j] = \max \begin{cases} \text{gap_start} + \text{gap_extend} + M[i-1, j] \\ \text{gap_start} + \text{gap_extend} + X[i-1, j] \\ \text{gap_extend} + Y[i-1, j] \end{cases}$$

$Y[i, j]$ gap in y