Forrest Ireland

Mark Klick

John Talbot

Multiple Sequence Alignment Worst Case Analysis

**Needleman Wunsch Alignment of 2 Sequences**

The first two for loops to initialize the first row and column of the score matrix **(a)**

Then we add in the nested for loops at **(b)**

Next we add in the trace back procedure at **(c)**. In a worst case scenario, this procedure would have to travel through the matrix in the longest possible path while always decreasing i or j with each move. Therefore this path would end up being m + n moves long. So…

Therefore the efficiency class of this algorithm is ϴ(mn), which is similar to ϴ(n2)

**Neighbor Joining**

Neighbor Joining = alignments

Substitute in for each which gives

Neighbor Joining =

which reduces to