

Today

Finish Sequence Alignment

Discussion about DP vs. DAC

ex: $P_{gap} = 2$ (insertions and deletions more unlikely than mutations)
 $P_{mm} = 1$

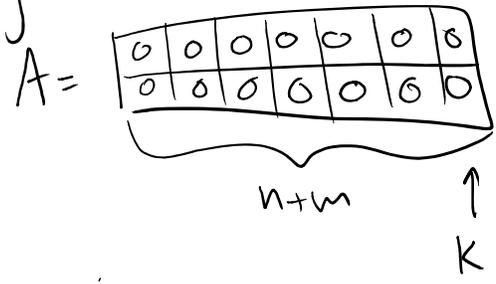
| | | | | | | | |
|--|--|-----|-----|---|---|----|-----|
| | | | TAG | | | | |
| | | | | | | | |
| | | TAG | 3 | 6 | 5 | 4 | 2 |
| | | TA | 2 | 4 | 3 | 2 | 3 |
| | | T | 1 | 2 | 1 | 2 | 5 |
| | | 0 | 0 | 0 | 2 | 4 | 6 |
| | | | | 0 | 1 | 2 | 3 |
| | | | | 0 | C | CT | CTG |

Work back through array

$i = n$
 $j = m$

Also $X = [x_1 | x_2 | \dots | x_n]$

$y = [y_1 | y_2 | \dots | y_m]$



$k = n+m$

while ($k \geq 1$)

{ if ($P(i,j) = P(i-1,j) + P_{gap}$)
 $A[k,1] = X[i]$
 $i--$

} Check if optimal solution has gap in j at position k

else if ($P(i,j) = P(i,j-1) + P_{gap}$)
 $A[k,2] = Y[j]$
 $j--$

} Check if optimal solution has a gap in i at position k

else

$A[k,1] = X[i]$
 $A[k,2] = Y[j]$
 $i--$
 $j--$

} Otherwise, no gap

$k--$

← Break if $P(i,0)$
 $P(0,j)$

Loop Invariant?

- $A[k+1:end]$ is optimal alignment of X, y from $k+1$ to end of A
- Initialization ✓
- Termination (gives us what we want) ✓
- Maintenance ✓ using $P(i, j)$ properties
 - ↳ rest should be optimal for X_i, y_i
 - ↳ use $P(i, j)$ properties to fix $A[k;]$