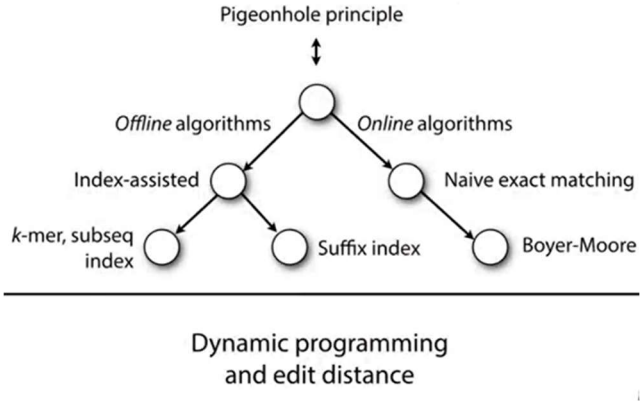
Read Alignment Methods



Number of Character Comparisons Example

How many character comparisons in this example?

P: word
T: There would have been a time for such a word

```
word word word word word word word word word
 word word word word word word word word word
  word word word word word word word word word
   word word word word word word word word word
    word word word word word word word word word
```

40 mismatches + 6 matches = 46 character comparisons

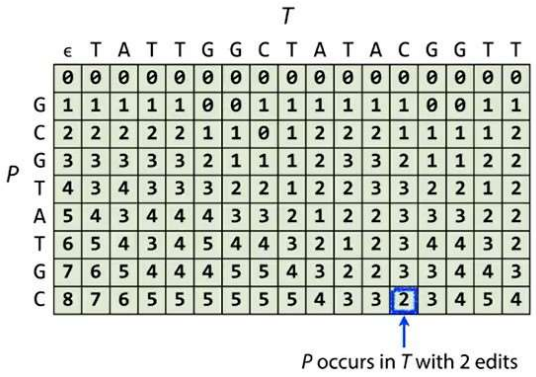
Much closer to minimum (41) than maximum (164)

Edit Distance Matrix

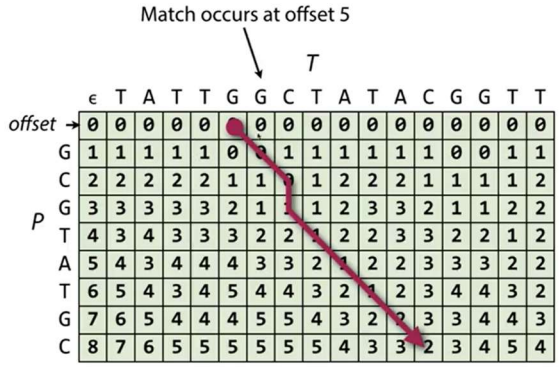
X \ Y	ϵ	G	C	T	A	T	A	C
ϵ	0	1	2	3				
G	1	0	1	2				
C	2	1	0	1				
G	3	2	1	1				
T								
A								
T								
G								
C								

$$\mathbf{edist}(\alpha x, \beta y) = \min \begin{cases} \mathbf{edist}(\alpha, \beta) + \delta(x, y) & = 0 + 1 = 1 \\ \mathbf{edist}(\alpha x, \beta) + 1 & = 1 + 1 = 2 \\ \mathbf{edist}(\alpha, \beta y) + 1 & = 1 + 1 = 2 \end{cases}$$

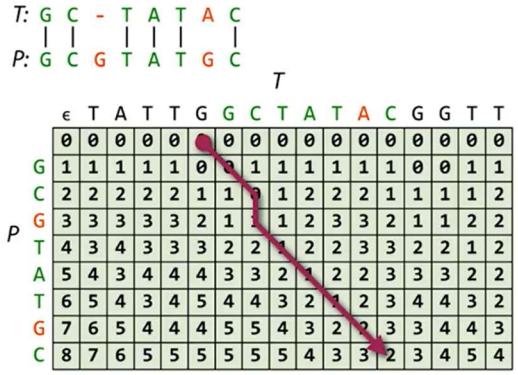
Alignment Matrix



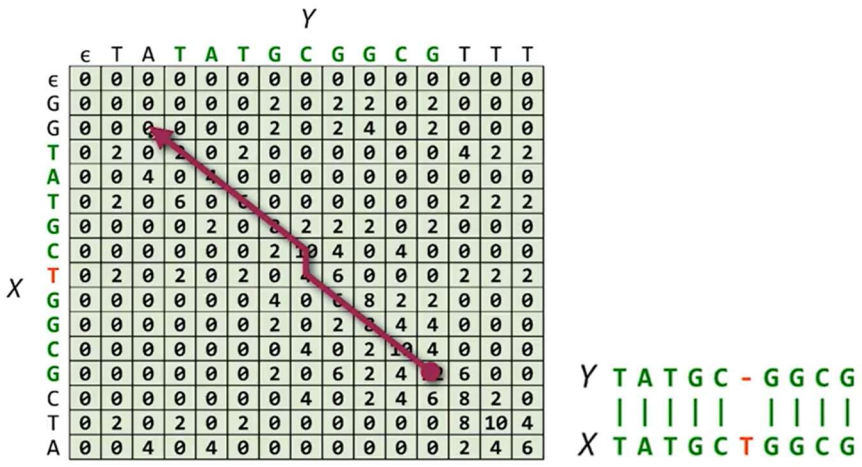
Shortest edit distance btwn the full strings



Path to the shortest distance

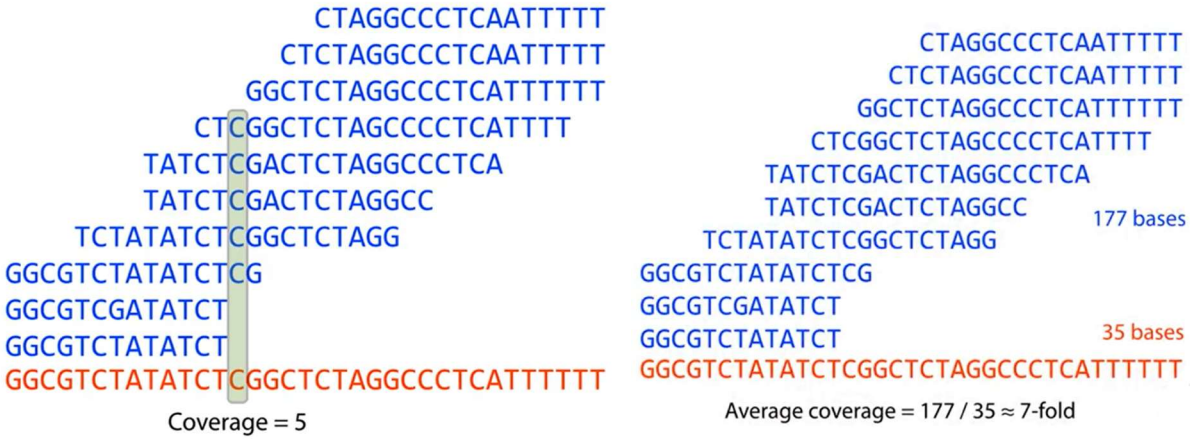


Local Alignment Matrix

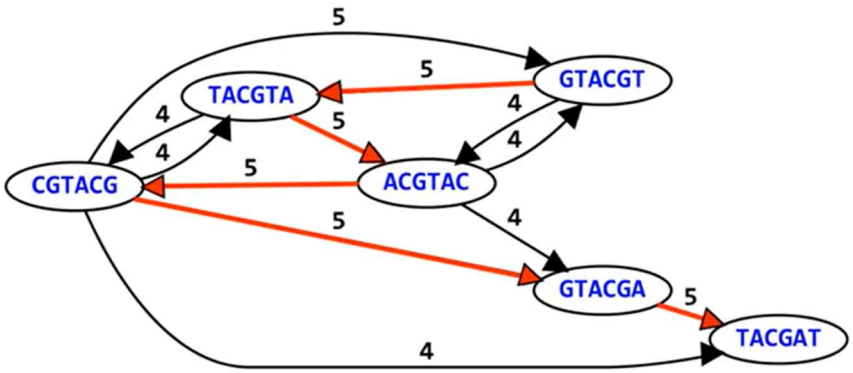


de novo Shotgun Assembly

Coverage



Overlap Graphs

Nodes: all 6-mers from GTACGTACGAT

Edges: overlaps of length ≥4