Clustal Progressive Alignment

Steps in Multiple Alignment

(A) Pairwise Alignment
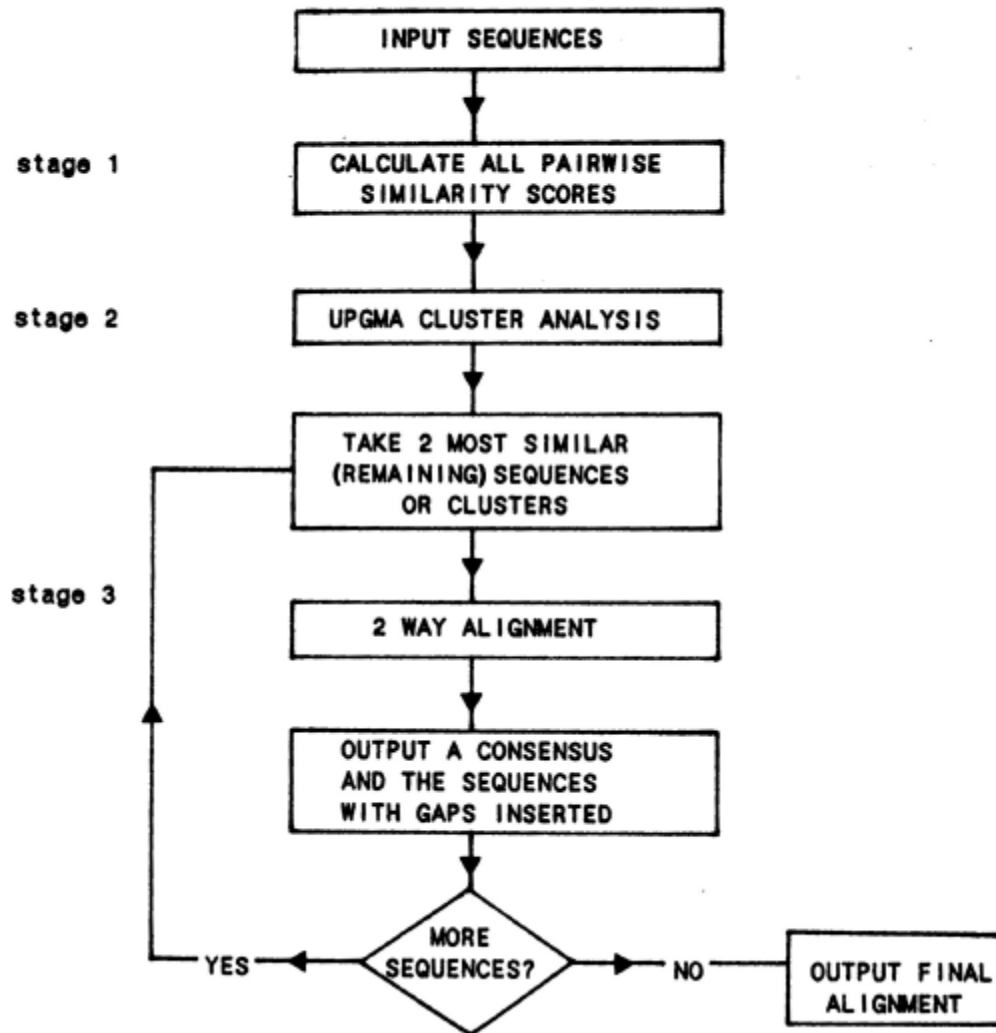
Example - 4 sequences $S_1\,S_2\,S_3\,S_4$

S_1

S_2 6 pairwise comparisons

S_3 then cluster analysis

S_4

S_2

S_4

S_1

S_3

similarity
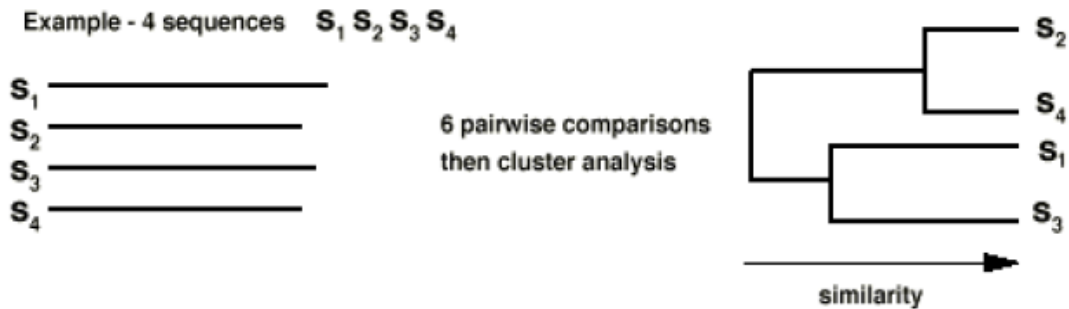
(B) Multiple alignment following the tree from A

S_2

S_4 align most similar pair

Gaps to optimize alignment

S_1

S_3 align next most similar pair

New gap to optimize
alignment of (s s) with (s s)
$\quad\quad\quad\quad\quad$ 2 4 $\quad\quad\quad$ 1 3

S_2

S_4

S_1 align alignments - preserve gaps

S_3
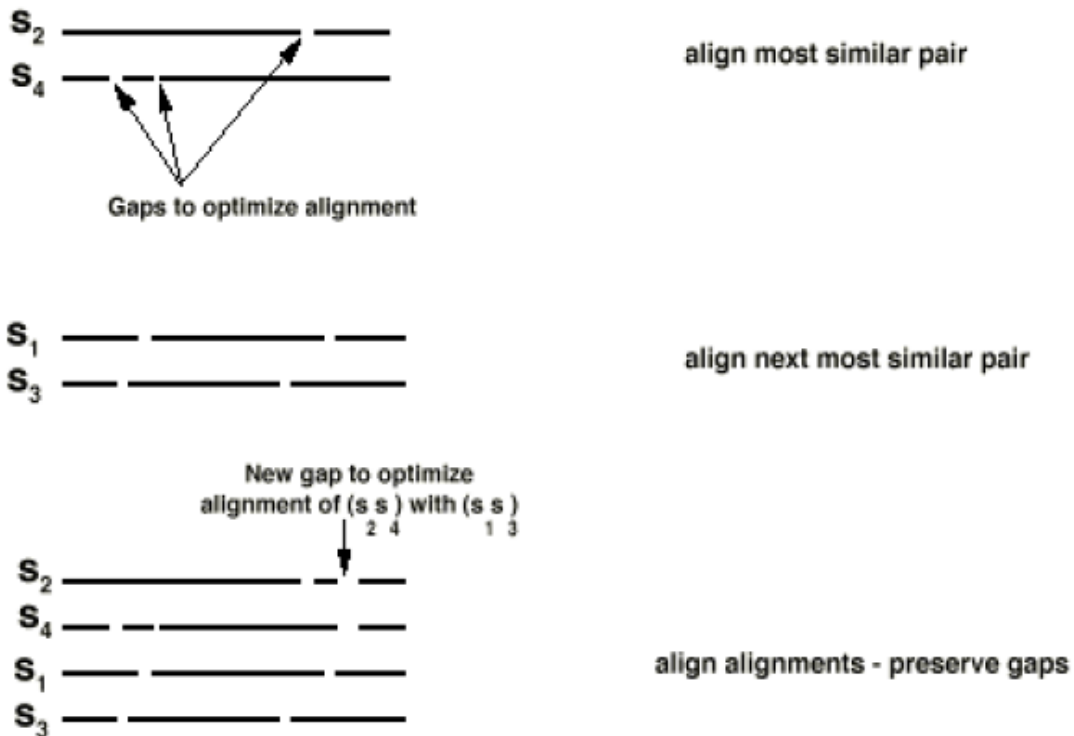
From: Doug Brutlag, BioMedical Informatics, Stanford University, 2010

Clustal Procedure

From: Doug Brutlag, BioMedical Informatics, Stanford University, 2010