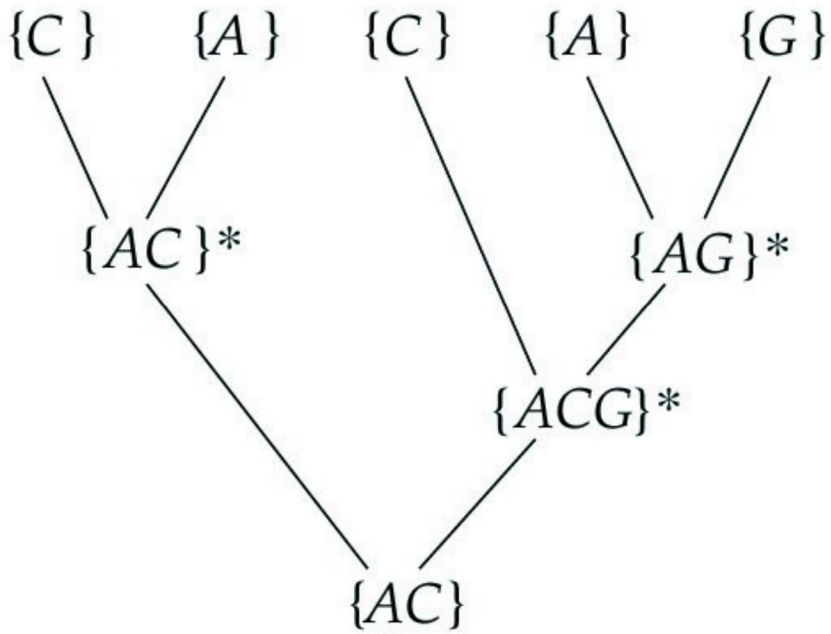
Tutorial 5

COMP90014 Algorithm for Bioinformatics

Semester 2, 2025

Fitch algorithm: example 1



For each leaf v:

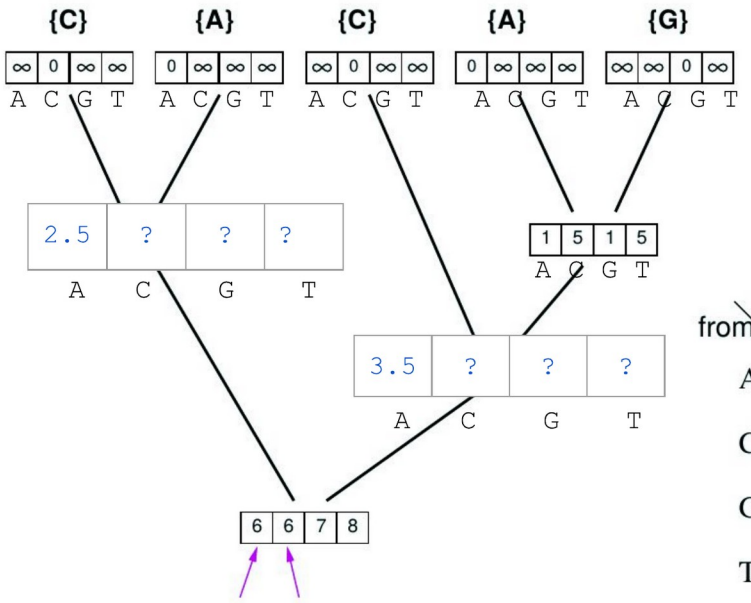
$$S_v = \{v_c\}$$

For any internal node v:

$$S_v = \{S_u \cap S_w \text{ if } S_u \cap S_w \neq 0$$
$$S_u \cup S_w \text{ otherwise}\}$$

- $L(T) = 3$
- Repeat the process for each column
- Changes have the same cost

Sankoff example



cost matrix:

from \ to	A	C	G	T
A	0	2.5	1	2.5
C	2.5	0	2.5	1
G	1	2.5	0	2.5
T	2.5	1	2.5	0

S_i?

$$i = A$$
$$j = A, C, G, T$$
$$k = A, C, G, T$$

$$S_a(i) = \min[c_{ij} + S_L(j)] + \min[c_{ik} + S_R(k)]$$

- Limitation: implicitly assumes that rate of change along branches is similar