SCJ

- Distance between two genomes
- Weighted median, *n* genomes
- Median of three genomes

Distance

- Distance between genomes Σ and Π

$$d(\Sigma, \Pi) = |\Sigma - \Pi| + |\Pi - \Sigma|$$
$$= |\Sigma| + |\Pi| - 2|\Sigma \cap \Pi|$$

- Each genome is a set of adjacencies

Weighted median

- Genomes $\Pi_1, \Pi_2, \ldots, \Pi_n$
- Weights $w_1, w_2, \ldots, w_n$
- Find genome Γ such that

  $\sum_i w_i d(\Gamma, \Pi_i)$

  is minimum

Weighted median

- Each adjacency can be viewed as a genome

$$d(\alpha, \Pi_i) = \begin{cases} |\Pi_i| - 1 & \alpha \in \Pi_i \\ |\Pi_i| + 1 & \alpha \notin \Pi_i \end{cases}$$

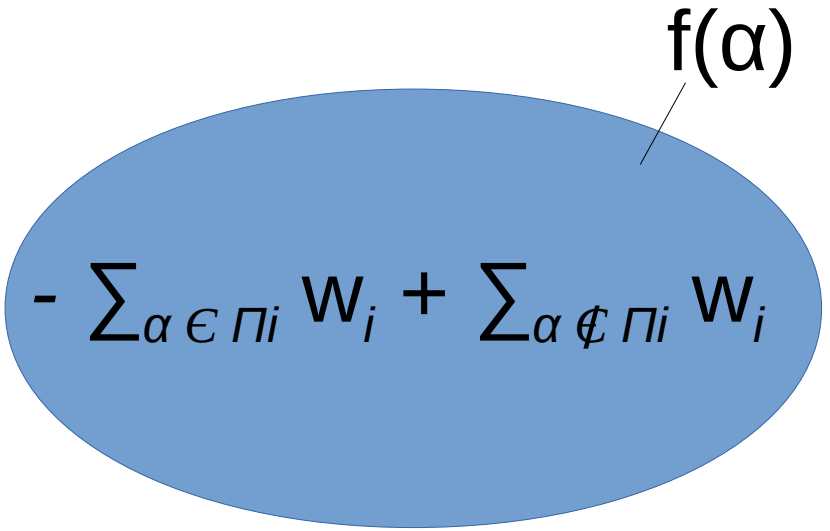
$$\sum_i w_i \, d(\alpha, \Pi_i) = \sum_i w_i |\Pi_i| - \sum_{\alpha \in \Pi i} w_i + \sum_{\alpha \notin \Pi i} w_i$$

Weighted median

- Each adjacency can be viewed as a genome

$$d(\alpha, \Pi_i) = \begin{cases} |\Pi_i| - 1 & \alpha \in \Pi_i \\ |\Pi_i| + 1 & \alpha \notin \Pi_i \end{cases}$$

$$\sum_i w_i \, d(\alpha, \Pi_i) = \sum_i w_i \, |\Pi_i| - \sum_{\alpha \in \Pi i} w_i + \sum_{\alpha \notin \Pi i} w_i$$



Weighted median

- Take all adjacencies α such that

  $f(\alpha) < 0$

- If α and β conflict, then $f(\alpha) + f(\beta) \geq 0$

Median

- Genomes Π_1, Π_2, Π_3
- Weights 1, 1, 1
- $f(\alpha) = -3, -1, 1, \text{or } 3$
- Unique median: adjacencies with $f(\alpha) < 0$