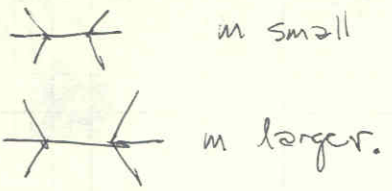
XII. Solution: scale?



Scale tree by factor m.

$N_i \equiv$ ith leaf node

$l_{ij} \equiv \Delta_T(N_i, N_j)$

$m \equiv$ scale

$v_{ij} \equiv$ coord of $v_i \rightsquigarrow N_i$

$$\min(-m) \text{ s.t. } |v_i - v_j| \geq m l_{ij}, \quad v_{ix} \geq 0, \; v_{ix} \leq 1, \; v_{iy} \geq 0, \; v_{iy} \leq 1 \quad \forall\, i,j$$

-- Nonlinear, nonconvex constrained optimization
↑ typically quadratic

XIII. Constraints:

Symmetry, etc — see ch 14 of ODS.
Mostly linear, some higher order polynomial

XIV. Strain (ch 14 of ODS)

$$l_{ij} = \sum_k e_j \Rightarrow \sum_k (1+\sigma_k) e_k$$

now $\min\left(-\sum_{k \in K} \sigma_k\right)$ "maximize common strain"

or $\min \sum \sigma_k^2$ "minimize RMS strain"

XV. Treemaker demo.

✱ Open problem / conjecture: For a given active polygon & subtree, the crease pattern that folds flat & whose projection is the given tree ~~with~~ with the minimum total crease length is always the Universal Molecule.

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