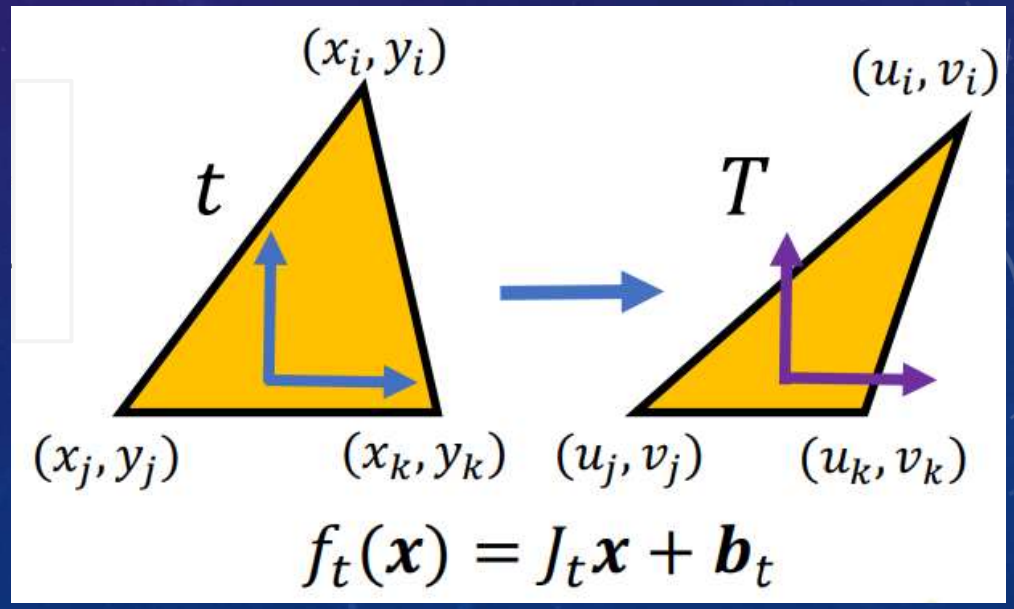
As-rigid-as-possible (ARAP)

- Liu L, Zhang L, Xu Y, et al. A local/global approach to mesh parameterization [C]//Computer Graphics Forum. Oxford, UK: Blackwell Publishing Ltd, 2008, 27(5): 1495-1504
- Homework #3, ARAP + ASAP, Deadline 2024.03.31

Formulation

- Variables: parameterization coordinate (u_i, v_i) and target transformations L_t
- Energy: $E(u, v, L) = \sum_t A_t \|J_t(u, v) - L_t\|_F^2$
- Target transformation L_t
  - Isometric mapping: rotation matrix
  - Conformal mapping: similar matrix



Local-global solver

$$E(u, v, L) = \sum_t A_t \| J_t(u, v) - L_t \|_F^2$$

Alternatively optimization

- Local step: fix (u, v), optimize L_t.
- Global step: fix L_t, optimize (u, v)

Local-global solver

$$E(u, v, L) = \sum_t A_t \| J_t(u, v) - L_t \|_F^2$$

Alternatively optimization

- Local step: fix (u, v), optimize L_t (SVD).
- Global step: fix L_t, optimize (u, v) (quadratic energy)

Global solver

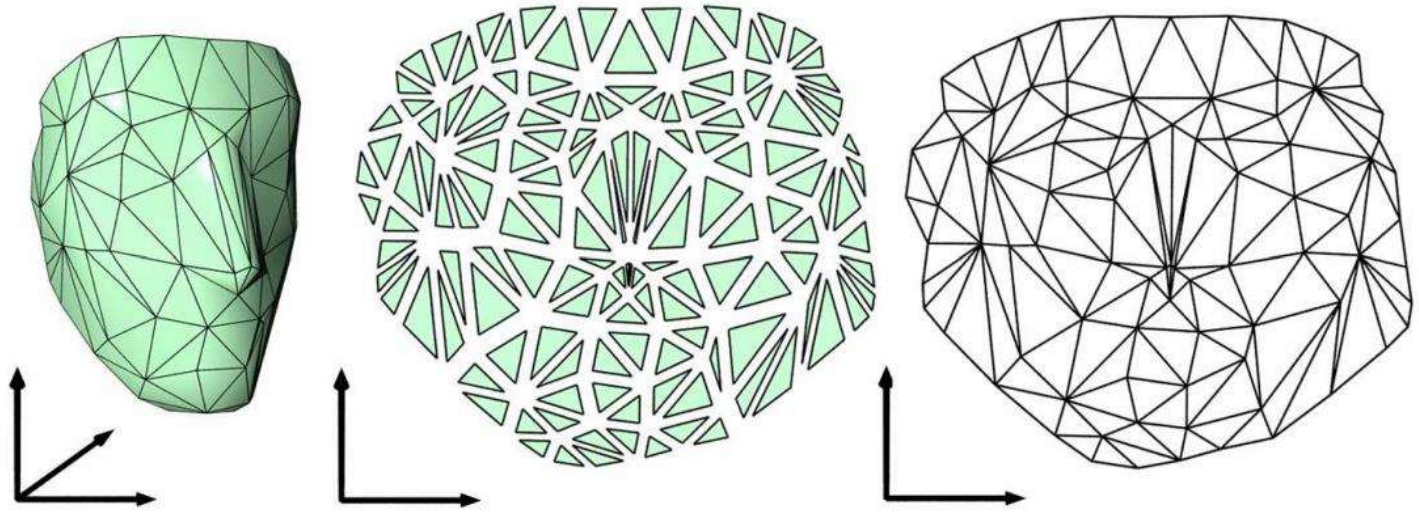


Figure 2: *Parameterizing a mesh by aligning locally flattened triangles. (Left) Original 3D mesh; (middle) flattened triangles; (right) 2D parameterization.*