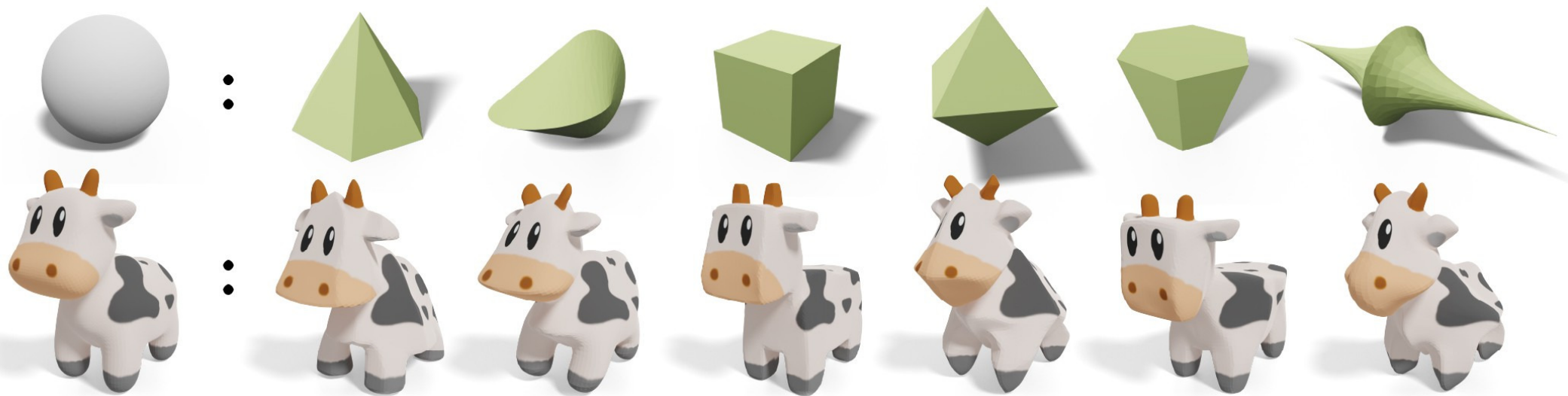


Normal-Driven Spherical Shape Analogies

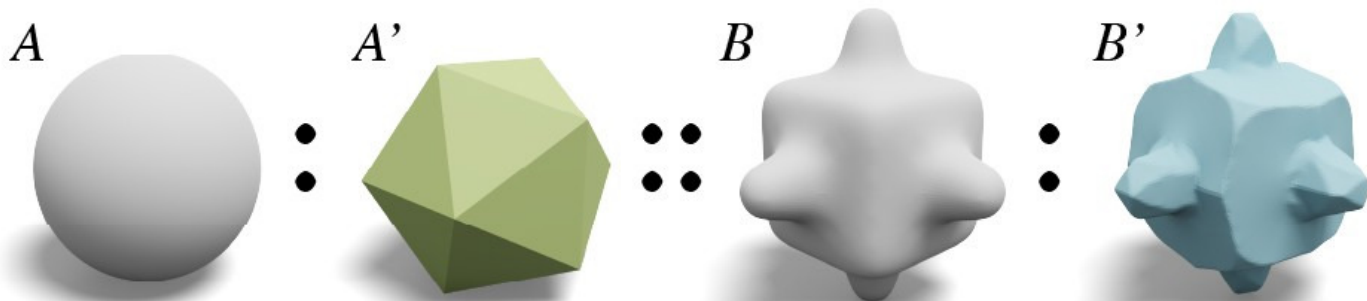
Hsueh-Ti Derek Liu and Alec Jacobson
University of Toronto

Symposium on Geometry Processing 2021 (SGP21)

- What is the goal? : Transferring style between meshes

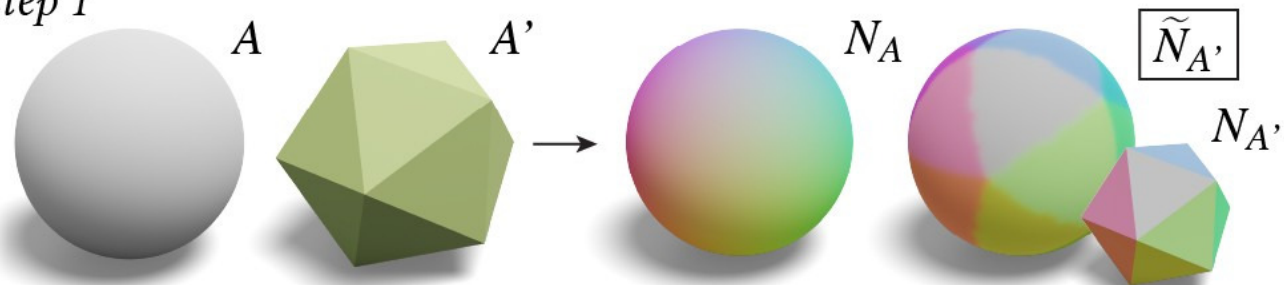


- How is it done? : Shape analogies on surface normals

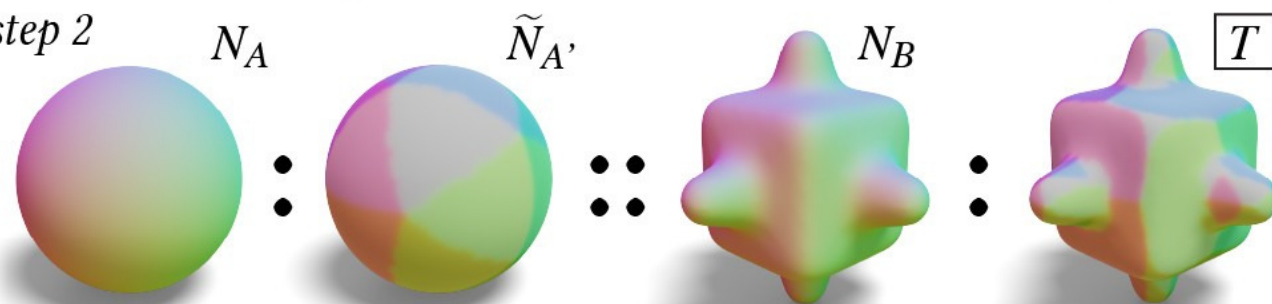


Core concept:

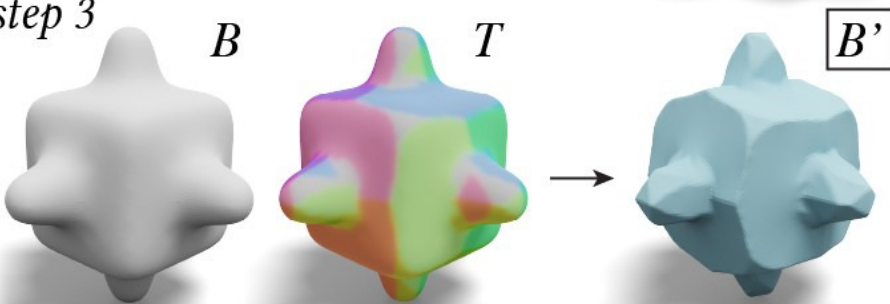
step 1



step 2

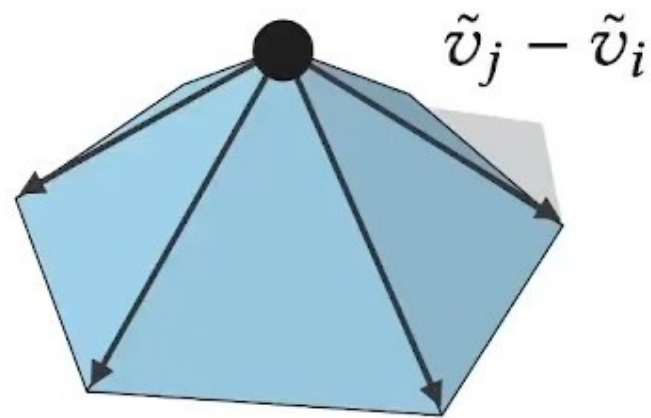
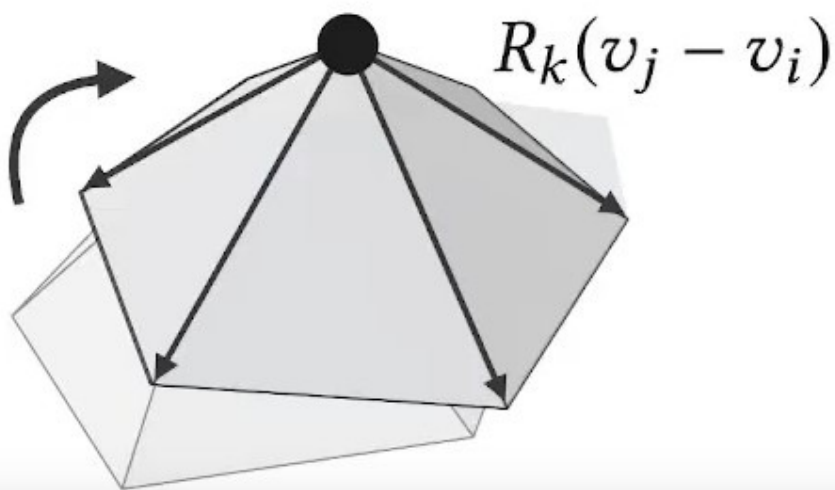


step 3



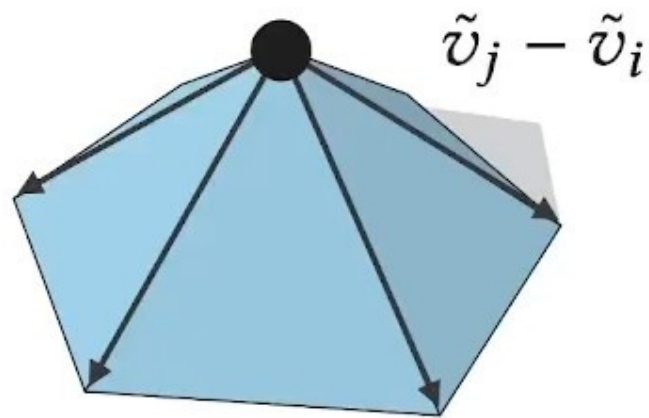
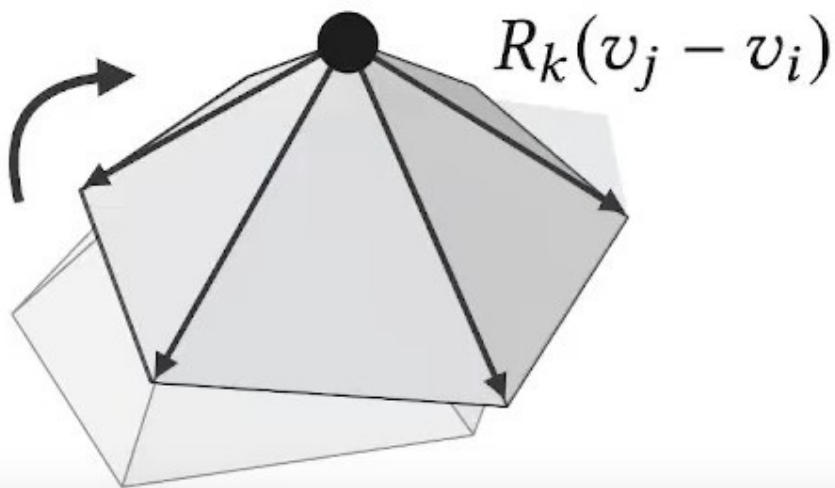
- Deformation: Normal-Driven Optimization

$$\min_{V', R} \underbrace{\sum_{k \in V} \sum_{i, j \in \mathcal{N}_k} w_{ij} \|R_k \mathbf{e}_{ij} - \mathbf{e}'_{ij}\|_2^2}_{E_{\text{ARAP}}} + \lambda a_k \|\hat{n}_k(V') - \mathbf{t}_k\|_2^2.$$

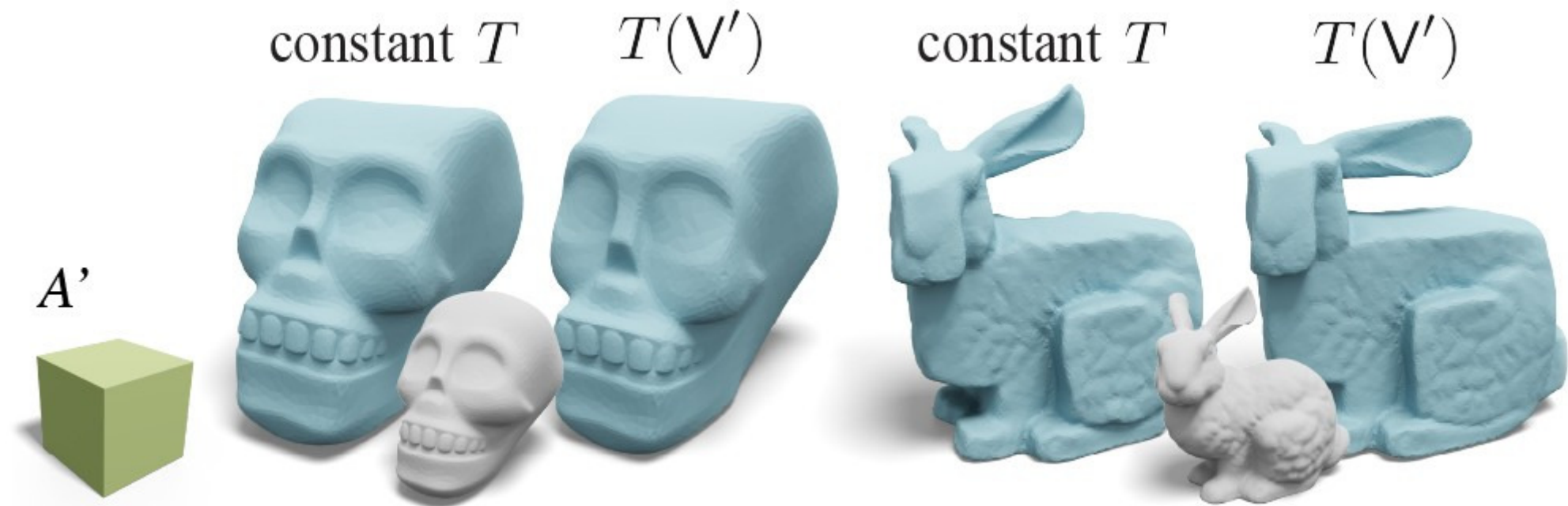


- Deformation: Normal-Driven Optimization

$$\min_{V', R} \sum_{k \in V} \sum_{i, j \in \mathcal{N}_k} w_{ij} \|R_k \mathbf{e}_{ij} - \mathbf{e}'_{ij}\|_2^2 + \lambda a_k \|R_k \hat{\mathbf{n}}_k - \mathbf{t}_k\|_2^2$$

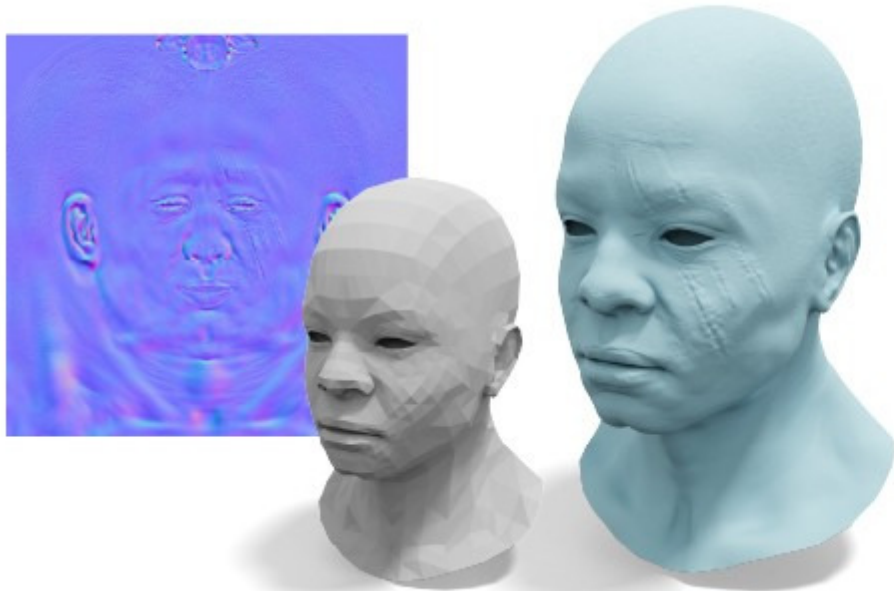


- Extensions:
 - Constant target normals
 - Dynamic target normals

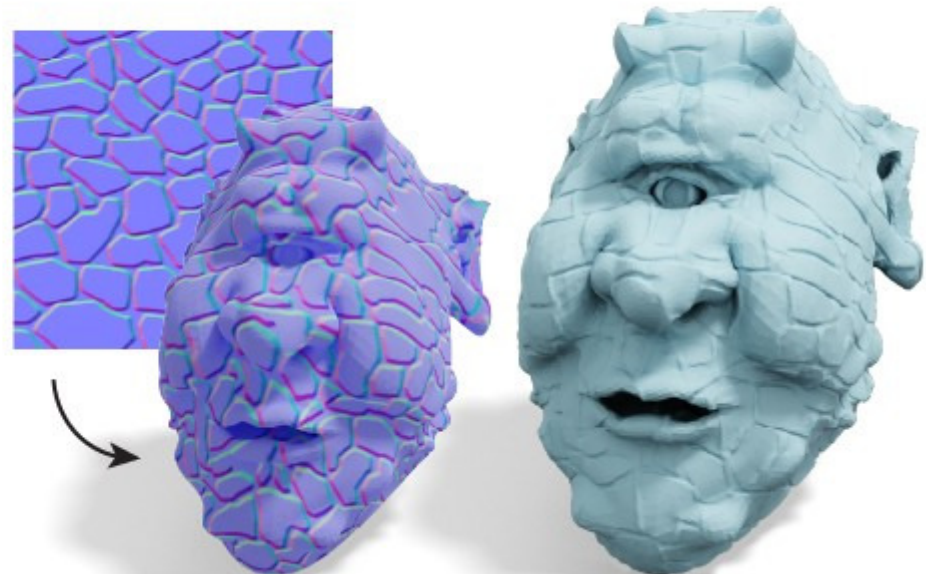


- Extensions:
 - Others regularisation energies : Face-only ARAP, Energy As-Conformal-As-Possible
 - Normal maps

unbaking normal maps



normal texture synthesis



- To conclude :
 - Efficient normal-driven deformation
 - Easily plugged in to any normal mapping method
 - Style transfer limited to normals