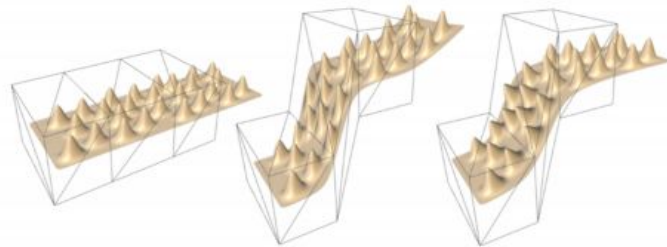
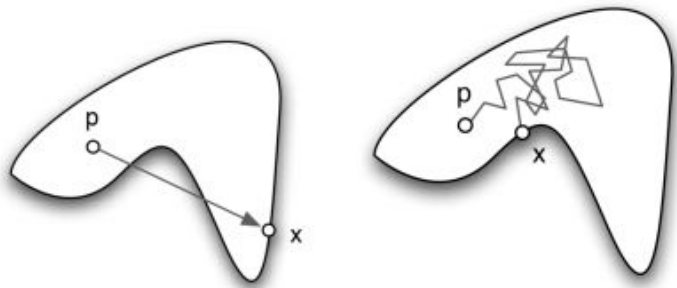


Cage Based Deformation

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Background

- Cage based deformation is a model deformation technique that encloses a target object within a cage structure that closely resembles its geometry. This cage can then be subject to transformations that cause intuitive deformation of the internal object.
- It is a technique closely coupled with animation.
- The course notes outline 3 researched methods to extend influence of the cage vertices onto the internal object.
- Mean Value Coordinates, Harmonic Coordinates, Green Coordinates
- Each subsequent method fixes a drawback from the previous one, but becomes more complicated.



Our program (features)

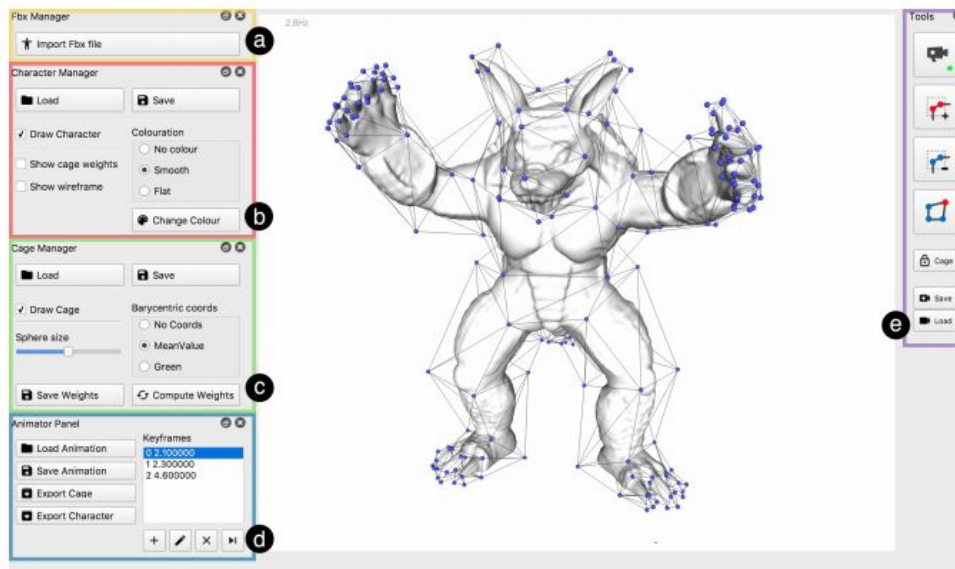
- Import a generic model
- Generate a rough “Best-Guess” cage
- Allow user to refine local cage regions
- Allow user to select 1 of 3 coordinate methods to use
- Auto-compute the “weights” for the cage vertices based on the chosen coordinate method
- Provide a simple interface for the user to transform the cage in order to deform the model
- Export the deformed model (+cage?)

Our focus

- How do we generate our “Best-Guess” cage?
 - Automatic techniques? (e.g. mesh simplification, voxelization)
 - Problem: can produce suboptimal cages that still work for deformation, but may not be suitable for animation or hard to edit.
 - User-assisted techniques? (e.g. contour drawing, cutting planes)
 - Problem: requires more time/experience from the user
 - Combination?
- How do we limit the number of steps for the user to refine the cage?
- How do we make it easier for the user to transform the cage?

Source of reference

- <https://github.com/cordafab/Cagelab2018> **CageLab: an Interactive Tool for Cage-Based Deformations**
 - Allows deformation of a model, but a cage has to be loaded with the model.
 - Our Improvement: Generate a coarse cage for you. Allow you to refine the cage.



“CageLab does not include any cage generation facility, but can import and use cages produced with any of the aforementioned techniques (as well as manually crafted).”