Mesh Retopology using Geodesic Segmentations

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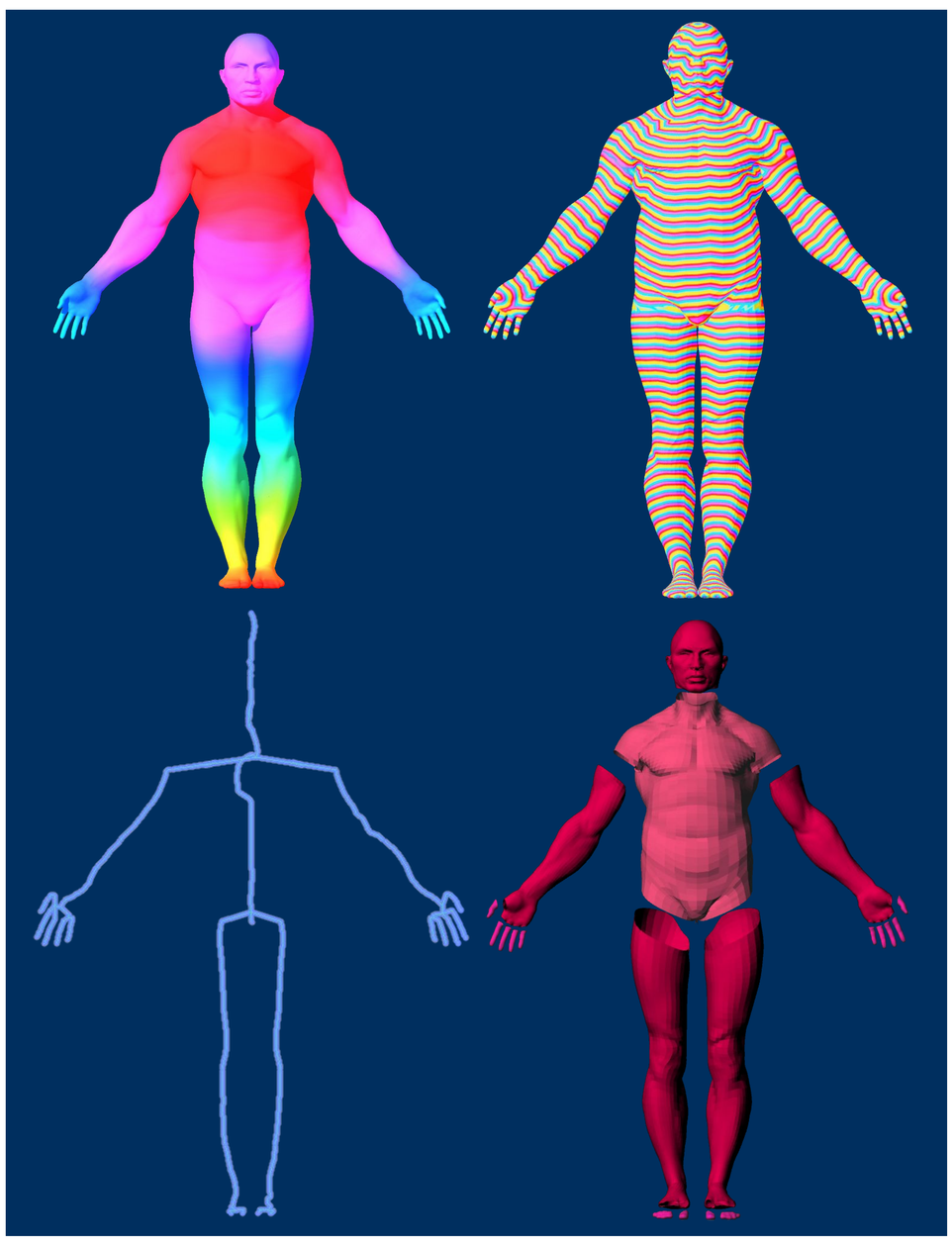
Introduction

Many modern 3D meshes are generated using digital sculpture or optical scanning techniques. This results in a highly detailed mesh, however the quantity and layout of the vertices is non optimal. Rendering or analysing this mesh is time consuming, and the layout does not assist clean deformation of the model.

We attempt to remesh these models with clean edge loops and topology so that the same structure is preserved, but the vertex count is reduced and mesh deformations are much cleaner.



Segmentation

We segment the model into meaningful divisions, whose boundaries will be points of deformation and the root of topological changes.

➔ We extract the extremities of the model using geodesic distance, minimum traversal distance between vertices.

➔ This gives us a mapping which is invariant to model pose and noise.

➔ These extremities are used to create a skeletal representation of the mesh.

➔ Analysing the degree of each node in the skeleton then provides a foundation for mesh analysis and segmentation.

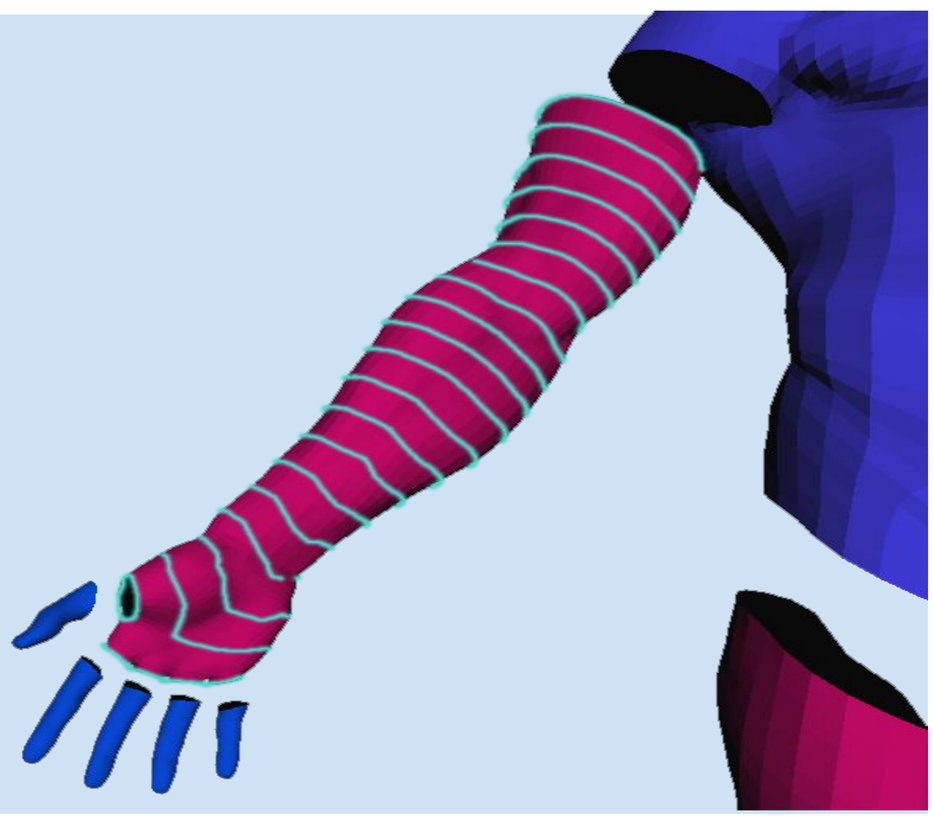
Retopology

Edge loops are generated for each segment, which attempt to cleanly blend between the divisions, maintaining the following properties:

➔ The areas between divisions are also deformable.

➔ The quantity of edge loops is variable, so that different polycounts can be targeted.

➔ The loops are joinable and maintain the shape of the original mesh.



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