Surface Simplification

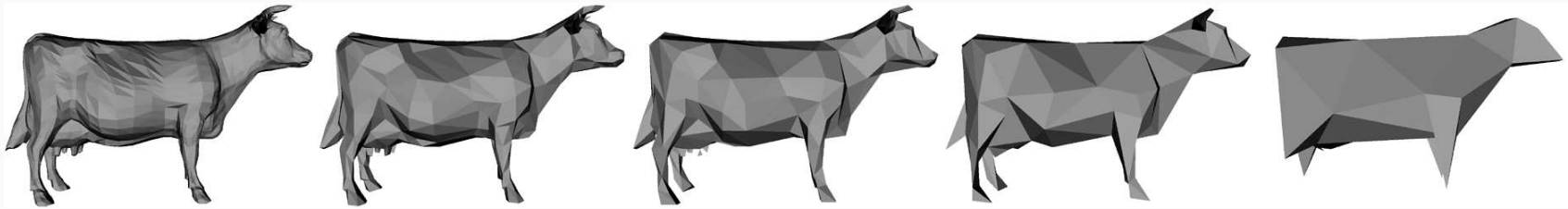
Computational Topology
Faculty of Computer and Information Science
University of Ljubljana

Sven Cerk, Miha Eleršič, Mitja Rozman

6. junij 2017

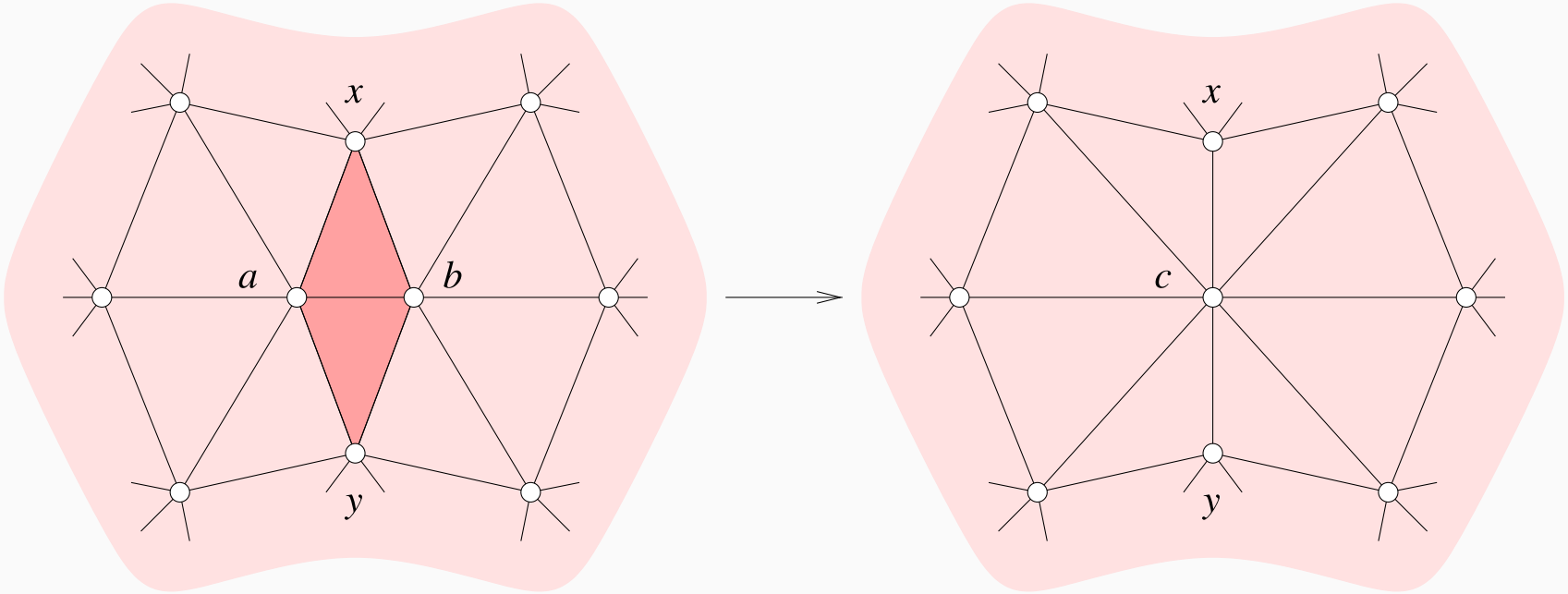
Project Goal

- Implement an algorithm for simplifying surface triangulations



Algorithm idea

- Iteratively contract edges which minimally affect the overall shape
- Edge is chosen according to an error function



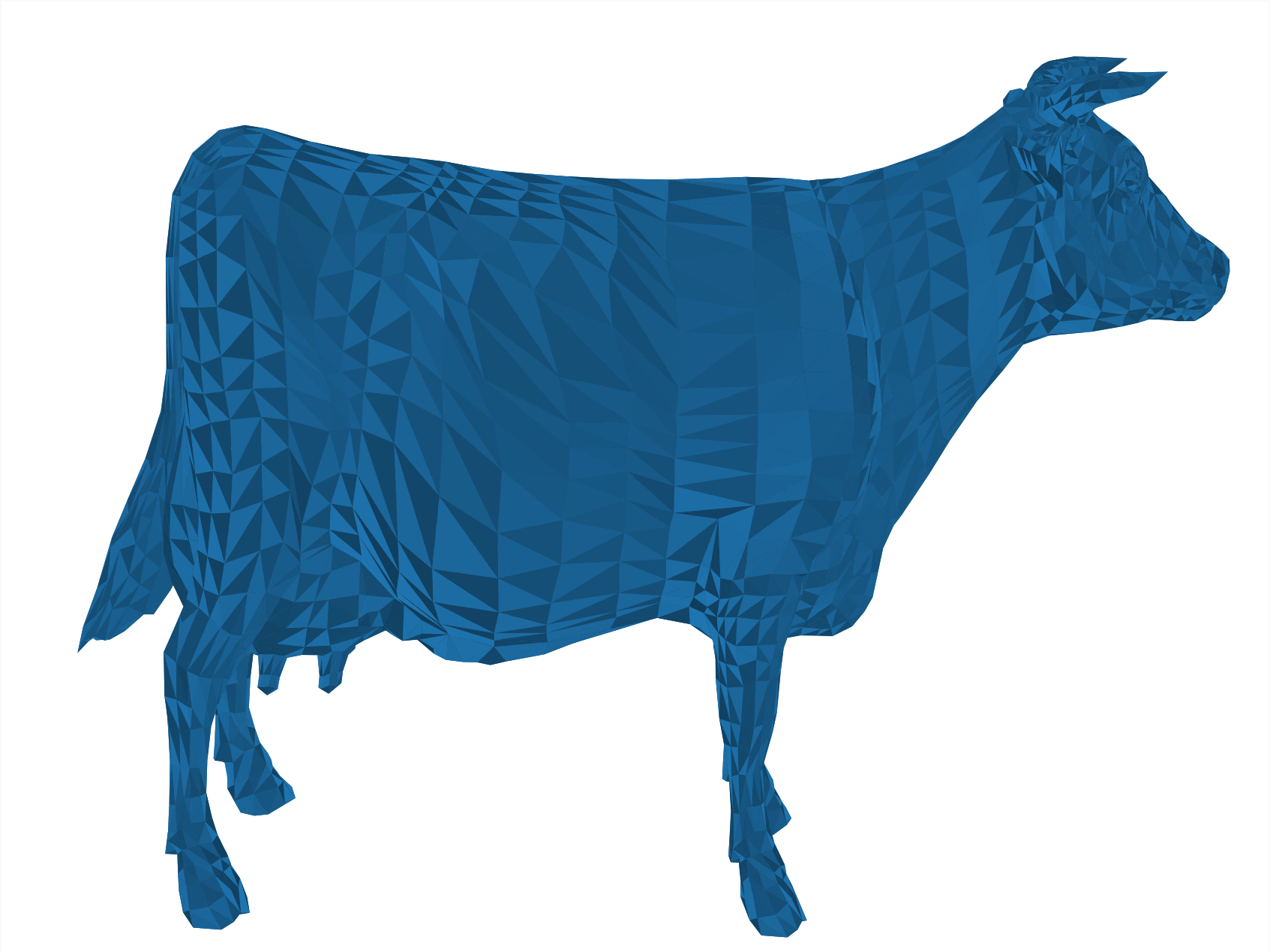
Error function

- For each edge we compute the point to which this edge will contract
- The error of this point is calculated as the sum of squared distances to the planes spanned by adjacent triangles

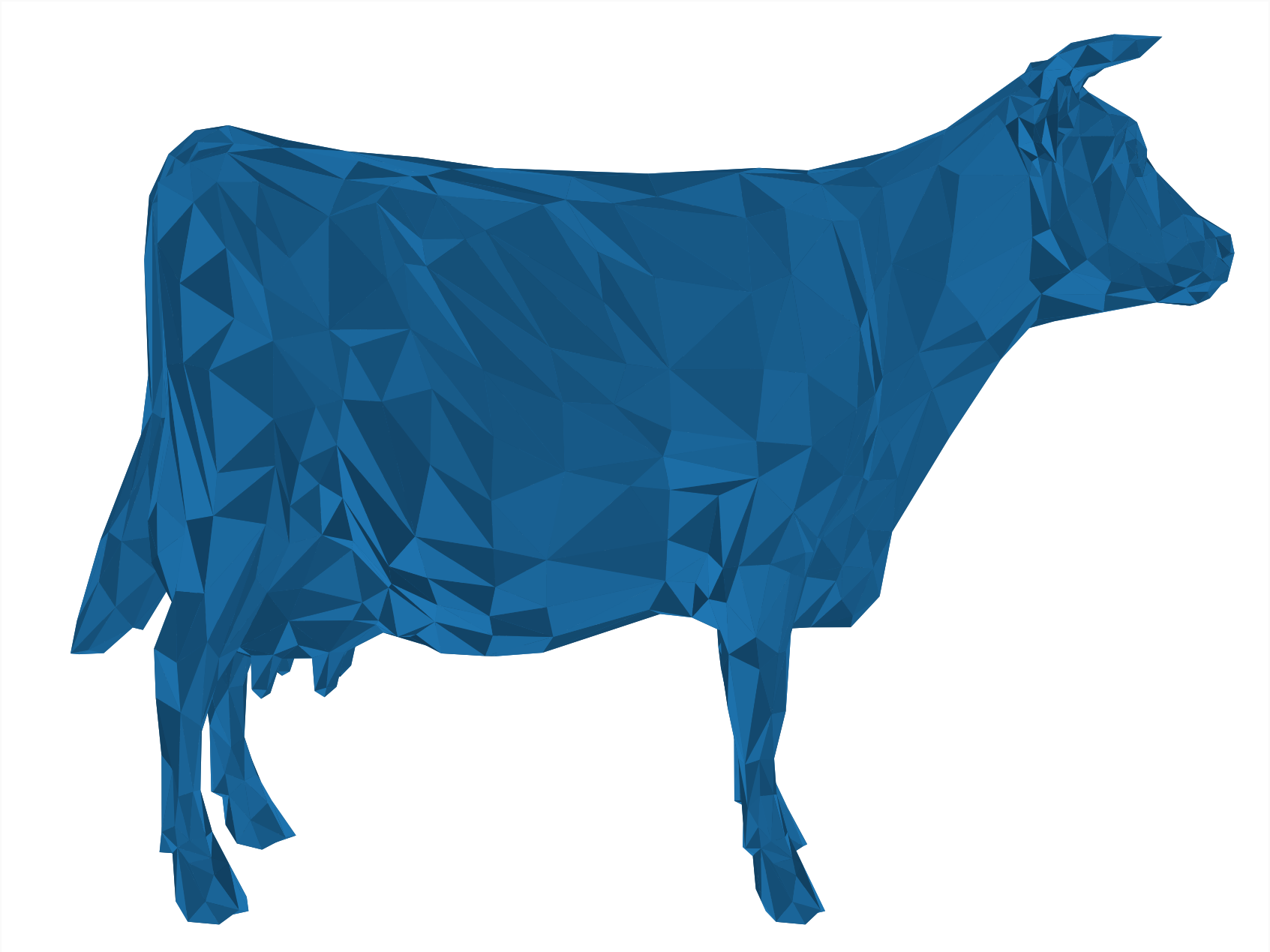
Implementation

- The edges are stored in a priority queue, ordered on the error of the point that replaces them
- Each iteration we contract the edge from the top the priority queue
- After contracting we discard all the adjacent edges, recompute their error and reinsert them in the priority queue
- Repeat until the number of triangles is sufficiently low

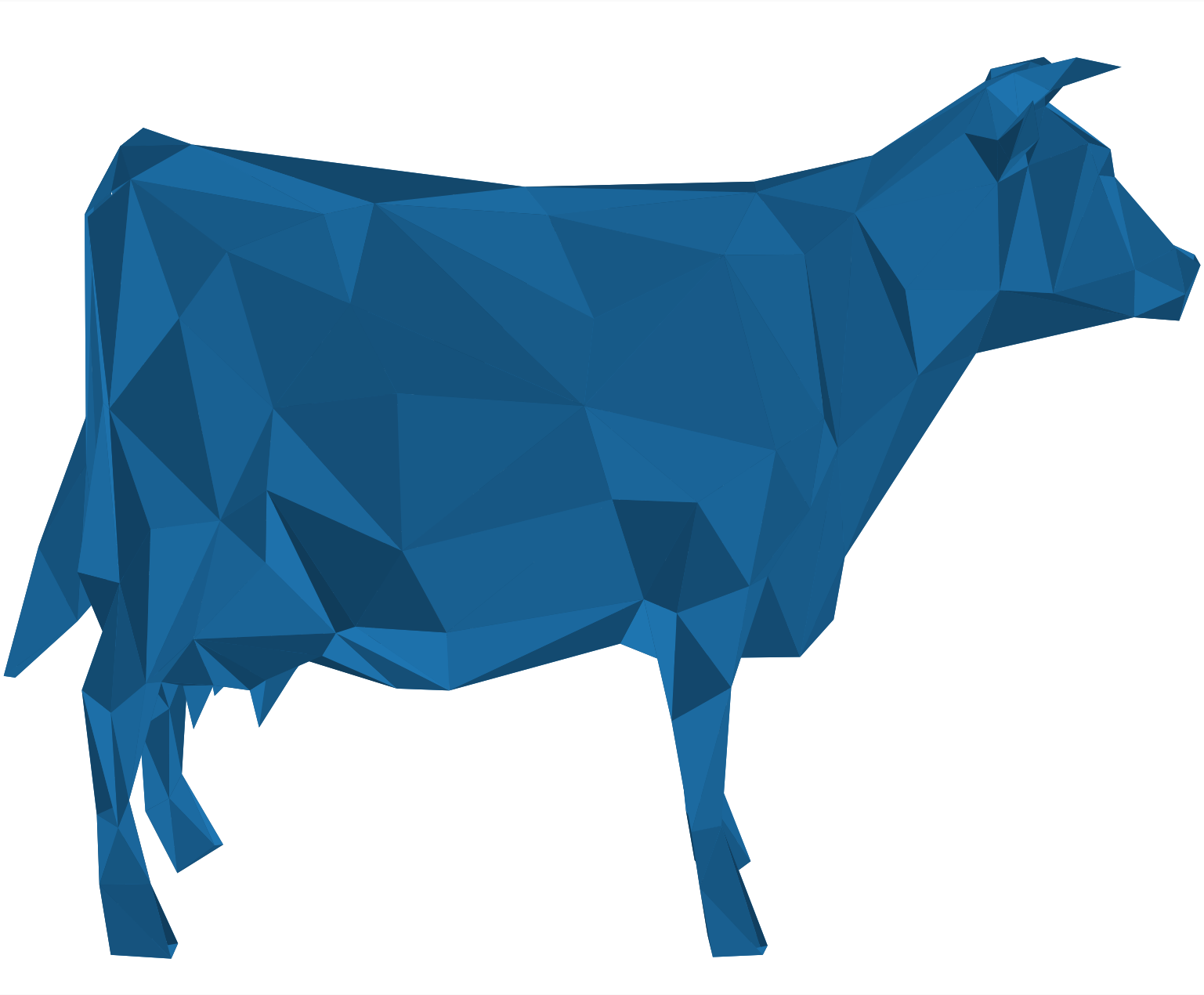
Demo - 5200



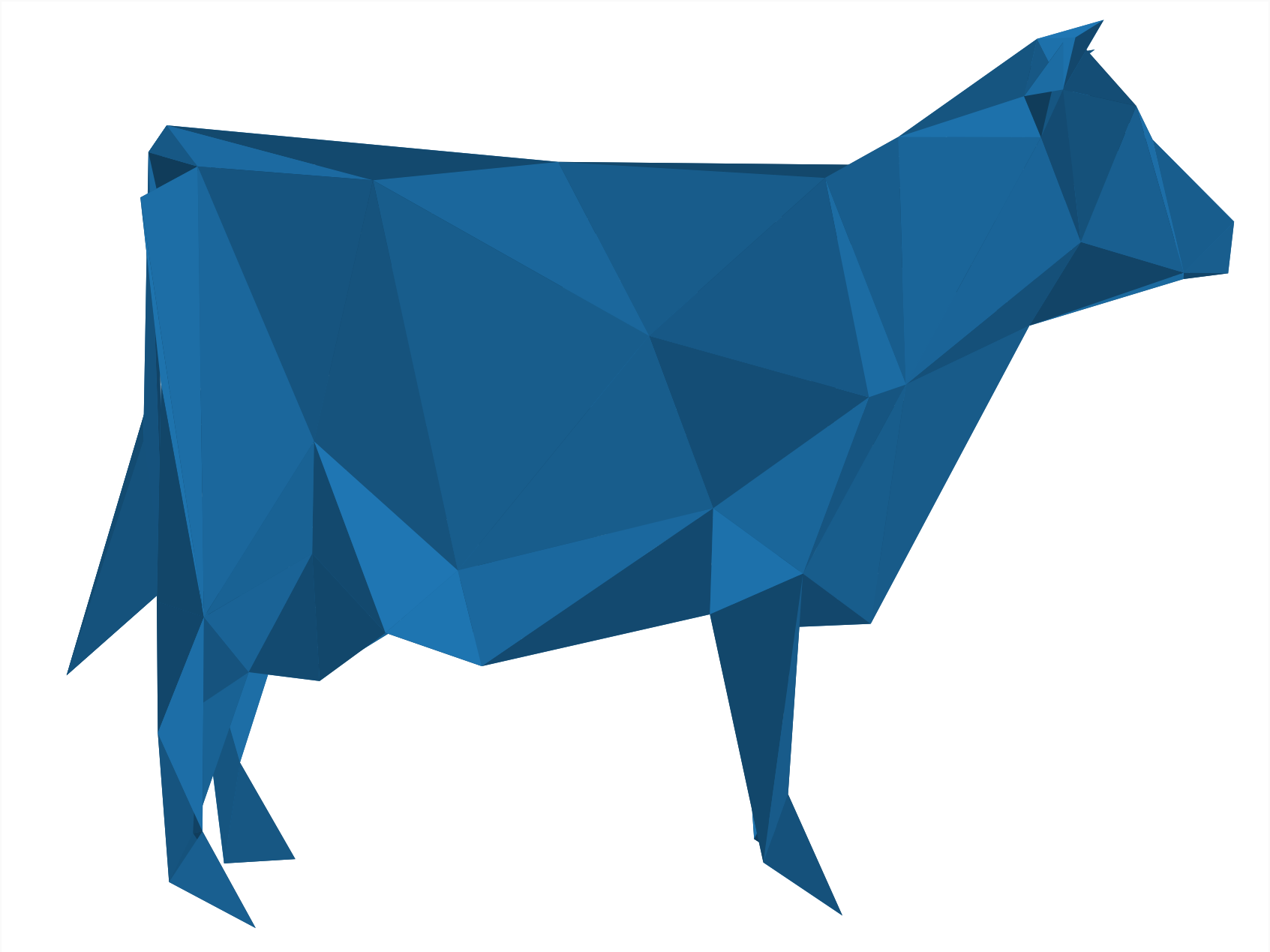
Demo - 2000



Demo - 500



Demo - 200



Demo - 60