

# Pre-Optimized Compatible Triangulations of Simple Polygons

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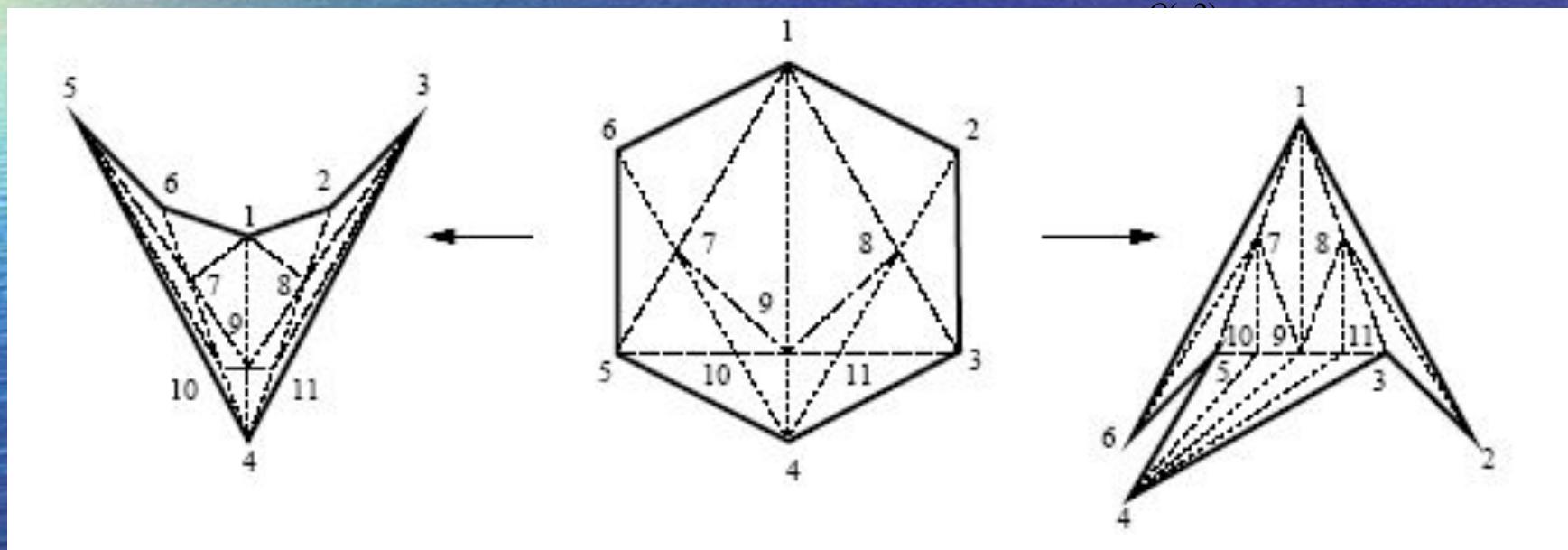
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# Important Techniques !

- Graphics Deformation
- Texture Warping
- As-Rigid-As-Possible Shape Interpolation!  
(SIGGRAPH 2000)

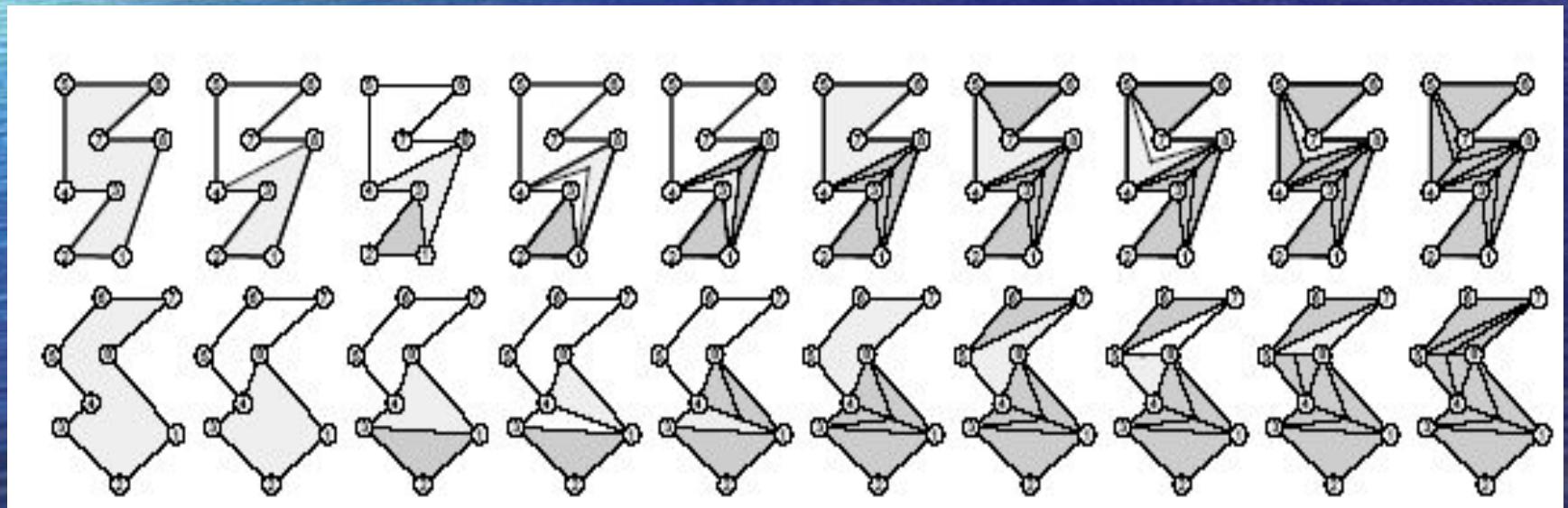
# A Simple Construction [1]

- Additional  $O(n^2)$  Steiner Points



# High Quality Com. Triangulations[2]

- Calculate minimum-link
- Create link-paths (Costly act!)



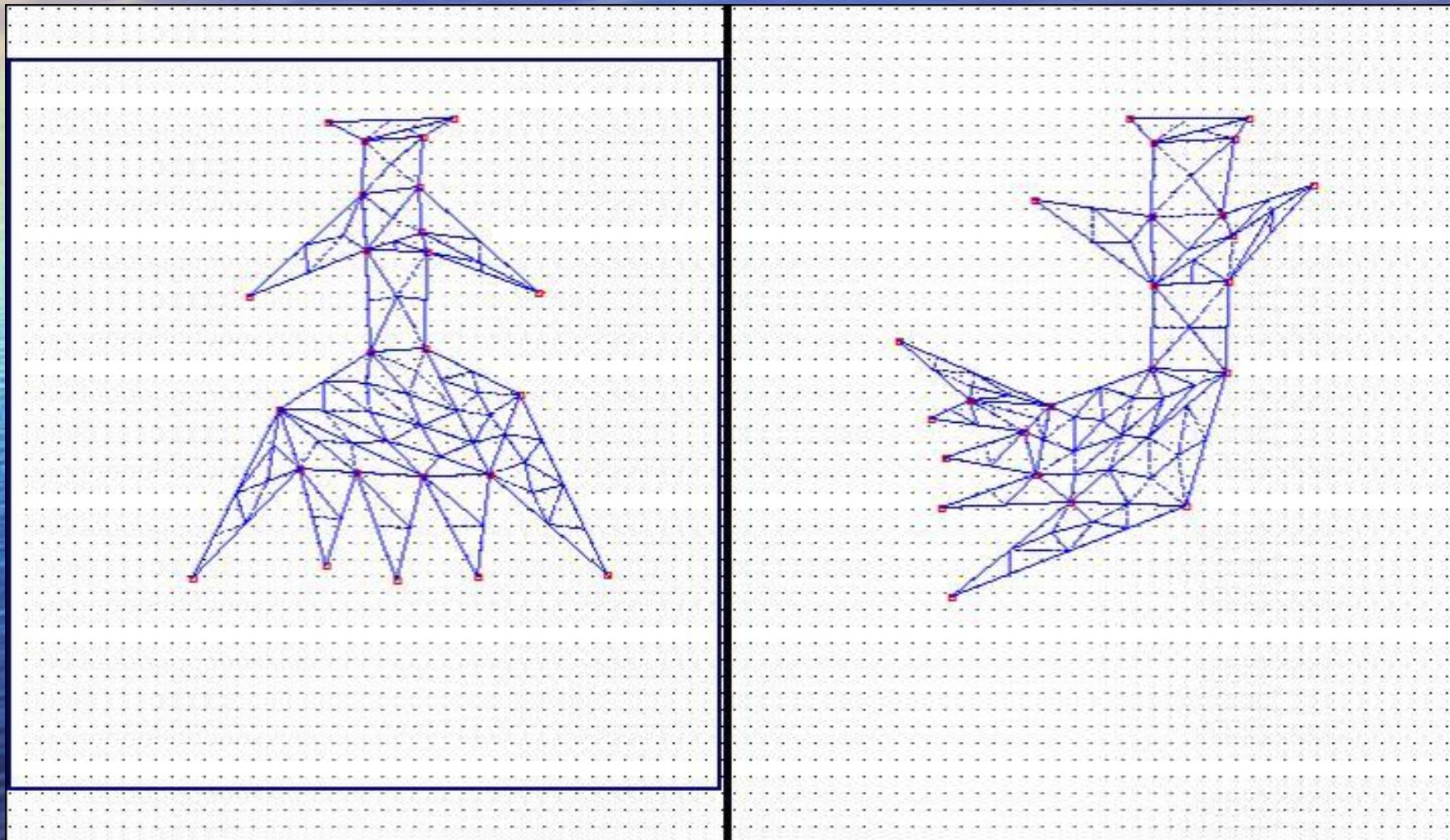
# The Problems

- Can this be fast? (Real-time perform?)
- How to get better result?  
(Regular triangles and better shape)

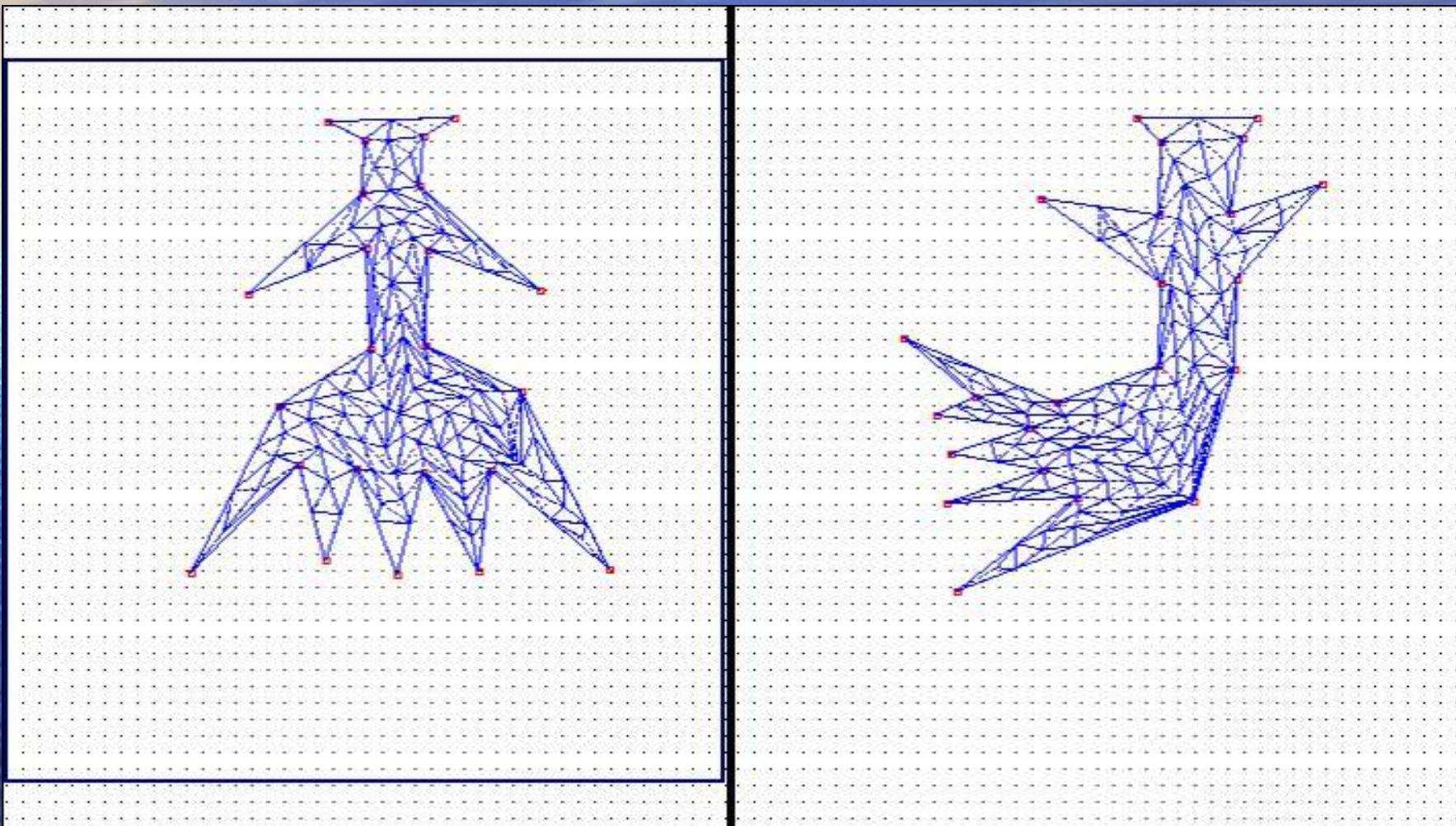
# Our Algorithm

- 1) Create Compatible Polygons  
(Force Target Sub-Polygons to be Convex)
- 2) Triangulate Source Sub-Polygons
- 3) Pre – Optimize!
- 4) Smooth Surface Fitting
- 5) Combine the Pieces of Meshes

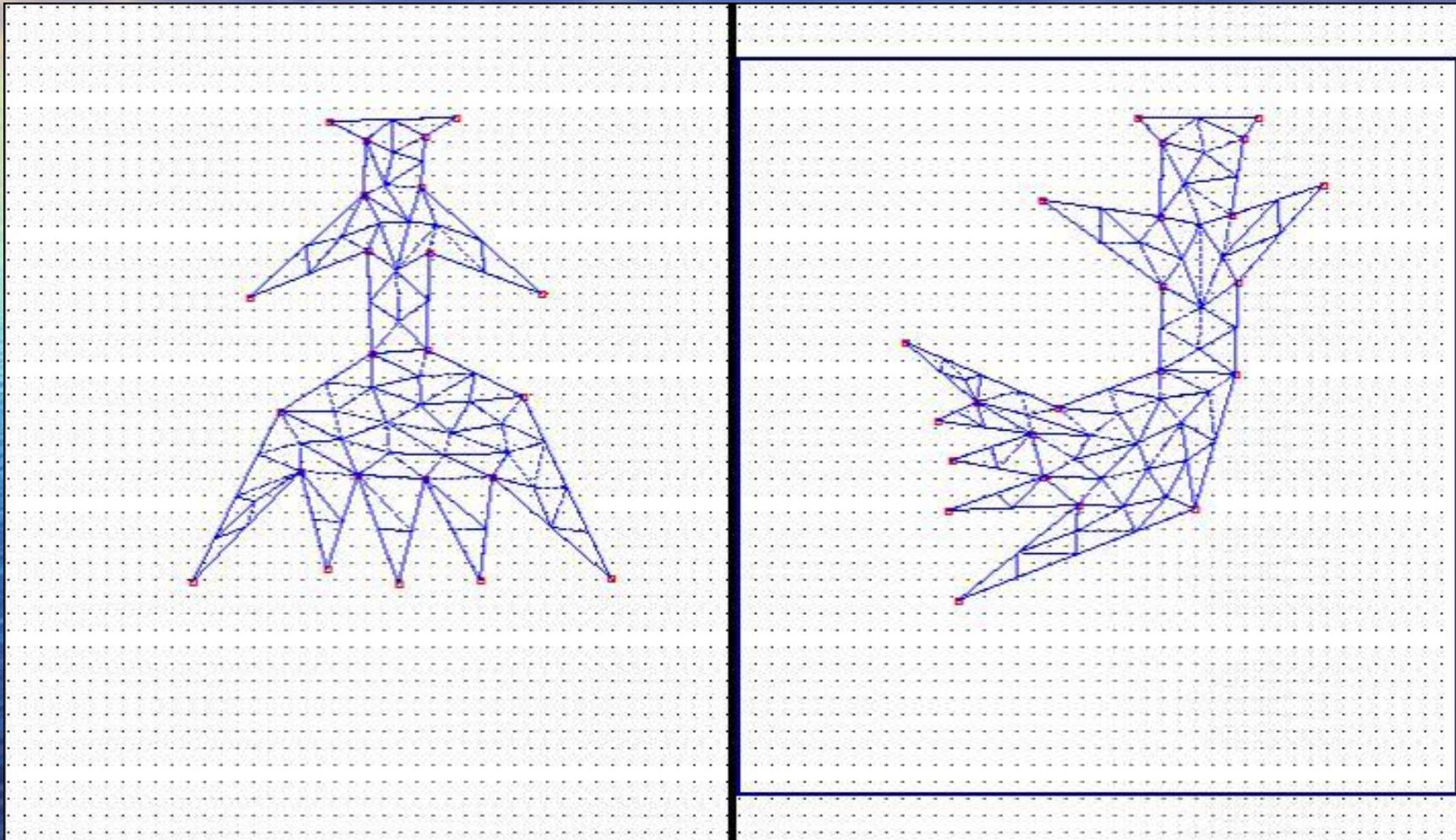
# Performance — Our Algorithm



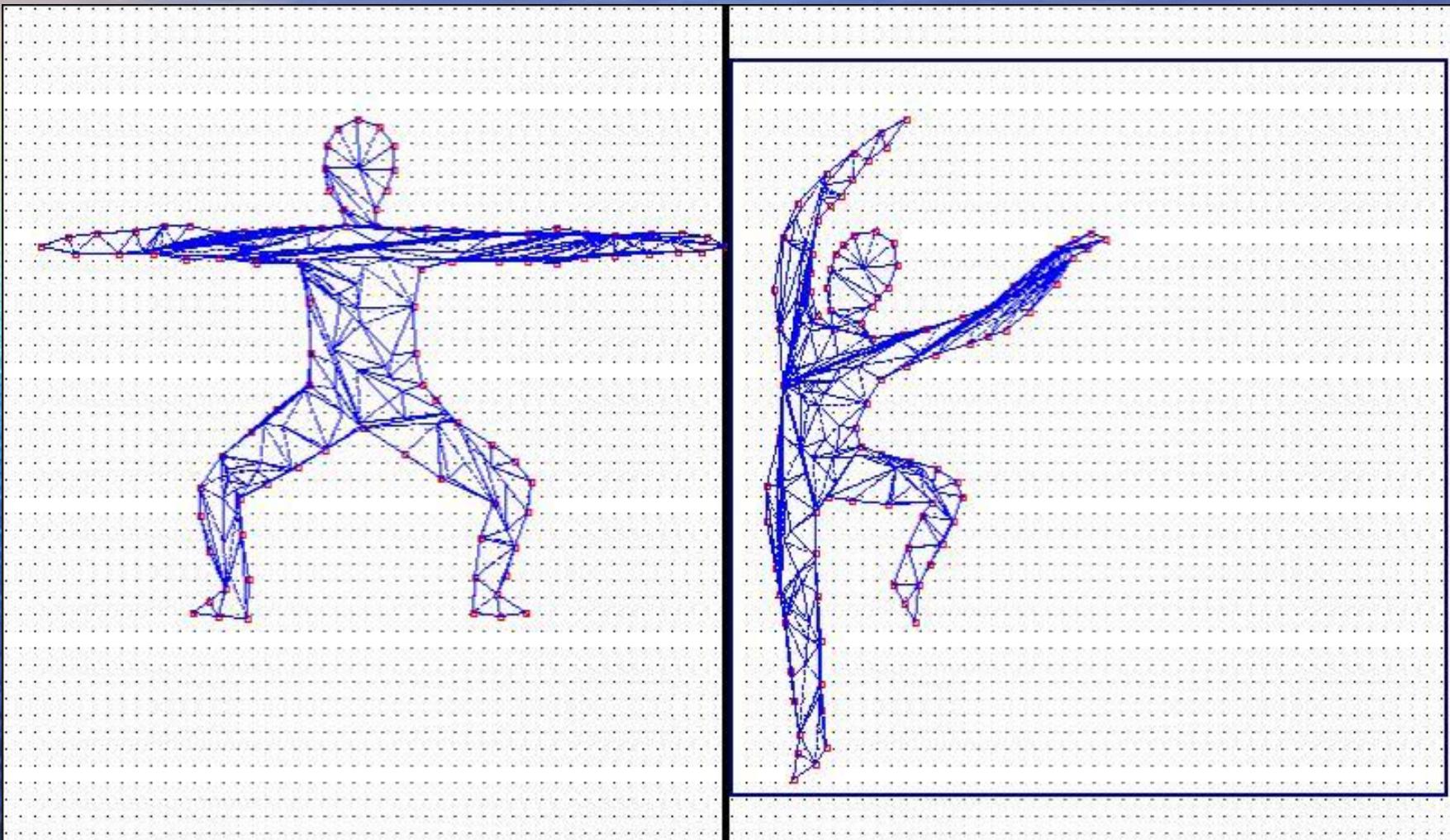
# Performance [1]



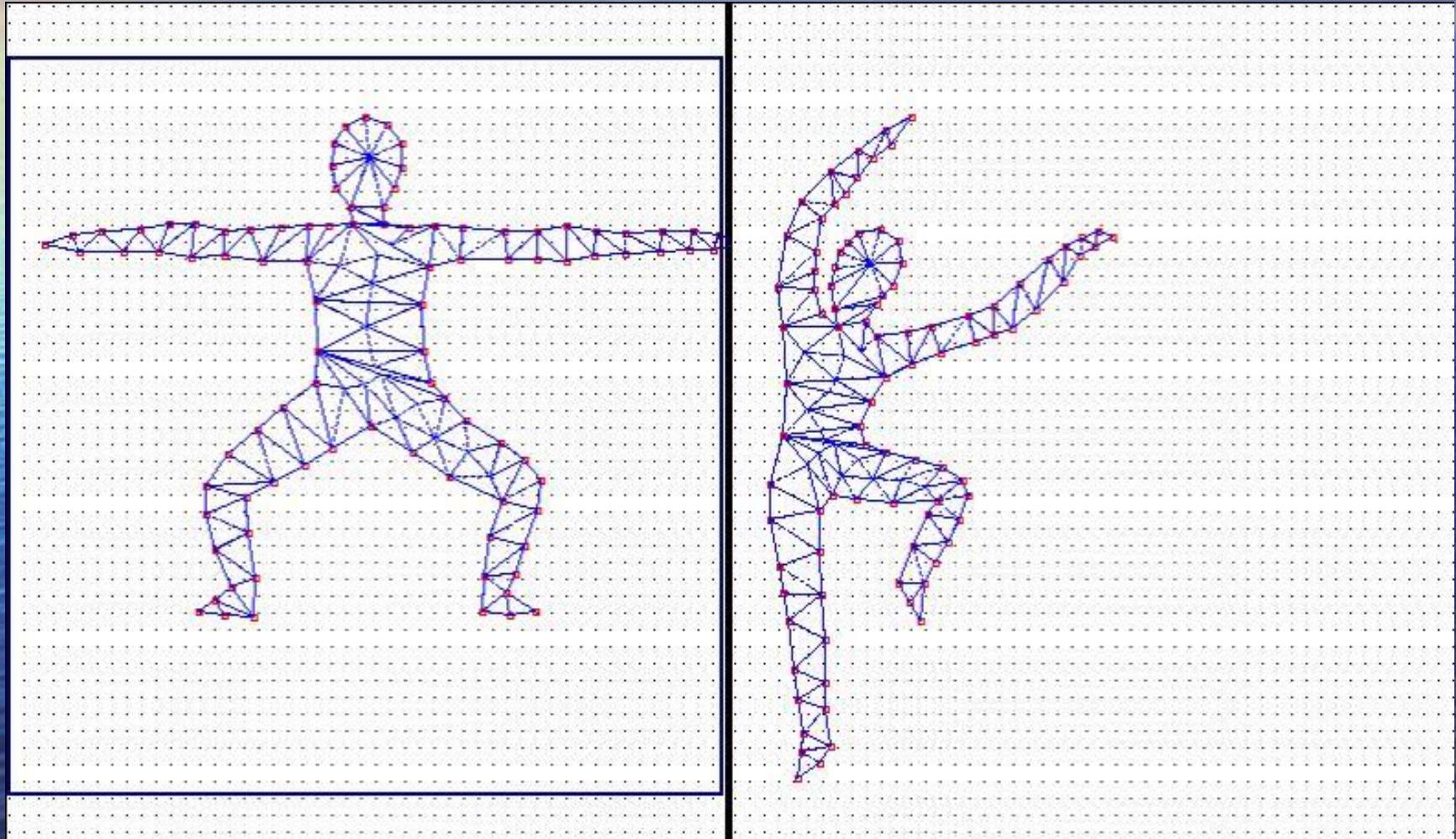
# Performance [2]



# Performance [1]

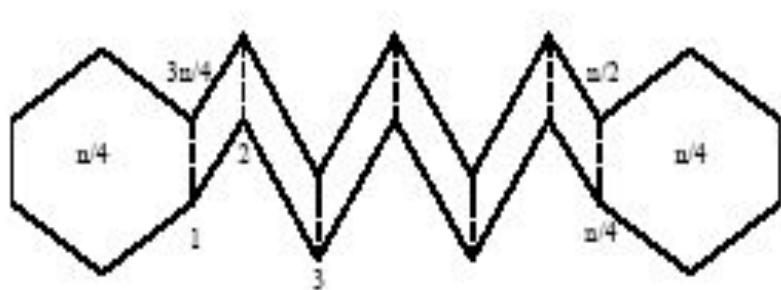


# Performance — Our Algorithm



# A Lower Bound

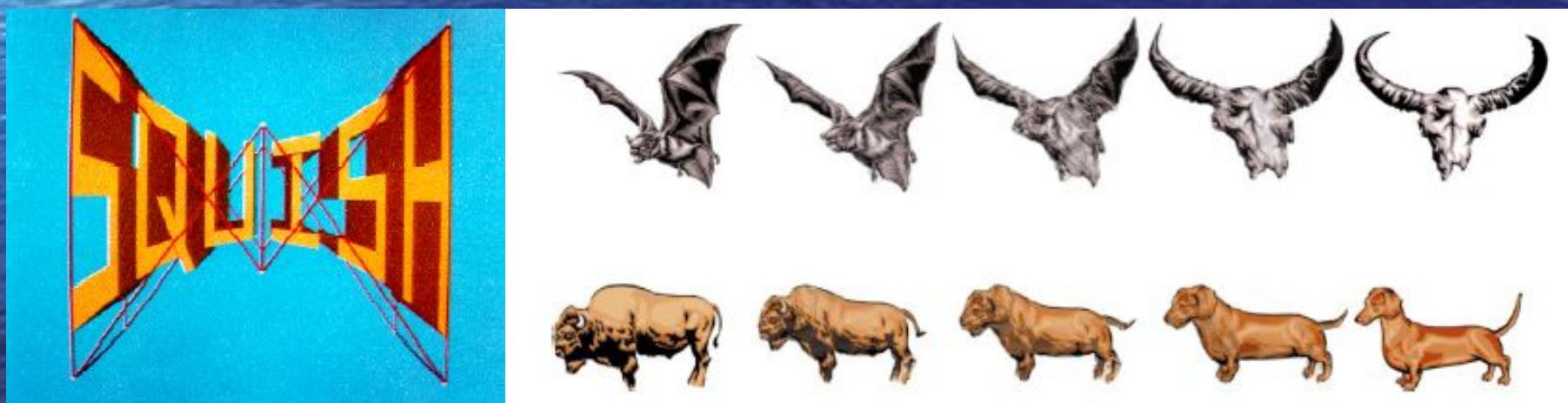
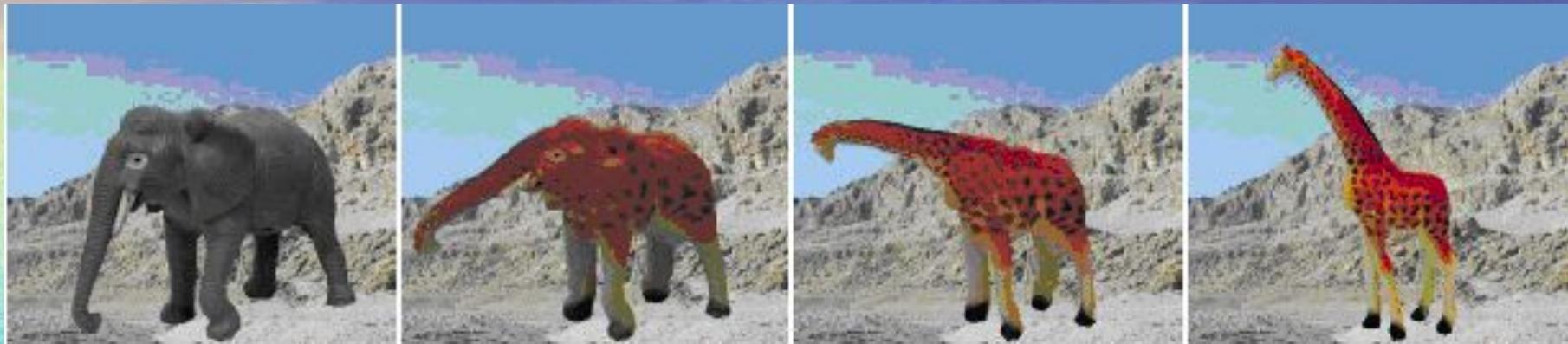
$$\frac{\left(\frac{n}{2}-2\right)^3}{3} + \left(\frac{n}{2}-2\right)^2 - \frac{\left(\frac{n}{2}-2\right)}{3}$$



# Contrasts

	Const. Speed	Opt. Speed	Extra Points	Mesh Quality
SCT [1]	—	×	×	×
HQCT[2]	×	—	○	—
POCT	○	○	—	○

# The Future!



# References

- [1] Boris Aronov, Raimund Seidel, Diane Souvaine. On Compatible Triangulations of Simple Polygons. Computational Geometry: Theory and Application, 3:27-35, 1993.
- [2] Vitaly Surazhsky, Craig Gotsman. High Quality Compatible Triangulations. 11th International Meshing Roundtable, Ithaca, NY, September 2002, pages 183-192.
- [3] Michael S. Floater. Parametrization and smooth approximation of surface triangulations. Elsevier Science B. V. 1997.
- [4] Vitaly Surazhsky, Craig Gotsman. Morphing Stick Figures Using Optimized Compatible Triangulations. Pacific Graphics 2001.
- [5] Craig Gotsman, Vitaly Surazhsky. Guaranteed intersection-free polygon morphing. Computers & Graphics 2001.

The background of the image is a photograph of a vast ocean meeting a blue sky with light, wispy clouds. The water in the foreground is a deep, dark blue with small, gentle ripples. In the upper portion of the image, the text "Thank you !" is displayed in a large, white, sans-serif font.

Thank you !