

Programming Assignment 1 - Unfolding heuristics

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Computer Aided 3D Artifact Fabrication

1 Unfolding polytope

Let P be a polytope, bounded polyhedron. A simple polygon without overlapping is called *net* N of P . Each of polyhedra has multiple nets. The set of cut edges for the net is a spanning tree T , the *cut tree*, of $G(P)$. An *unfolding* is an isometric mapping $\phi: F(P) \rightarrow \mathbb{R}^2$ of the facets of P to the Euclidean plane, such that for all $(f_1, f_2) \in D(P)$, $\phi(f_1) \cap \phi(f_2)$ is an edge of both $\phi(f_1)$ and $\phi(f_2)$. $N(P, T) = \phi(F(P))$ is the unfolding of P induced by T . In this project, I will provide two implementation of unfolding heuristics from ‘Schlickenrieder, Wolfram. “Net of Polyhedra.” Master’s Thesis, Technische Universität Berlin (1997)’ [1].

2 The expected results

1. Source code for generating support materials **34%**
2. Report contains the details of algorithm generating support materials **33%**
3. The physical copies of the digital shadow art using a consumer-level 3D printer **33%** 2 of 5
 - (a) jockey on horse using hands
 - (b) Dinosaurs with tools
 - (c) Musician playing a instrument using various instruments
 - (d) something using pokemon
 - (e) disney castle using disney characters

3 Figures

Following figures show expected results.

References

- [1] Wolfram Schlickenrieder. Nets of polyhedra. Master’s thesis, Technische Universität Berlin, 1997.

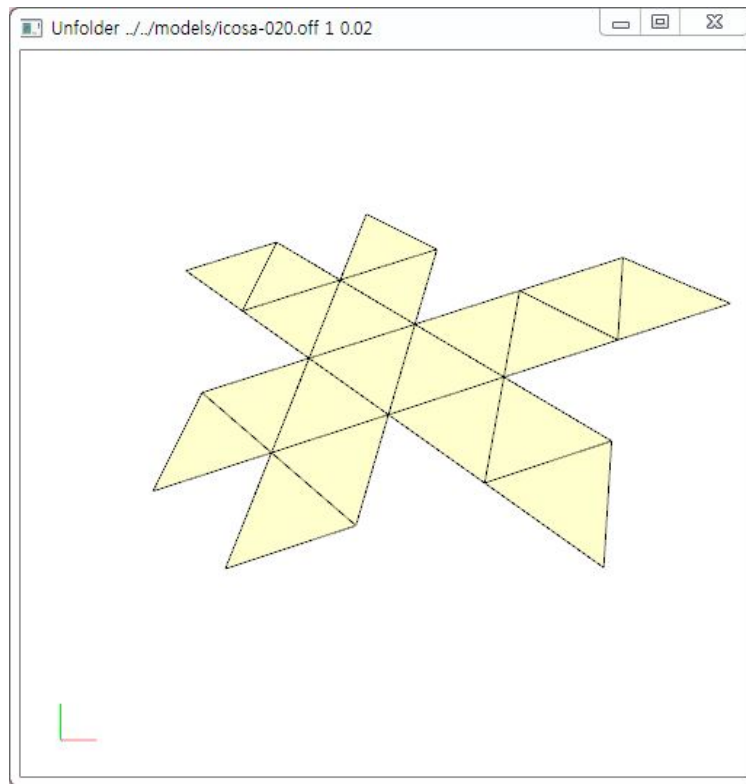


Figure 1: Jockey on horse using hands

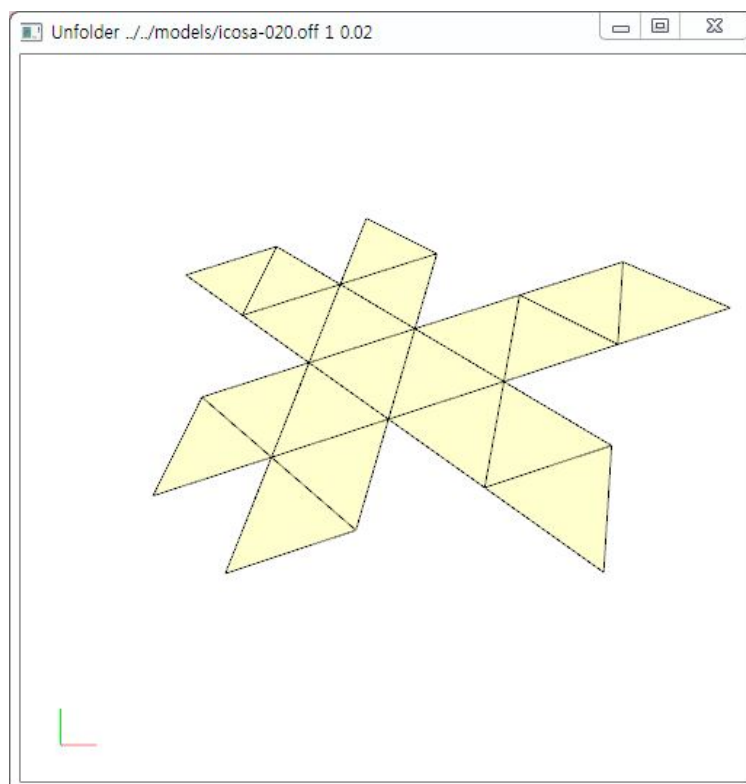


Figure 2: Dinasour using tools

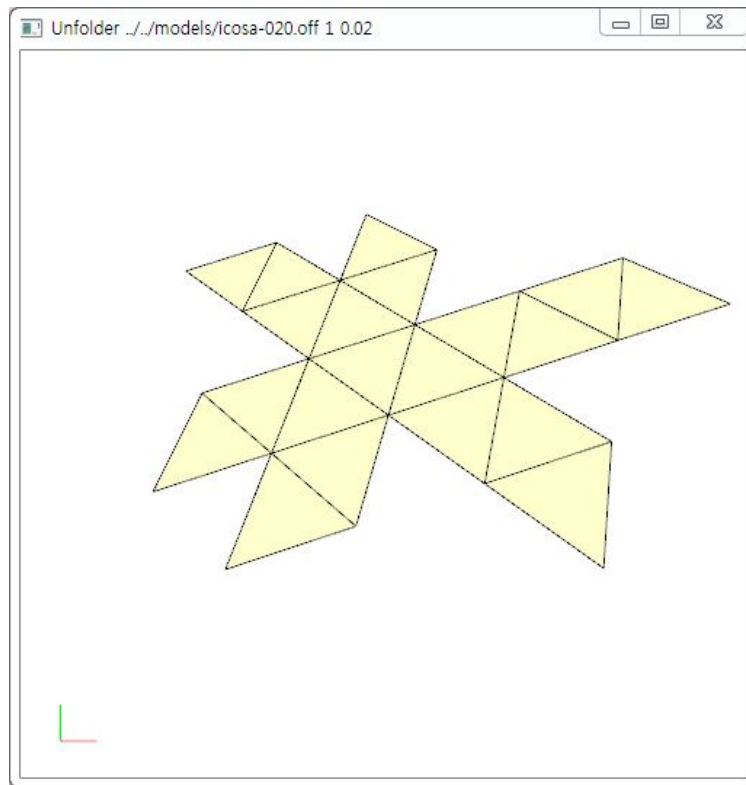


Figure 3: Musicians playing instruments

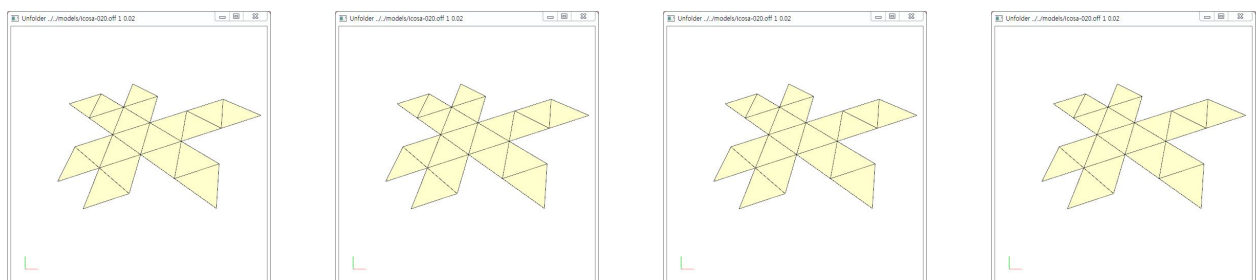
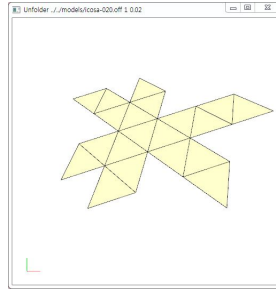
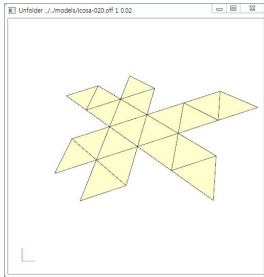


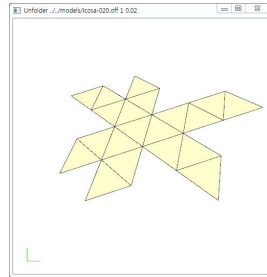
Figure 4: Pockemon silhouette



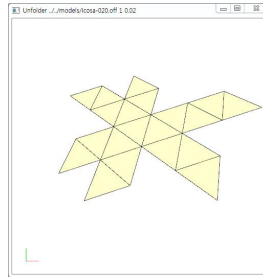
(a) target shadow



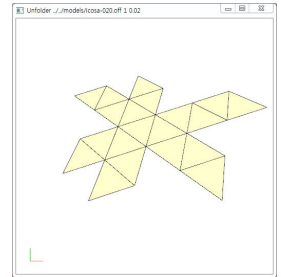
(b) stitch



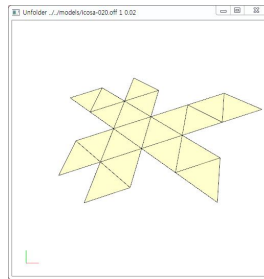
(c) tinkerbelle



(d) pooh



(e) pluto



(f) micky

Figure 5: Disneyland castle silhouette and disney characters.