Computational geometry : Project proposal

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December 3, 2015

1 Introduction

My project is about tile-makers. A tile-maker is a 3D surface such that every unfolding generates a region that tiles the plane. In other words, this region can be combined with copies of it to cover the plane exactly once (e.g. figure 1).

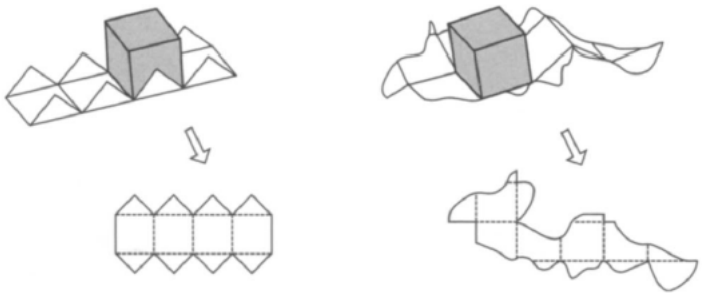

Figure 1: Example of 2 unfolding of a cube from [1]

2 Implementation proposal

As mentioned on the course' site, the goal is to program a tools that produces tilings. Given a tile-maker, users can visualize it in a interface in which he can rotate and (de)zoom in 3D. This interface has to be adapted depending on the fact that the tile-maker is flat or not(tetrahedron). For example, the rotation are restricted to the Y-axis for flat torus . Users can create tilings by cutting through the faces until the tile-maker can be unfolded. Then they can try to combine copies of their creations to tile the plane. They can try a lot of unfolding and see more or less easily that it can always tile the plane. At each try, their intuition that the proposed 3D form is a tile-maker will increase.

References

[1] Jin Akiyama. Tile-makers and semi-tile-makers. *The American Mathematical Monthly*, 7:602–609, 2006.