2D Image to 3D Object Conversion

Drew Marschner

February 12, 2015

1 Abstract

Orthographic projection views are 2D images used to convey information about a 3D object. In CAD drawings conforming to international standards there is enough information in all of the 2D projections to fully define a 3D object [1]. The purpose of this project is to create a tool that can take simple 2D orthographic images and create accurate 3D objects in the .STP file format using information from the orthographic images [2].

I will use the third-angle projection[1] and edge-detection algorithms to generate a model of each feature of the 3D object. I can ignore the overall scale, as long as the different features of the model are accurate relative to each other the scale of the whole object can be adjusted appropriately.

My background is in mechanical engineering, specifically CAD design. I have a fair amount of experience with converting datasheets into 3D models (many component and part vendors do not release their CAD models and force their customers to come up with their own models). Eventually I would like to be able to have a tool that could convert such datasheets into working 3D models with a minimal amount of manual work. Taking this project further into the realm of usefulness I would attempt to replicate some of the work done in the space of reconstructing a 3D image from a single 2D image [3]. This would be much too difficult to do in the space of one semester for a single person. However this is an area I am very interested in, and I believe that CAD design work in the future will be heavily influenced by processes that allow immediate file creation from images.

2 Tools

I will use MATLAB for running edge detection, and SolidWorks or Inventor to use as a way to examine 3D object files.

References

[1] Wikipedia. http://en.wikipedia.org/wiki/multiview_orthographic_projection.

[2] Wikipedia. http://en.wikipedia.org/wiki/iso_10303-21.

[3] Shi-Min Hu Daniel Cohen-Or Tao Chen, Zhe Zhu1 Ariel Shamir. 3-sweep: Extracting editable objects from a single photo.