

Close-Range Stereovision for Accurate 3D Renderings of Featureless Surfaces



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Introduction

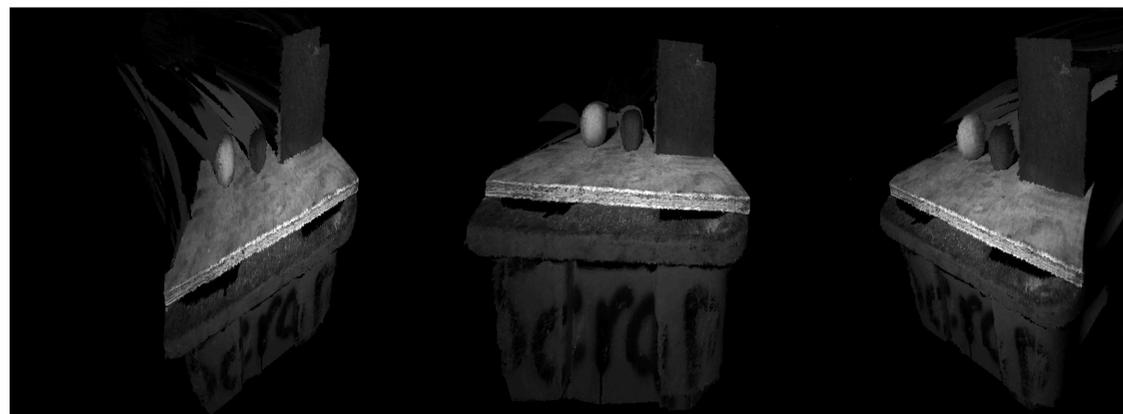
Automated inspection of infrastructure, like bridges, would enhance its accuracy and usefulness, while improving the safety of those assessing it. In order to detect erosion and cracks in these structures, the 3D renderings must be accurate up to one millimeter. Our proposed stereovision method accurately renders reflective surfaces.

Capturing Dataset

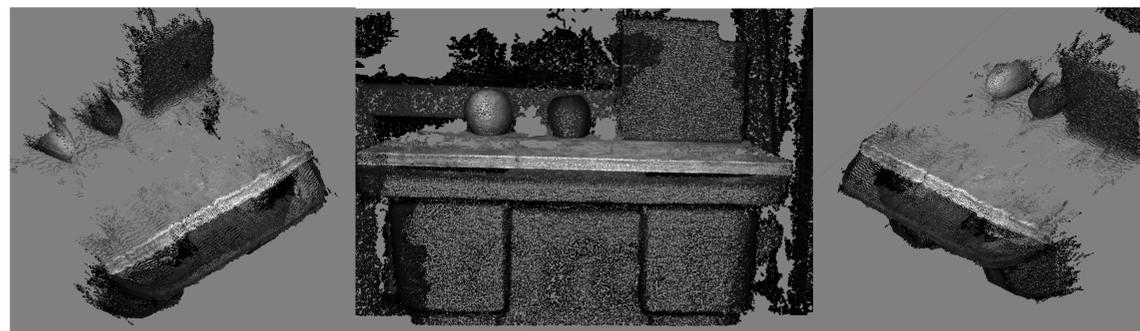
Since specular reflection negatively affects computer vision for metal infrastructure, we used a dataset of sleek, shiny surfaces. Taking the images with a polarized flash reduced the presence of specular reflection. The images were taken along a mill, so they could be used for stereovision or structure from motion for comparison.



Results



Multiple views of the point cloud obtained from using stereovision for a disparity map



Multiple views of the point cloud obtained using Photoscan, a structure from motion software

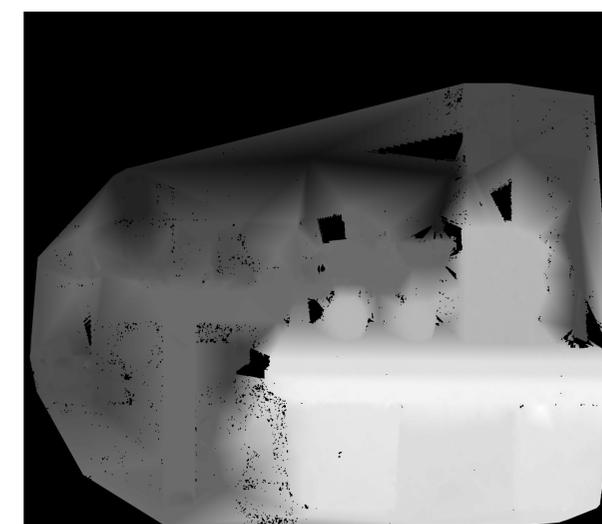
The stereovision and LIBELAS point cloud is more dense and colored than another of the same scene that was obtained from commercial structure from motion software. This improved rendering would facilitate detecting cracks and erosion on infrastructure to improve safety.

Methods

Two consecutive images from the mill dataset were used together as a stereovision pair.



Using the LIBELAS library, we achieved high-resolution disparity maps for the stereovision pairs.



We used the disparity maps and their original images to create colored point clouds with OpenCV and Point Cloud Library.