

3D Object Reconstruction through the use of Projective Geometry

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Abstract:

The world today is being captured by digital cameras that are incorporated into so many of our everyday devices. From cell phones and tablets, to glasses and watches, these digital cameras are quickly becoming our pair of “digital eyes.” The interpretation of these visual images by computers opens a pathway to the field of study called Computer Vision. The concept of Computer Vision was developed by utilizing computers to interpret digital images, combined with the focal length of the camera, to understand and reconstruct 3D objects and scenes from 2D planar images. The guiding concept of Computer Vision comes from the interpretation of Projective Geometry in images by using Simultaneous Location and Mapping algorithms, also known as SLAM. Programs such as AutoDesk 123D Catch and Adobe Photoshop take advantage of SLAM programming in order to reconstruct an object in 3D derived from 2D images or re-scaled or re-proportioned images based upon the usage of projective transformation. Computer Vision combines Science, Technology, Engineering and Mathematics into a study with practical applications in robotics, humanoid interactive recognition, bio-technology, video gaming and 3D mapping.