

3d Visualization Through Planar Pattern Based Augmented Reality

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SUMMARY

Augmented reality is the scientific field that aims at an enhanced sense of the real world. Although it was first presented in the 1960s, actually in recent years it has begun to have practical applications on various fields and today arouses the interest of many researchers, scientists, as well as companies. The purpose of this paper is the presentation of an augmented reality application that allows the visualization of the three-dimensional anaglyph of a region. The application was developed through the use of methods and algorithms of photogrammetry and computer vision and is based on the recognition of an orthoimage of a region that is augmented with its digital terrain model on a computer screen. The SURF algorithm is used for the extraction of interest points in a photograph of the orthoimage and in every real world frame. The matched features between these images are geometrically verified by the RANSAC algorithm. The Levenberg-Marquardt optimization algorithm is used for the calculation of the homography between the matched images, pattern recognition is conducted and the camera exterior orientation for each frame is estimated. The latter, in combination with the camera intrinsic parameters, which are computed through a camera calibration procedure, leads to the augmentation of the real world scenes. The application indicates the very promising capabilities of augmented reality for the realistic visualization of the topography of an area and the detailed observation of the anaglyph, without the need of a three-dimensional printing of the terrain model.