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3D POINT CLOUD MODEL COLORIZATION BY DENSE REGISTRATION OF DIGITAL IMAGES

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Abstract. Architectural heritage is a historic and artistic property which has to be protected, preserved, restored and must be shown to the public. Modern tools like 3D laser scanners are more and more used in heritage documentation. Most of the time, the 3D laser scanner is completed by a digital camera which is used to enrich the accurate geometric informations with the scanned objects colors. However, the photometric quality of the acquired point clouds is generally rather low because of several problems presented below. We propose an accurate method for registering digital images acquired from any viewpoints on point clouds which is a crucial step for a good colorization by colors projection. We express this image-to-geometry registration as a pose estimation problem. The camera pose is computed using the entire images intensities under a photometric visual and virtual servoing (VVS) framework. The camera extrinsic and intrinsic parameters are automatically estimated. Because we estimates the intrinsic parameters we do not need any informations about the camera which took the used digital image. Finally, when the point cloud model and the digital image are correctly registered, we project the 3D model in the digital image frame and assign new colors to the visible points. The performance of the approach is proven in simulation and real experiments on indoor and outdoor datasets of the cathedral of Amiens, which highlight the success of our method, leading to point clouds with better photometric quality and resolution.

[Conference Paper](#) (PDF, 9564 KB)

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