Automating Accident Scene Reconstruction Using UAS based Photogrammetric Reconstruction and Orthophotos

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Traffic accidents are one of the leading causes of mortality in developed countries, and in many cases, it is necessary to document the scene in order to determine potential liability. Accident scene reconstruction and forensic analysis using photogrammetry has a rich background and extensive use within police departments worldwide. In addition to increased safety and time savings, photogrammetry allows investigators the opportunity to review evidence at a later date (should it be necessary) via the photographs. The proliferation of unmanned aerial systems into the public domain has also created the ability to document crime scenes and accidents much faster than traditional close range photogrammetry. The UAS based photogrammetric workflow must be able to accommodate certain complexities, such as irregularly shaped objects (vehicles), illumination changes, and low resolution cameras with high lens distortion. Dealing with such cases programmatically requires considerable flexibility, and in this paper we will discuss algorithmic techniques which mitigate these problems to ensure that accurate accident scene reconstructions can be performed. Additionally, we illustrate that orthophotos can be utilized to produce not only accurate 2D measurements of accident scenes, but also 3D measurements when utilized with a corresponding DEM.

Key words: Close range photogrammetry, Automation, UAS, Orthophotos