OBLIQUE AERIAL PHOTOGRAPHY FOR BUILDING INSPECTION AND DAMAGE ASSESSMENT

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Abstract

Aerial photography has a long history of being employed for mapping purposes due to its intrinsic advantages. Nowadays UAV platforms may be also deployed to address problems on small areas which require high resolution images and a quick response. But the last years have witnessed the return of the aerial oblique imagery acquired by multi-camera (normally five) systems. Such platforms (Blomoblique, IGI, Leica, Midas, Pictometry, Vexcel/Microsoft, VisionMap, etc.) allow to capture not only the conventional nadir images, but also tilted views. The indisputable virtue of aerial oblique photography lies in its simplicity of interpretation and understanding for inexperienced users, allowing the use of oblique images in very different applications, such as building detection and reconstruction, building structural damage classification, road land updating and administration services, etc. Being a relatively new technology in the geospatial market and domain, automated processing and data visualization are still under investigation and development.

This paper presents a work related to management, visualization and feature extraction from large blocks of oblique aerial images with the aim of building inspection, city modelling as well as damage's assessment. The main idea is to ease the assess of a building from four cardinal directions by simply clicking on it in a nadir image which views the building. An application with GUI has been developed to easily and friendly manage large blocks of oblique images over urban areas. Knowing the cameras parameters, the tool uses the collinearity condition and terrain information to establish relations between the five cameras, the images and object space. The main functionalities of the tool are:
- building's identification from several oblique points of view;
- building inspection;
- distances and building height measurements (monoplotting);
- digitization of building blocks (up to LOD3 in case of high image resolution).
The geometric accuracy of the measurements and digitization remains linked to the image quality and resolution as well as to the user expertise but the tool is a very promising and useful instrument for public administrations and private users for inspection, visualization and assessment as well as a valid response to the expanding airborne technology market and interest for mapping from oblique imagery.
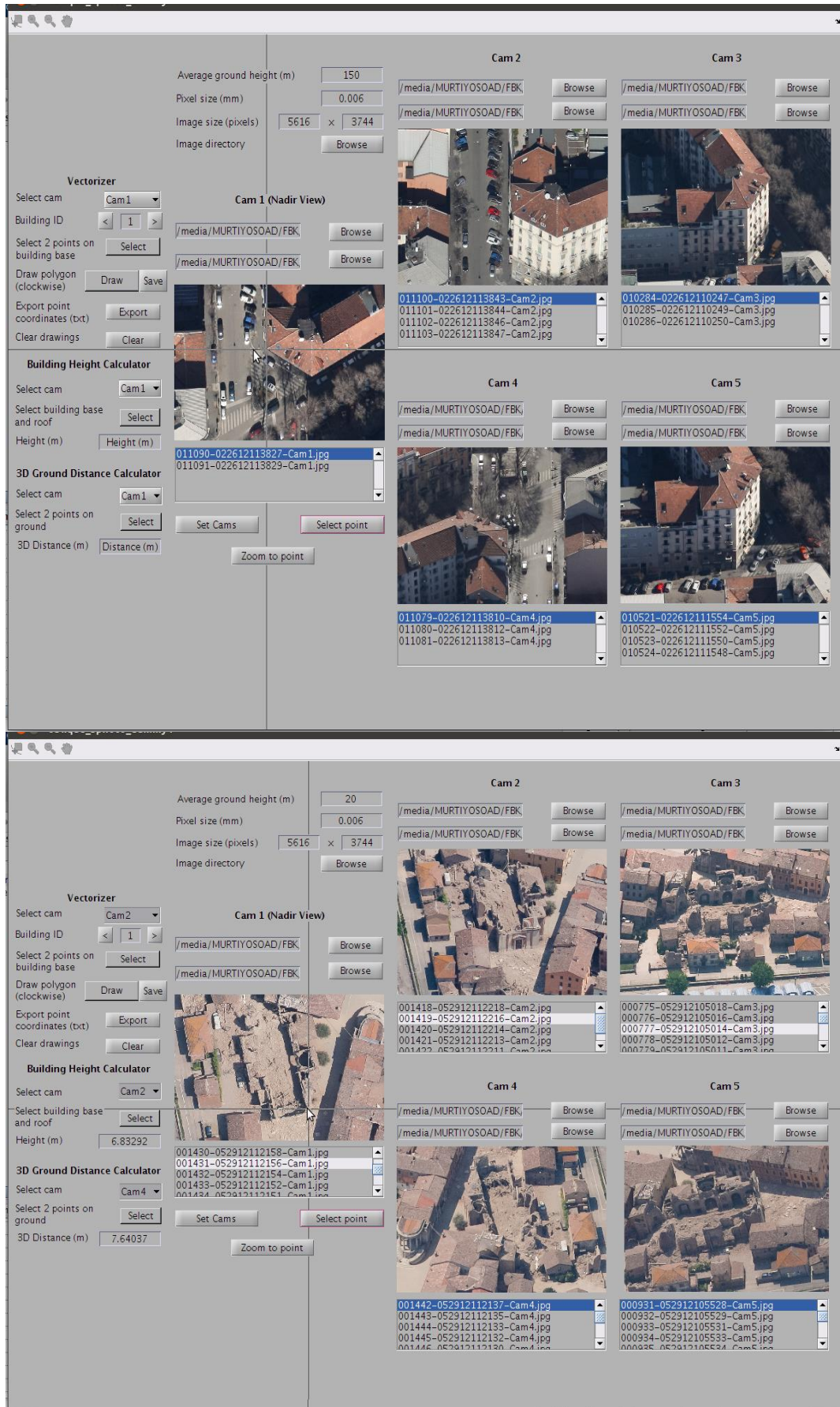
Figure 1: Use of photogrammetric functions to inspect a buildings from oblique imagery.

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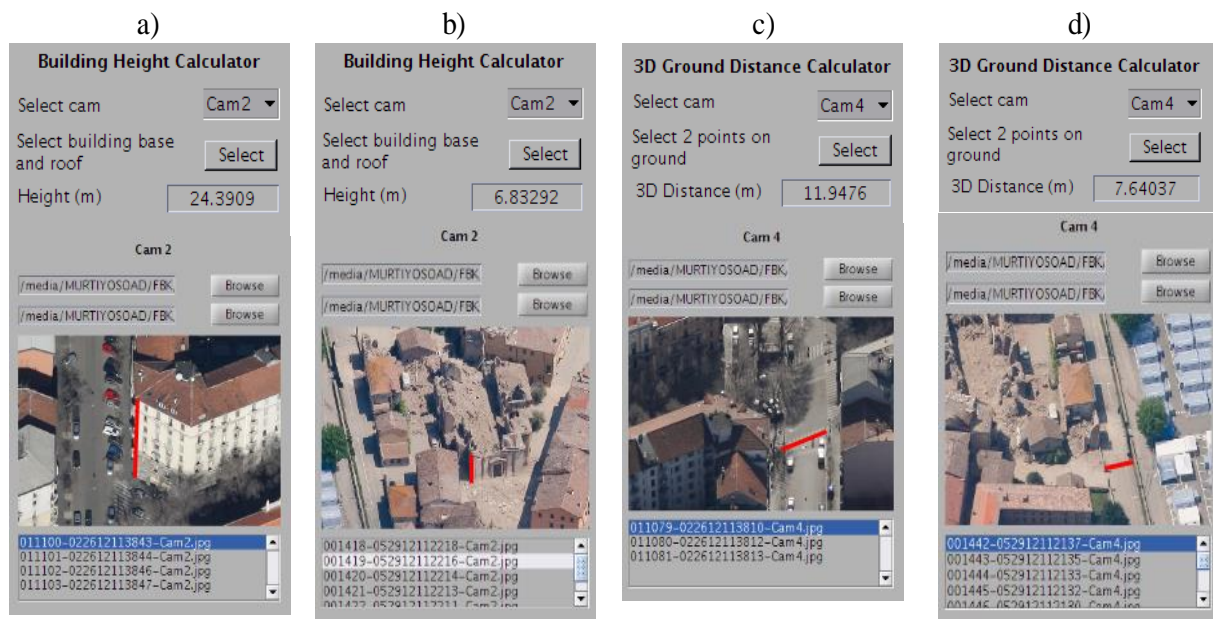
Figure 2: Use of the monoplotting principle to derive building heights (a,b) and measure ground distances like street's width (c,d) in urban and natural hazard scenarios.
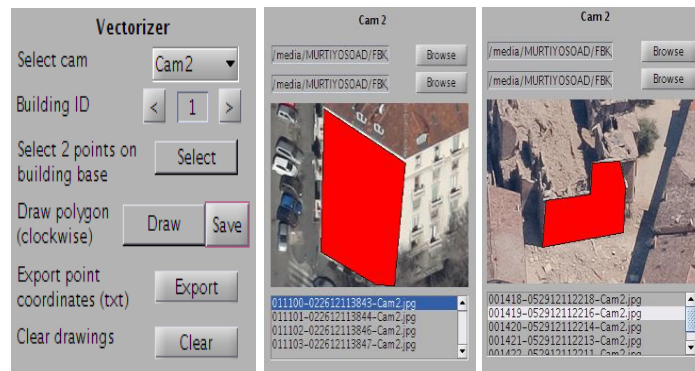
Figure 3: Digitization of a building elements or damage structures for the derivation of 3D building block models.