UNIVERSITI TEKNOLOGI MARA

ASSESSMENT OF THREE-DIMENSIONAL MODEL GENERATED USING DIGITAL CLOSE-RANGE PHOTOGRAMMETRIC METHOD FOR HERITAGE DOCUMENTATION APPLICATIONS

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of requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledge as referenced work. This thesis has not been submitted to any other academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Lately, there were a number of photogrammetric techniques developed and utilized in documenting heritage and historical monuments. Reality image based modelling technique has been frequently used to obtain an accurate measurement of the heritage building, monuments and archaeological site studies. This is in line with the current rapid changes in the development of technology. The subject, which is the heritage and historical monument, is chosen to improve the documentation process. Perhaps with this research, it will give a new drive or tools of improvement for heritage monument documentation projects in Malaysia. It is hoped that the preservation and conservation activities would be developed for the benefit of our future generation. With the enhancement and advancement of instrument being utilized and used during the historical monument documentation, it has been shown that a great number of research and studies have been done by previous researchers. This research aims to assess the 3D reconstruction model obtained from a low-cost, low-specification digital camera, in order to resolve current limitations and gaps for developing 3D models of heritage monument remains using monoscopic close-range photogrammetry image based data. Lower specification for this research is defined as having a resolution of less the state-of-the art digital camera (10-24 Megapixels). The main objective of this research is to carry out a wider investigation into current approaches used in digital documentation of heritage monuments remains. Secondly, to provide a solution for the state-of-the-art image modeling by using low cost, low specification image sensor when collecting data for 3D heritage building remains. The development of a suitable semi-automatic approach to process the data obtained from the low cost, low specification image sensor by adapting current methods and combining them with novel methods. Finally, to analyse the concept by means of empirical evaluation that leads to the justification of the 3D constructed Malaysian heritage monuments. There are various applications of photogrammetry techniques being used in documenting the heritage monument. Each of it has its own strength and weaknesses. So as the photogrammetrist, one could choose any of the techniques and at the same time improve the ability of the techniques. This approach has successfully reconstructed the structure of façade of the monuments. The time taken to produce the resulting model is almost economical with ease of use, compared to existing techniques to generate the reconstruction for documentation purposes. The produced model is also acceptable in term of measurement accuracy requirement from a regular 3D CAD drawing and can be used to assist professionals and experts in related fields. This research makes significant contributions, which includes a literature review as well as several contributions made by the hardware and the well-known commercial software itself. The review developed here consists of existing techniques in producing 3D models of building façade or structures using image based, as well as applications that could benefit from this research's model, with advances technology on the current practice.

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