3D Browsing of historical books by means of Active Infrared Thermography

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Digitization activity in in the field of archives and library materials is usually focused on their content and, to this aim, standard 2D scanning and photography techniques are employed [1]. However, not only the content but also the structural features of an ancient book like the bookbinding, the book block and the decorative elements are important from both a historical and a codicological point of view. In addition, some of the most valuable information often lie below the binding of a book. Sub-surface elements can reveal for instance hidden texts on waste material used in the binding manufacturing process, binding components and damage, often, not accessible through the simple visual inspection. These elements are of the highest importance for scholars and conservators and highly fascinating to the general public. Nevertheless, many of such elements are not visible because faded or buried inside the book structure and it would be important to display their position in a 3D digital representation of the book. This can be obtained by integrating the 3D image-based techniques with other imaging diagnostics able to reveal and also characterize sub-surface features [2-3].

In this study the depth-resolved analysis capability provided by active infrared thermography (IRT) is applied in combination with 3D image-based techniques in order to obtain a representation of the subsurface features buried into historical books. The procedure utilized for the generation of thermal texturing [4] makes use of a texture mapping algorithm. Active thermography has been employed to record thermograms of the investigated manuscripts from different viewpoints and beside the manuscript. Moreover, in order to perform a robust orientation among thermal and RGB images, homologous image, obtained by shooting the same checkboard, coordinates were used (Fig. 1). As it will be shown, the image coordinates of such markers play a crucial role in the model thermal texturing.

Fig. 1. Photograph of the markers used to align thermal and RGB cameras

The final result consists of a 3D thermographic texturing showing features lying at different depths (Fig. 2) allowing to display the book from different angles. Finally, the 3D representations should go beyond current levels of visual depictions, support information integration, shape-related analysis and provide the necessary semantic information for in-depth studies.

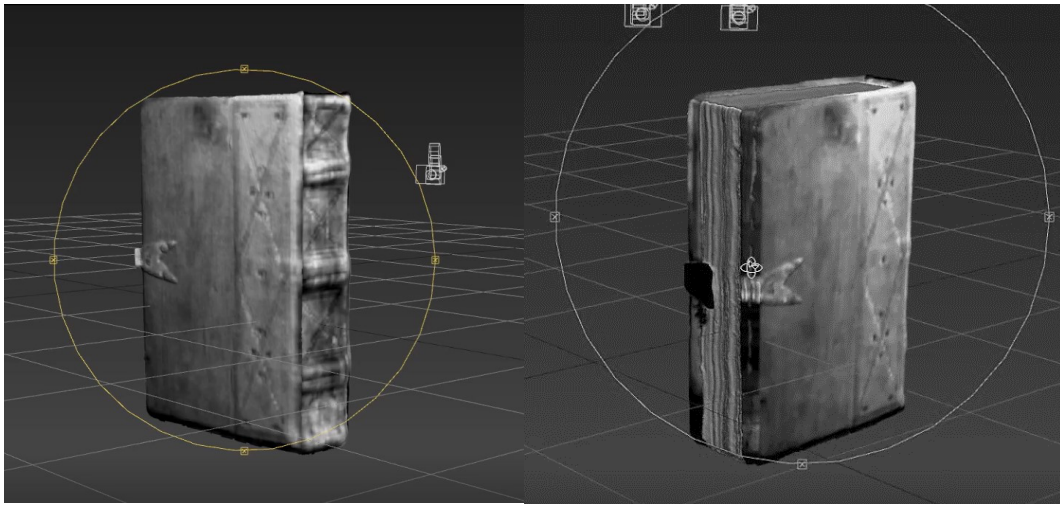

Fig. 2. Book's thermographic texturing

Acknowledgements – The authors wish to thank Ilaria Vercillo and Lucia Marchi, Biblioteca Casanatense of Rome.

Funded project: "Codex 4D | Viaggio in 4D nel manoscritto." CUP: B79J21002850002.

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