

# International Consensus and Guidelines on Medical Thermography 2011 (ICGMT 2011) 2<sup>nd</sup> International Work Group for Medical Thermography Meeting (IWGMT 2011)

The abstracts of the ICGMT 2011 have been published in issue 4 of last years' volume. One abstract was submitted after finalising issue for the print and could therefore not included in the proceedings. In order to achieve a complete documentation of the Meeting, held in Iguassu last November, the lately submitted abstract is shown below

## 3D THERMOGRAPHY MODEL USING MAGNETIC RESONANCE AND INFRARED IMAGE FUSION

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**OBJECTIVES:** Medical Infrared imaging is a noninvasive diagnostic method that allows the examiner to evaluate and quantify changes on skin surface temperature. However, IR is essentially a 2D technique and its image does not provide useful anatomical information associated with it. This paper presents a new registration/fusion method that allows the fusion and 3D visualization of combined multimodal medical images (MRI or CT). The result is a 3D rendered image that can be used as a tool to improve medical diagnosis of certain pathologies [1].

**METHOD:** Two experiments were performed to acquire IR images of a volunteer and a phantom using a ThermaCAME320 infrared camera (FLIR Systems). In each experiment four images were acquired: anterior (0°), lateral (90°), posterior (180°) and medial (270°).

Before image sobreposition (fusion) it is necessary to register the IR with the MRI/CT images. In order to do this, for each one of the orthogonal IR view, a correspondent 2D projection of the reconstructed 3D MRI/CT volume was created using a technique similar to Range Image [2]. Then, the registration between the MRI/CT projection with the corresponding thermal images of the volunteer and the phantom are performed. The affine

transformation technique was used to perform such registration. Finally, it is performed the back-projection, in which the registered thermal images are superimposed at the thermal image, onto the contour of the object for each corresponding MRI slice.

**RESULTS:** This new methodology was validated using sets of MRI/CT and IR medical images [1]. The 3D visualization is done using OpenGL library. The voxels on the outer surface are represented as an outer thermal shell, which are surrounded by the internal MRI/CT images (containing the morphological information).

**CONCLUSION:** This new image registration tool combines two completely different medical images modalities: 2D surface thermal images and MRI/CT images slices. The result is a 3D thermal visualization image that contains the surface gradient temperature, measured by the IR cameras, and the anatomical internal information of the MRI or CT scanner.

### REFERENCES:

1. Bichinho G L, Gariba MA, Sanches IJ, Gamba HR, Cruz FPF, Nohama P. A Computer Tool for the Fusion and Visualization of Thermal and Magnetic Resonance Images, *Journal of Digital Imaging*, 2009, 22(5) 527-534
- [2] Jain R, Kasturi R., Schunck BG, *Machine Vision*, McGraw-Hill, 1995.