

A Hybrid Normalized Gradient Correlation Based Thermal Image Registration for Morphoea

Authors : L. I. Izhar, T. Stathaki, K. Howell

Abstract : Analyzing and interpreting of thermograms have been increasingly employed in the diagnosis and monitoring of diseases thanks to its non-invasive, non-harmful nature and low cost. In this paper, a novel system is proposed to improve diagnosis and monitoring of morphoea skin disorder based on integration with the published lines of Blaschko. In the proposed system, image registration based on global and local registration methods are found inevitable. This paper presents a modified normalized gradient cross-correlation (NGC) method to reduce large geometrical differences between two multimodal images that are represented by smooth gray edge maps is proposed for the global registration approach. This method is improved further by incorporating an iterative-based normalized cross-correlation coefficient (NCC) method. It is found that by replacing the final registration part of the NGC method where translational differences are solved in the spatial Fourier domain with the NCC method performed in the spatial domain, the performance and robustness of the NGC method can be greatly improved. It is shown in this paper that the hybrid NGC method not only outperforms phase correlation (PC) method but also improved misregistration due to translation, suffered by the modified NGC method alone for thermograms with ill-defined jawline. This also demonstrates that by using the gradients of the gray edge maps and a hybrid technique, the performance of the PC based image registration method can be greatly improved.

Keywords : Blaschko's lines, image registration, morphoea, thermal imaging

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