

THE USE OF SIMILARITY IMAGES ON MULTI-SENSOR AUTOMATIC IMAGE REGISTRATION

H. Gonçalves^{*a} J. Gonçalves^a L. Corte-Real^b

^b Universidade do Porto, Faculdade de Engenharia - Dep. Engenharia Eletrotécnica e de Computadores, Rua Dr Roberto Frias, s/n, 4200-465, Porto, Portugal

^a Universidade do Porto, Faculdade de Ciências - DGAOT, Rua do Campo Alegre, 687, 4169-007, Porto, Portugal

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ABSTRACT:

Automatic image registration (AIR) is still a present challenge regarding remote sensing applications. Although several methods have been proposed in the last few years, geometric correction is often a time and effort consuming manual task. The only AIR method which is commonly used is the correlation-based template matching method. It usually consists on considering a window from one image and passing it throughout the other, looking for a maximum of correlation, which may be associated to the displacement between the two images. This approach leads sometimes (for example with multi-sensor image registration) to low correlation coefficient values, which do not give sufficient confidence to associate the peak of correlation to the correct displacement between the images. Furthermore, the peak of correlation is several times too flat or ambiguous, since more than one local peak may occur. Recently, we have tested a new approach, which shortly consists on the identification of a brighter diagonal on a “similarity image”. The displacement of this brighter diagonal to the main diagonal corresponds to the displacement in each axis. In this work, we explored the potential of using the “similarity images” instead of the classical “similarity surface” also with other similarity measures such as the mutual information. Our experiments were performed on some multi-sensor pairs of medium resolution (Landsat, ASTER and SPOT) and high spatial resolution images (IKONOS, ALOS-PRISM and orthophotos). The performance obtained with each of the considered similarity measures was evaluated through a set of measures recently proposed, which allow for an objective evaluation of the geometric correction process quality.

TOPIC: Image processing and pattern recognition

ALTERNATIVE TOPIC: Change detection and process modelling