Similarity Transformation Parameters Recovery based on Radon Transform. Application in Image Registration and Object Recognition

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Abstract: The Radon transform, since its introduction in the beginning of the last century, has been studied deeply and applied by researchers in a great number of applications, especially in the biomedical imaging fields. By using the Radon transform properties, the issue is to recover the transformation parameters regarding the rotation, scaling and translation, by handling only the image projections assuming no access to the spatial domain of the image. This paper proposes an algorithm using an extended version of the Radon transform to recover such parameters relating to two unknown images, directly from their projection data. Especially, our approach deals with the problem of the estimation accuracy of the rotation angle and its finding in one step instead of two steps as it is reported in the literature. This method may be applied in image registration as well in object recognition. The results are, for the first time, exploited in object recognition where comparison with powerful descriptors shows the outstanding performance of the proposed paradigm. Moreover, the influence of additive noise on registration and recognition experiments is discussed and shows the efficiency of the method to reduce the effect of the noise.

Keywords : radon transform, 2?-Based Radon transform, Rotation, Scaling and translation transforms, Parameters recovery algorithm, Additive image noise