GLOBAL JOURNAL OF ENGINEERING SCIENCE AND RESEARCHES

STATISTICAL PATTERN RECOGNITION IN MULTISTAGE DATA FUSION USING UNIFORM DISTRIBUTION MAXIMAL INTEGRATION TECHNIQUE

Reza Khajeh Mohammad Lou
Department of Electrical Engineering, Miandoab Branch, Islamic Azad University, Miandoab, Iran
reza.mohammadlou63@gmail.com

ABSTRACT

The main contributions of Information theoretic approach for ISAR image focusing and multistage data fusion is a new generalized divergence measure, the divergence. We prove the convexity of this divergence measure, derive its maximum value, and analyze its upper bounds in terms of the Bayes error in statistical pattern recognition. Based on the divergence, we propose a new approach to the problem of ISAR image registration. This is accomplished by using the divergence to measure the statistical dependence between consecutive ISAR image frames, which is maximal if the images are geometrically aligned.

Keywords: ISAR, divergence, convexity, Bayes etc.

I. INTRODUCTION

Based on the estimated motion parameters, translational motion compensation (TMC), and rotational motion compensation (RMC) can be used to generate a focused image of the target. In order to integrate complementary information from multi-sensor data so that the fused images are more suitable for visual perception and recognition, we derive a new information theoretic fusion scheme in a multiscale framework [1-3]. We formulate the image fusion as an optimization problem. We have successfully tested the new scheme on fusion of multi-sensor (low-light-television and forward-looking-infrared), multi-modality (CT and MRI), multi-spectral, and multifocus images. Quantitative performance measure for fusion of synthetic test images and visual evaluation for real multi-sensor image fusion demonstrates that the presented algorithm clearly [4-7] outperforms pixel averaging and wavelet based maximum selection fusion schemes. Multistage shape enhancement and shape analysis As a pre-processing step for the shapes extracted from ISAR images, we propose a novel non-linear smoothness-constrained filtering technique. The key idea is to separate the signal portion from its measured data, and to preserve the original smoothness property of the underlying shape. Using notations of H¨older spaces and H¨older exponent, we establish results of signal regularity measurement with wavelets. To detect the singular points of signal from measured data, we turned to curve shortening and derived the partial differential equations that characterize the evolution of curvature.

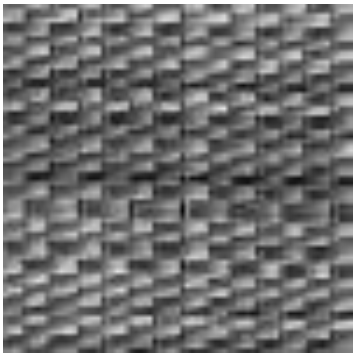
II. METHODS AND MATERIALS

We conclude that is best for the ideal case of registration, if one can exactly model the misalignment between two images. It is, however, also the least robust selection, as it tends to make all the same as the uniform distribution [4], if it is not degenerate distribution. Then the divergence would be zero for the whole transformation parameter space as in case where the adapted transformation group cannot completely model the misalignment. On the other hand, it is the most robust choice, in spite of also resulting in the least sharp peak. It would suggest formulating a cost function over and solving its optimal value by minimizing that cost function. The difficulty is to find such a cost function that it is convex in and also reasonable for a specific application. Registration in the presence of local variation For the purpose of ISAR image focusing, local variations may be presented in the consecutive image frames due to the target motion and other perturbations. If such local variations are severe, a global transform and a local deformation may be used together to aid the divergence to identify the registration point. Even though in the motion compensation stage, the local transformation is not required. The local deformation would also help to determine the maximal integration angle, since it indicates the projection variation of target reflectivity density onto the imaging plane. Given two ISAR image frames f and f, an estimate of target motion parameters is then given by where it is an induced similarity measure based on divergence of order weight is a local deformation. A good candidate for such a local deformation is a thin-plate. The thin-plate spline is a natural interpolating function for data in two

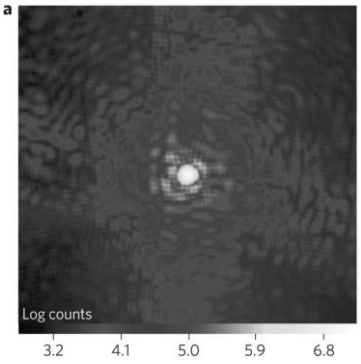
dimensions and plays a similar role to the natural cubic spline in the one dimensional case. It minimizes the total bending energy of all possible interpolation functions. Implementation of a thin-plate spline interpolation is straight forward. The difficulty could be a robust scheme to select two sets of feature landmarks to characterize the target in both images. These two sets of landmarks are necessary to calculate the parameters in a thin-plate spline interpolation. Segmentation techniques to construct decision maps in image fusion improving the segmentation techniques to construct a decision map is crucial for musicale image fusion. I would suggest applying region growing methods to segment the selection map in the future research. Region growing methods are well suited for the selection maps, where borders are difficult to detect.

III. RESULTS

A new singularity detection method by tracking the curvature extreme across scales is proposed and a multistage curvature mask is generated. Then we proceed to project measured data into the wavelet domain and suppress wavelet coefficients by this multistage curvature mask. For a piecewise smooth signal, it was shown that filtering by this curvature mask is equivalent to keeping the signal Pointwise exponents at the singular points of the underlying signal, and to lifting its smoothness at all the remaining points. Figure 1 illustrate (a) Texture of image (b) Radon Transformed of image (a).To identify a shape independently of its registration information, we finally propose matching two configurations by regression, using notations of general shape spaces and procrustean distances. Computation cost used to be a problem, however, a recently developed fast watershed algorithm was found to be several hundreds of times faster than several classical algorithms. Image segmented by region growing methods sometimes contain either too many regions (under-growing) or too few regions (over-growing) as a result of non-optimal parameter setting. To improve classification results, a variety of post-processors has been developed. I would also suggest investigating these post-processors to fine tune the resulting decision map. A well-constructed decision map could reduce the artifacts introduced by switching source wavelet coefficients and hence improve the quality of the fusion result. In particular, we study the generalized Euclidean and affine matching by estimating a mean configuration in two dimensions. Simulation results show that matching by way of a mean configuration is more robust than matching target shapes directly. We provide some discussions and suggestions for extending the research presented in this paper. Optimal choice of exponential order for the Jensen-R´enyi divergence A large fraction of our effort was focused on searching for a spatial transformation such that a similarity metric achieves its maximum between two images taken at different times, from different sensors, or from different viewpoints. Figure 2 shows Transformed of Statistical pattern recognition. We propose a general framework based on the divergence for the purpose of image registration and establish the optimal choice of weight vector. For the selection of exponential order there is a tradeoff between optimality and practicality.



(a) Texture image



(b) Radon transformed

Figure 1 (a) Texture of image (b) Radon Transformed of image (a)

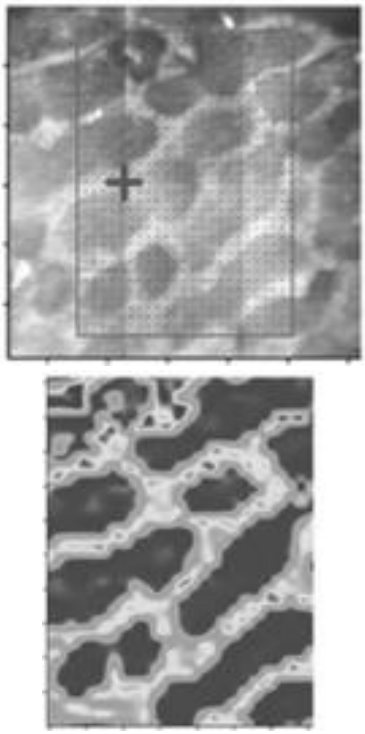


Figure 2 Transformed of Statistical pattern recognition

IV. CONCLUSION

Compared to the mutual information based registration techniques, the divergence provides an ability to control the measurement sensitivity of the joint histogram. This flexibility results in more robust registration in the presence of noise. Maximization of the divergence is a very general criterion, because no assumptions are made in regards to the nature of this dependence and no limiting constraints are imposed on image contents. Simulation results demonstrate that our approach achieves an effective estimation of the target motion automatically without any prior feature extraction.

V. *REFERENCES*

[1] *Sedghi T., "A Fast and Effective Model for cyclic Analysis and its application in classification" Arabian Journal for Science and Engineering Vol. 38 October 2012.*

[2] *A. El-Fallah and G. Ford, "The evolution of mean curvature in image processing," Proc. IEEE Int. Conf. on Image Processing, pp. 298–303, 2004.*

[3] *M. Cage and R. S. Hamilton, "The heat equation shrinking convex plane curves," Journal of Differential Geometry, vol. 23, pp. 69–96, 1986. [88] J. Canny, "A computational approach to edge detection," IEEE Trans. Pattern Analysis, and Machine Intelligence, vol. 8, pp. 679–698, 2006.*

[4] *A. Witkin, "Scale space filtering," Proc. 8th Int. Joint Conf. Art. Intell. (West Germanny), pp. 1019–1022, 2013.*

[5] *D. Marr and E. Hildreth, "Theory of edge detection," Proc. Roy. Soc. Lon., vol. 207, pp. 187–217, 2010.*

[6] *M. Fakheri, T. Sedghi, M. Gh. Shayesteh, M. C. Amirani, "A Framework for Image Retrieval Using Machine Learning and Statistical Similarity Matching Techniques" Image Processing, IET, Vol. 7, Issue: 1, 1–11, 2013.*

[7] *A. Rosenfeld and M. Thurston, "Edge and curve detection for visual scene analysis," IEEE Trans. Computing, vol. C-20, pp. 562–569, 2011.*