1145-VN-1618 **Zicong Zhou*** (zicong.zhou@mavs.uta.edu), 411 South Nedderman, Box 19408, Arlington, TX 76019-0408, and **Guojun Liao**. *Averaging images through averaging Diffeomorphisms.*

Given some similar images, apply our method for Image Registration [New Development of Non-rigid Registration, Hsiao, et al, 2013], then same number of diffeomorphic transformations can be constructed between the given similar images. A geometrical connection from constructed diffeomorphic transformations, in terms of the Jacobian determinant (which reflects local changes in cell size) and curl-vector (which reflects local rotation), to the given images has been computationally realized, which allows us to average images by averaging the constructed diffeomorphic transformations [New method of averaging diffeomorphisms based on Jacobian determinant and curl-vector, Chen, et al, 2016]. Also, a uniqueness problem has been theoretically discussed in [Uniqueness of Transformation based on Jacobian Determinant and curl-Vector, Zhou, et al, 2017], which indicates the averaged diffeomorphic transformation is unique. In this work, we integrate the above components to build a novel approach to average the given similar images. An algorithm is provided for demonstrating the proposed approach. Numerical examples are displayed in 2D case. (Received September 25, 2018)