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Dana C Paquin* (dpaquin@stanford.edu), 718 Old San Francisco Road, Apartment 355, Sunnyvale, CA 94086, **Doron Levy**, CA , and **Lei Xing**, CA. *Hybrid Multiscale Landmark and Deformable Image Registration*.

A hybrid image registration algorithm is presented based on combining landmark and deformable registration techniques and a multiscale decomposition of the images to be registered. Image registration is the process of determining the optimal spatial transformation that maps one image to another. Image registration is necessary, for example, when images of the same object are taken at different times, from different imaging devices, or from different perspectives. Applications of image registration include image-guided radiation therapy (IGRT), tumor detection, computer vision, and pattern recognition.

The images are decomposed into coarse and fine scales, using the hierarchical multiscale image decomposition of E. Tadmor, S. Nezzar, and L. Vese in *A multiscale image representation using hierarchical (BV, L^2) decompositions*, Multiscale Modeling and Simulations, vol. 2, no. 4, pp. 554-579, 2004. The coarse scales are then registered with one another using landmark-based registration, and the resulting transformation is used as the starting point for a more refined B-spline deformable registration. Numerous experiments in 2 and 3 dimensions are presented to demonstrate the accuracy, efficiency, and robustness of the method. (Received September 22, 2006)