1125-62-1596 **Matthew Pietrosanu*** (pietrosa@ualberta.ca), Edmonton, Alberta , Canada, and **Giseon Heo** (gheo@ualberta.ca). *Pseudo-Multidimensional Persistent Homology for Landmark-Free Analysis of Point-Cloud Datasets for Medical Imaging and the Determination of Manual Segmentation Reliability.*

Shape comparison, particularly of "soft" objects such as skin-covered or internal structures of the human body, is a difficult problem relevant to computer vision, rehabilitation medicine, dentistry/orthodontics, and beyond, and is commonly employed in the screening, diagnosis, and management of physical deformities. Current methods, however, are often qualitative, rely on visual inspection, or require the manual selection of landmark points, and are thus subjectively influenced by the choice of reviewer.

Seeking to improve upon current methods, we apply persistent homology, a technique in computational topology useful for recovering the underlying topology of a point-cloud dataset. In particular, we extend the standard one-variable distance filtration by incorporating point-cloud curvature estimates to distinguish between otherwise topologically-equivalent manifolds. We present this new technique for *pseudo-multidimensional persistence* as robust against landmark selection and the variability inherent in manual segmentation. Furthermore, we demonstrate an application of this technique to the comparison of maxillary sinuses between multiple patients and to the determination of the reliability of repeated manual segmentations performed by a particular reviewer. (Received September 18, 2016)